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Minding translation

Con la traducción en mente

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UNIVERSITAT JAUME·I

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This special issue includes a selection of papers from the AIETI6 conference (January, 2013) that focused on cognitive and psycholinguistic approaches to Translation Process Research. Out of 25 papers presented, 11 (44%) have been finally published in this issue.

Este número especial contiene una selección de las ponencias de la Conferencia AIETI6 (enero de 2013) centradas en los enfoques cognitivos y psicolingüísticos dirigidos a la investigación en el proceso de traducción. De 25 ponencias que se presentaron, se han publicado finalmente 11 (44%) en este número.

MAIN INSTRUCTIONS FOR AUTHORS

MonTI publishes one yearly issue. The contributions, which should be original and unpublished, will be strictly subjected to the following norms:

1. Maximum length: 10,000 words, including works cited.

2. Font and spacing: Font: Times New Roman; Size: 11 pt.; Line spacing: single.

3. Language options: Catalan, English, French, German or Spanish.

4. The title page should include the following information in this same order:

Title of the article, followed by a blank line. An English translation of the title should be included if this is not in English. Author(s). <e-mail>. Affiliation, followed by a blank line. Abstracts in English and in any of the other four languages. (Maximum length: 150 words each). Keywords: up to five subject headings in each of the same two languages.

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8. After requesting the editors' approval and receiving the reports from the referees, the journal will provide the authors with a reasoned statement regarding the acceptance of their contributions.

PRINCIPALES NORMAS DE REDACCIÓN

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1. Extensión máxima: 10.000 palabras, incluida la bibliografía.

2. Tipo de letra: Times New Roman. Tamaño de letra: 11 pt. Interlineado: sencillo.

3. Lenguas vehiculares: alemán, castellano, catalán, francés, inglés o italiano.

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Título del trabajo, seguido de una línea en blanco de separación. Deberá aportarse, además, la traducción del título al inglés, si el artículo no está escrito en esta lengua. Autor(es). <Correo electrónico>. Centro de procedencia, seguido de una línea en blanco de separación. Resúmenes en inglés y en otra de las lenguas vehiculares (extensión máxima de 150 palabras cada uno). Palabras clave: se aportarán cinco términos en los dos idiomas de los resúmenes.

5. Remisión a la Bibliografía. Se seguirá una de las principales variantes del estilo Chicago de citas: Apellido(s) del autor (año: páginas) o (Apellido(s) del autor año: páginas).

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En la página web de *MonTI* (http://dti.ua.es/es/monti/normas-de-redaccion.html) se puede acceder a numerosos ejemplos de cada una de las variantes de referencia bibliográfica.

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ÍNDICE

UNA INSTANTÁNEA MOVIDA
DE LA INVESTIGACIÓN
EN PROCESOS DE TRADUCCIÓN

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Resumen

Este artículo brinda un panorama de los avances en las investigaciones sobre los procesos de traducción e interpretación desde enfoques cognitivos y psicolingüísticos entre 2006 y 2013, con el fin de contextualizar las restantes contribuciones a este monográfico. Ofrece algunas cifras sobre publicaciones e iniciativas y luego se centra en la competencia y la pericia, la redacción, la carga mental y la complejidad lingüística, los avances en los métodos de investigación, la revisión y la metacognición, la cognición más allá del pensamiento racional y consciente, y la recontextualización de la investigación empírica. Para concluir se ofrecen algunas notas sobre las tendencias generales en el área, en las publicaciones de la muestra y en el campo de la edición académica.

Abstract

This article offers an overview of some advances in cognitive and psycholinguistic approaches to translation and interpreting process research between 2006 and 2013, in order to provide context to the contributions to this volume. It provides some figures on publications and initiatives and then focuses on competence and expertise; writing; mental load and linguistic complexity; advances in research methods; revision and metacognition; cognition beyond conscious, rational thought; and recontextualized empirical research. The article closes with some notes on the overall tendencies in the area, in the sample of contributions, and in publishing.

Palabras clave: Traducción e Interpretación. Cognición. Proceso. Investigación empírica. Metodología.

En 2006, los estudiosos de la traducción y la interpretación acudieron a Liubliana para asistir a un congreso de la EST con el lema *Why Translation Studies Matters* ('¿por qué importan los Estudios de Traducción e Interpretación?') donde ofrecieron muchas respuestas parciales a la pregunta. Federici (2013: 106) resume esas respuestas al afirmar que "La traducción importa más que nunca porque los investigadores están demostrando su incidencia en muchas áreas novedosas a las que se había prestado poca atención".[1] Esto atañe a todas las vertientes de los Estudios de Traducción e Interpretación (ETI), pero quizás especialmente a un cúmulo de tendencias muy imbricadas, que estudian los aspectos mentales de la traducción y la interpretación desde perspectivas cognitivas y psicolingüísticas y también a las conocidas como *Translation Process Research* o 'investigación de los procesos de traducción'. No son lo mismo, pero aquí voy a usar simplemente TPR (por el acrónimo inglés), con una cierta imprecisión, para referirme a todas esas áreas, a menudo superpuestas y quizás enmarañadas.

Este texto persigue dos objetivos. En primer lugar, y principalmente, busca contextualizar los artículos de este monográfico. En segundo lugar, aspira a ofrecer una panorámica de los avances en TPR. Por fortuna, pero también injustamente, el primer objetivo restringe el segundo, porque obliga a ignorar un número similar de temas, sencillamente porque los textos de este volumen no aluden a ellos directamente, como en el caso de la lectura. Incluso así, sería literalmente imposible repasar todas las publicaciones relativas a TPR en un artículo. Así, he escogido el período de los últimos ocho años, comenzando en 2006, cuando se formuló la pregunta. Al hacerlo, inevitablemente quedan al margen muchos textos importantes, a veces trascendentales en la evolución del área. Sin embargo, el período tiene una duración similar a la que necesita un estudiante para completar sus estudios de posgrado (máster y doctorado) y empezar a publicar. Como el motor tras muchos esfuerzos de investigación

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1. "Translation matters now more than ever before because research is uncovering alternative, previously under-researched areas in which translating has an impact" (todas las traducciones de este texto son mías).

son esos estudiantes que aspiran a doctorarse, debería apreciarse una cierta progresión.

Además, me he esforzado en restringir el repaso a capítulos de libros antológicos y a artículos en revistas con índice de impacto. Este no es el lugar para abordar cómo se determina la calidad de la investigación, cómo se clasifican las revistas de traducción e interpretación, ni cómo los libros a menudo alcanzan niveles más altos de calidad gracias a la selección coherente y cuidadosa de los autores y a un proceso de edición riguroso. Baste decir que, de acuerdo a los criterios generalmente aceptados, la calidad de la investigación que se presenta en estas páginas se puede considerar razonablemente buena. En definitiva, lo que este texto ofrece es una instantánea muy parcial de algunas tendencias de investigación interrelacionadas y en constante movimiento, por lo que la fotografía, naturalmente, saldrá movida.

Las siguientes secciones se centran sucesivamente en la competencia y la pericia (2), la carga mental y la complejidad lingüística (3), los avances en los métodos de investigación (4), la redacción (5), la revisión y la metacognición (6), la cognición más allá del pensamiento racional consciente (7) y la recontextualización de la investigación (8). Cierra el artículo un corolario que ofrece la foto movida de los progresos generales en el área (9). Comencemos por echar un vistazo a algunas iniciativas y cifras sobre publicaciones relativas a TPR en el período (1).

1. Una explosión de iniciativas y publicaciones

Entre 2006 y 2013 se publicaron al menos 11 libros antológicos sobre TPR, obra de múltiples autores, que suman más de 100 capítulos:

- 2007. *Interpreting Studies and Beyond* (Pöchhacker, Jakobsen & Mees, eds.)
- 2008. *Looking at eyes. Eye-Tracking Studies of Reading and Translation Processing.* (Göpferich, Jakobsen & Mees, eds.)
- 2009: *Behind the Mind: Methods, Models & Results in Translation Process Research* (Göpferich, Jakobsen & Mees, eds.)
- 2009. *Efforts and Models in Interpreting and Translation Research* (Hansen, Chesterman & Gerzymisch-Arbogast, eds.)
- 2009. *Methodology, Technology and Innovation in Translation Process Research* (Mees, Alves & Göpferich, eds.)
- 2010. *New Approaches in Translation Process Research* (Alves, Mees & Göpferich, eds.)
- 2010. *Translation and Cognition* (Shreve & Angelone, eds.)

- 2011. *Advances in Interpreting Research. Inquiry in Action* (Nicodemus & Swabey, eds.)
- 2011. *Cognitive Explorations of Translation* (O'Brien, ed.)
- 2011. *Methods and Strategies of Process Research: Integrative Approaches in Translation Studies* (Alvstad, Hild & Tiselius, eds.)
- 2013. *Cognitive Linguistics and Translation. Advances in some theoretical models and applications* (Rojo & Ibarretxe-Antuñano, eds.)

La mayoría de libros apareció en colecciones de las editoriales John Benjamins y Samfundslitteratur. Varias revistas publicaron números especiales, como *Across Languages & Cultures* 12/2 (2011), *Target* 25/1 (2013) y *Translation and Interpreting Studies* 8/2 (2013). Otras revistas dedicaron secciones enteras a TPR, como el *Journal of Translation Studies* 10/1 (2007), *Hermes* 42 (2009) y el *Journal of Writing Research* 5/1 (2013). En el período 2006–2013, los números ordinarios de las revistas de traducción e interpretación con índice de impacto ofrecían a menudo artículos sobre esta área, que suman al menos 200 (tabla 1).[2]

Las cantidades que obran en la tabla 1 lógicamente conllevan una selección particular. Otros investigadores del área llegarían a cantidades ligeramente distintas, pero el objetivo no es ofrecer un cómputo preciso y exhaustivo, sino más bien un panorama general de tendencias.[3] Y la tendencia sería probablemente idéntica en cualquier caso: la de un crecimiento constante tanto en cantidad como en calidad. En cuanto a la cantidad, si a los anteriores añadimos las publicaciones sobre TPR de todas las revistas de la lista de la EST (más de cien), las aparecidas en publicaciones periódicas no específicas de traducción e interpretación y los libros obra de un solo investigador (monografías, tesis publicadas), la producción relativa a TPR puede haber doblado la suma final de la tabla 1. En cuanto a la calidad de la investigación, en los últimos años ha sido una preocupación constante de los ETI, en general, y de TPR en particular. Por ejemplo, *Cadernos de Traduçao* 1/17 (2006) y *The Interpreter & Translator Trainer* 3/1 (2009) dedicaron monográficos a

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2. Revistas con índice SJR según la lista de la EST en línea (el índice JCR sólo incluye *Interpreting* y *Target*). *Translation & Literature* no produjo resultado alguno. Los datos de *New Voices in Translation Studies* sólo cubren artículos completos, no resúmenes de tesis doctorales (1 en 2007; 1 en 2011, 2 en 2012, 5 en 2013). Los datos de *trans-kom* se ofrecen como ilustración de una revista digital abierta no indexada. Las cifras sobre capítulos de libro incluyen las contribuciones a las actas de congresos de la EST.
3. Por ejemplo, Javier Franco (comunicación personal) me hace notar que, adoptando mis propios criterios, en BITRA constan 5 libros y 18 artículos más. A fecha de hoy, BITRA recoge 514 textos relativos a TPR durante este período.

la formación de investigadores (empíricos) y desde 2006 han visto la luz al menos cuatro libros sobre metodología de la investigación: Göpferich (2008), Hale & Napier (2013), Rojo (2013) y Saldanha & O'Brien (2013). Las escuelas de verano de doctorado de la UAB se centraron especialmente en TPR en 2010, 2011 y 2012 y la CBS de Copenhague ofrece cursos veraniegos monográficos desde 2011.

revista	año	06	07	08	09	10	11	12	13	total
Meta		2	9	4	5	1	2	10	0	33
Interpreting		4	6	1	1	2	9	2	2	27
Target		3	2	1	1	2	2	4	*11	26
Across Languages & Cultures		2	3	3	0	2	*7	4	0	21
TIS		5	1	3	0	1	1	0	*8	19
Perspectives		1	2	2	1	0	2	5	3	16
The Translator		1	2	2	0	1	2	2	1	11
Hermes		0	0	0	3	6	0	1	0	10
TTR		1	2	3	0	0	3	0	0	9
The Interp. & Trans. Trainer		0	0	0	7	1	0	0	1	9
Babel		0	0	1	3	1	0	1	2	8
Machine Translation		1	1	0	1	1	3	0	0	7
New Voices in TS		0	0	0	1	0	0	0	2	3
Translation Studies		0	0	1	0	0	0	0	0	1
total artículos/año		20	28	21	23	18	31	29	30	200
trans-kom		0	0	4	1	1	0	3	1	10
capítulos		0	8	7	23	23	28	0	18	107
Total de publicaciones		20	36	32	47	42	59	32	49	317

Table 1. Artículos sobre TPR en revistas de traducción e interpretación con índice SJR y en algunos libros antológicos, 2006–2013
(* números monográficos de revistas)

Por todo lo anterior, no puede sorprender que nuestra área haya cobrado mayor presencia. Las actas de los congresos de la EST ofrecen un número relativamente importante de artículos sobre TPR y todos los congresos de AIETI, ATISA e IATIS del período le han dedicado paneles y talleres, como también el congreso «Research Models in Translation Studies II» (Manchester, 2011).

También hubo sesiones sobre TPR en otros congresos internacionales, como AILA (Essen, 2008), AESLA (Salamanca, 2011), el XX Simposio Internacional sobre Lingüística Teórica y Aplicada (Tesalónica, 2011) y el de ABRAPT (Florianópolis, 2013). El creciente interés general por TPR se evidencia también en que Miriam Shlesinger ostentó la cátedra CETRA en 2007 y que en este 2014 ha recaído en Arnt Lykke Jakobsen. Hubo también otros encuentros, más centrados y reducidos. La CBS organizó al menos dos simposios, sobre investigación de la pericia en traducción y la post-edición en 2012 y sobre la traducción a vista y el seguimiento de movimientos oculares en la traducción en 2013, y la Universidad de Aston organizó dos encuentros virtuales en 2011 y 2013.

Este fue el contexto en el que Susanne Göpferich convocó el primer simposio sobre TPR en la Universidad de Graz (Austria) en 2009, donde investigadores de nueve países presentamos 16 trabajos que después se publicarían en diversos medios. En 2011, Göpferich convocó el segundo (TPRW2) en la Universidad de Giessen (Alemania), donde se presentaron 15 trabajos de investigadores de 11 países, que se publicaron de diversos modos también. El TPRW3 lo organizó el grupo de investigación PETRA en Puerto de Mogán (Gran Canaria) en 2013. Como en ediciones anteriores, el número de asistentes estaba entre 30 y 40 y la mitad presentaron sus trabajos en él. En este caso, el simposio era formalmente parte del VI congreso internacional de la AIETI y algunos asistentes al TPRW3 presentaron sus ponencias en alguno de los cinco paneles de la conferencia general. Así, este volumen incluye una selección de las ponencias sobre TPR presentadas en AIETI6 y todos sus autores asistieron al simposio TPRW3. Veamos de qué hablamos. En primer lugar, sobre la competencia y la pericia, quizás los conceptos de TPR más conocidos en los ETI.

2. Competencia y pericia

Estos conceptos están estrechamente entretejidos en la bibliografía, y muchos investigadores usan uno u otro o incluso los dos para aludir a lo que quiera que sea que hace que algunas personas traduzcan o interpreten bien. La definición más conocida de competencia es de PACTE: «el sistema subyacente de conocimientos y habilidades necesarios para traducir».[4] Lesznyák (2007) reseña y clasifica nueve modelos conocidos de competencia y afirma que ninguno es intrínsecamente mejor que los demás, y que la preferencia por uno

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4. «the underlying system of knowledge and skills needed to be able to translate».

u otro depende de los objetivos del investigador o el formador. Para complicar más las cosas, los investigadores pueden intencionada o inadvertidamente usar el término con distintas interpretaciones. A pesar de ello, algunos modelos de competencia, como el de PACTE, destacan porque están basados en la investigación empírica, algo que también destaca Lesznyák. Curiosamente, algunos de los modelos que Lesznyák critica o considera extemporáneos —y que Pym (2003) clasifica en la categoría «competencia, no hay tal», parecen más próximos a la tradición de investigación sobre la pericia (conocimiento experto).

La pericia es un constructo de la investigación en psicología cognitiva para aprehender el abanico potencial de factores, características y hábitos personales, motivacionales y cognitivos que confluyen para hacer posible un rendimiento superior constante. Determinar qué es un rendimiento superior constante en traducción e interpretación o cuáles son las características compartidas por traductores e intérpretes expertos no es nada fácil. En cualquier caso, la pericia en traducción e interpretación no tiene un contenido preciso, porque su naturaleza depende de los detalles de la tarea y las circunstancias del entorno. Las aproximaciones más habituales a la competencia y a la pericia coinciden en considerarlas un cúmulo de capacidades cognitivas especializadas, y tienden a diferir en sus marcos de referencia, su coherencia interna, la realidad psicológica de sus constructos derivados y la posibilidad de operativizarlos.

Comencemos por la pericia en interpretación (panorama en Liu 2009). En nuestro tramo temporal, Köpke & Nespoulous (2006) probaron una batería de pruebas de memoria en intérpretes expertos y en formación y en dos grupos de control, con especial incidencia en capacidades semánticas y fonológicas. En algunas tareas de memoria no hallaron diferencias entre intérpretes y los grupos de control, mientras que en alguna otra los estudiantes superaban ligeramente a los expertos. Sí hallaron diferencias significativas entre los grupos en áreas que apuntan a que el ejecutivo central o la atención focalizada desempeñan un papel crucial en la interpretación.[5] Köpke & Nespoulous formulan la hipótesis de que, una vez alcanzado un cierto nivel de pericia, las muy especializadas destrezas necesarias para la interpretación simultánea ya no dependen de la memoria de trabajo, sino de rutinas mentales específicas o de esquemas muy especializados.

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5. En el modelo de memoria de Baddeley, el *ejecutivo central* en un sistema atencional flexible que coordina, distribuye y regula los recursos cognitivos. Es responsable de aspectos como planificar la actividad, ligar informaciones dispersas, cambiar de tareas, inhibir las respuestas automáticas y focalizar la atención.

Tiselius & Jenset (2011) estudiaron si había diferencias al interpretar en cuanto a los problemas de procesamiento identificados, las actividades de control mental y las estrategias de interpretación en tres tríos de sujetos: uno sin experiencia (SE), otro con poca experiencia (PE) y otro con una muy larga experiencia (ME). En problemas de procesamiento, el grupo SE tuvo más dificultades con la comprensión y la simultaneización; el grupo PE, con encontrar equivalentes, y el grupo ME, con la velocidad del orador y el procesamiento sintáctico. En actividades de control mental, el grupo ME mostró mayor control que los demás en la precisión antes de la enunciación, y el grupo PE gestionó mejor los tiempos que el grupo SE. En cuanto a las estrategias, el grupo ME prefería la sobregeneralización, mientras que el grupo SE se inclinaba por soluciones creativas. Todas las diferencias alcanzaron validez estadística. Las interpretaciones se evaluaron en cuanto a informatividad e inteligibilidad. En informatividad, apreciaron que aumentaba linealmente con la experiencia mientras que en inteligibilidad, una vez alcanzado un mínimo de experiencia, no había mejoras. Tiselius & Jenset sugieren que la capacidad de control y la precisión en la enunciación podrían usarse como indicadores del nivel de pericia.

En traducción, Jääskeläinen (2010) revisa y reinterpreta estudios empíricos de TPR a la luz de la teoría de la pericia. Recuerda que, en estudios tempranos, a veces los estudiantes y los bilingües sin formación específica obtenían mejores resultados que los profesionales. Ello puede deberse a que no todos los profesionales son expertos, pero también a la especialidad de los sujetos (que se define de modo distinto en la investigación y en la profesión) y a que los que trabajan constantemente en los mismos entornos podrían estancarse y convertirse en *expertos rutinarios* (que solo rinden muy bien en esos entornos habituales). Otras razones que podrían explicar los malos resultados de los profesionales en las pruebas son la inflexibilidad, el exceso de confianza y los sesgos mentales. La automatización, considerada característica de la pericia, no facilita necesariamente la tarea en los expertos, pues a menudo dedican los recursos cognitivos liberados a otros aspectos y dificultades de la tarea. Eso sí, los expertos parecen disponer de una gran capacidad de control mental.

Dragsted, Hansen & Sørensen (2009) parecen confirmar algunos extremos del análisis de Jääskeläinen. Estudiaron el comportamiento de tres traductores expertos con distintos grados de experiencia con programas de reconocimiento de voz al efectuar tres tareas en rigurosas circunstancias de laboratorio: traducción a la vista, traducción a la vista con reconocimiento de voz y traducción escrita. Solo el traductor acostumbrado a usar el programa de reconocimiento de voz difería de los otros dos en el tiempo empleado y

en su comportamiento, en general. Los autores sugieren que el control y corrección constantes de la producción entrañan mayor esfuerzo que la propia redacción del TM.

En cuanto a la investigación de la competencia, Alves & Gonçalves (2007) parten del modelo de PACTE, de la Teoría de la Relevancia y de aproximaciones conexionistas a la cognición para formular una *competencia general de traducción* y una *competencia específica de traducción*. La general cubriría todo conocimiento, destreza y estrategia que domina un traductor y conduce a un rendimiento adecuado. La específica sería directamente proporcional a la producción de efectos contextuales generados por los binomios de unidades LO-LM, y también directamente proporcional a la superposición de esos efectos, esto es, a la maximización de la semejanza interpretativa. Desde su perspectiva, la competencia no es una facultad o componente de la mente del traductor, sino una configuración particular que se deriva gradualmente de las experiencias del traductor.

Göpferich (2009) propone un modelo de competencia como marco para su proyecto de investigación longitudinal TransComp, que comparaba a estudiantes de traducción con profesionales. A la vista de los resultados provisionales, Göpferich et al. (2011) subrayan problemas como los derivados de asumir ciertos grados de competencia en los grupos que se compara. Göpferich (2013) aplica la Teoría de los Sistemas Dinámicos para interpretar los resultados del proyecto TransComp en torno a la subcompetencia estratégica. En casi todas las categorías de toma de decisiones, los estudiantes obtuvieron mucho peores resultados que los profesionales. En particular, los profesionales dedicaban menos esfuerzo a las tareas rutinarias pero obtenían mejores resultados. No obstante, en las tareas de solución de problemas, que entrañan mayor carga mental (vease sección 4), los profesionales resultaron solo ligeramente mejores que los estudiantes. En la perspectiva longitudinal, los estudiantes no mostraron progresos en los cuatro primeros semestres, ni en estrategias de solución de problemas ni en creatividad. Por otro lado, desde la perspectiva de las variables en consideración, los profesionales no parecían haber alcanzado la pericia, que Göpferich considera el nivel más alto de competencia.

El grupo PACTE ha investigado concienzudamente su modelo de competencia, contrastando el comportamiento y los productos de 35 traductores profesionales y 24 docentes de lenguas. PACTE (2008) se centra en la subcompetencia «conocimientos de traducción». Para medirla, desarrolló un *índice de dinamismo de conocimientos de traducción,* derivado de clasificar y valorar las respuestas a un cuestionario sobre las creencias y conocimientos

de los sujetos sobre traducción. La aproximación considera dos polos: una concepción dinámica (interpretativa, textual, comunicativa, funcionalista) y una concepción estática (lingüística, literalista). Los traductores mostraron una aproximación mucho más dinámica a los métodos de traducción que los docentes de lenguas. PACTE (2008) también estudió la eficacia del proceso de traducción, como indicador de la subcompetencia estratégica. No se hallaron diferencias entre los grupos al completo, aunque un análisis posterior de los 15 sujetos de cada grupo con mejores resultados evidenció mejoras significativas en favor de los traductores.

En el modelo de PACTE, la toma de decisiones entraña activar subcompetencias mientras se ejecuta la tarea, por lo que refleja las subcompetencias instrumental y estratégica. PACTE (2009) estudió la aceptabilidad de las soluciones de traducción y la toma de decisiones. Al traducir a su L1, los traductores generalmente obtuvieron mejores resultados que los docentes de lenguas. Al traducir a la L2 los traductores seguían siendo mejores, pero las diferencias no eran significativas. Solo un 26% de los traductores con los mejores rendimientos en traducción directa obtuvieron valores comparables en la traducción inversa. PACTE (2009) también estudió las secuencias de acciones, donde distinguen *apoyo interno* (uso de los propios recursos mentales), *apoyo externo* (uso de fuentes de referencia y documentación) y dos categorías intermedias. Los docentes de lenguas tienden a usar más el apoyo interno y los traductores tienden a consultar fuentes pero tomar decisiones sobre la base de sus propios recursos mentales. Traducir hacia la lengua extranjera fomentó en ambos grupos muchas más decisiones basadas en las fuentes externas.

PACTE (2011a) halló que los problemas de traducción identificados varían mucho de sujeto en sujeto y que la direccionalidad incide en la definición de la dificultad de los problemas de traducción. Por otro lado, no hallaron relación entre la percepción de los sujetos de la dificultad global de un TO y la aceptabilidad de sus soluciones a problemas de traducción. PACTE (2011a) también concluye que la caracterización de los problemas de traducción no parece un rasgo inherente a la competencia. Aquí, PACTE presenta sus resultados sobre la adquisición de conocimientos declarativos de traducción.

3. La redacción

Los avances en la estilística forense han demostrado que redactores y oradores muestran ciertas regularidades idiosincrásicas. Así ocurre también con los traductores e intérpretes que, por ejemplo, pueden preferir ciertos patrones léxico-gramaticales y una variedad léxica menor o mayor (Shlesinger 2009). Henriksen (2007) muestra que los intérpretes de la UE adquieren un acervo

variable de lenguaje formulaico en su proceso de socialización profesional y que a menudo ese acervo se correlaciona con los juicios de valor de terceros sobre su rendimiento.

Comparar la redacción monolingüe con la traducción era un tema pendiente en TPR, que el registro de teclado finalmente ha hecho posible. Los segmentos de texto procesados de una vez, normalmente flanqueados por pausas, se consideran a menudo unidades cognitivas o de procesamiento. Por ello, las pausas se suelen interpretar como indicadores potenciales de actividad mental relacionada con los segmentos textuales vecinos de la pausa en cuestión. Immonen (2006) comparó la distribución de pausas en la redacción monolingüe y la traducción en 18 traductores profesionales. La tarea de redacción se basaba en un folleto y los sujetos disponían de un ejemplar de la revista donde se iba a publicar el texto. Immonen encontró que, en ambas tareas, la duración de las pausas es mayor entre párrafos y que disminuye sucesivamente entre unidades lingüísticas más pequeñas. Al contrastar las tareas, traducir mostraba un patrón particular: las pausas en las fronteras de párrafos y oraciones, que se supone que se utilizan sobre todo para la macroplanificación, eran considerablemente más cortas que en la redacción monolingüe, mientras que las pausas entre cláusulas y unidades menores, donde se escogen las estructuras gramaticales y las palabras del TM, eran más largas.

Immonen & Mäkisalo (2010) estudiaron los mismos datos para centrarse en la duración de las pausas en cláusulas, categorizadas por tipo, y en sintagmas (clasificados por tipo, función y longitud). En general, los traductores parecen propensos a procesar el texto suficiente para empezar a escribir y a hacer más o más largas pausas mientras redactan. En la redacción monolingüe, las pausas que preceden oraciones subordinadas tienden a ser mucho más breves que las anteriores a oraciones principales. Al traducir, ambos tipos de pausas son de longitud muy similar. Por tanto, cuando se traduce, las oraciones subordinadas parecen procesarse como cláusulas independientes. En cuanto a los sintagmas, Immonen & Mäkisalo sugieren que probablemente los sintagmas verbales se procesan durante las pausas iniciales de oración, mientras que los sintagmas nominales —que demandan más tiempo de procesamiento que los verbales— y los sintagmas adposicionales (los preposicionales y los relacionales) parecen procesarse localmente y pueden redundar en pausas más largas entre sintagmas.

Una de las principales diferencias potenciales entre la redacción monolingüe y la traducción es que, en esta última, la coordinación de la lectura y la redacción debería demandar más recursos cognitivos. Dragsted & Hansen (2008) encontraron que, al traducir, las actividades de lectura y redacción no

coinciden y que las pausas parecen apuntar a esfuerzos de coordinación para pasar del modo de comprensión al modo de producción. En una prolongación del estudio anterior, Dragsted (2010) sugiere que hay diferencias de coordinación entre profesionales y estudiantes de traducción: los profesionales cambian continuamente entre TO y TM, y parecen solapar los procesos de comprensión y producción; en cambio, los estudiantes tienden a secuenciar las actividades, probablemente para reducir la carga mental (véase la sección siguiente).

Con un enfoque similar al de sus estudios anteriores, Immonen (2011) comparó la redacción monolingüe y la traducción en 28 traductores, esta vez de forma individual antes de considerar los datos colectivos. No encontró correlación alguna entre ambas tareas en los sujetos, que también mostraron una gran variación en las unidades de procesamiento. En general, las diferencias entre la redacción monolingüe y la traducción parecen más importantes en el procesamiento sintáctico, probablemente debido a la búsqueda de equivalencias para acomodarse a la LM.

En definitiva, se puede formular la hipótesis de que la traducción y la redacción monolingüe son similares en varios aspectos pero que también implican diferencias de comportamiento, relacionadas con sus objetivos y con la coordinación de la lectura y la redacción. ¿Podrán transferirse las destrezas desarrolladas para una tarea a la otra? Göpferich, en este volumen, explora si la capacidad de los sujetos para expresarse en sus L1 y L2 es diferente, y si los ejercicios de traducción son útiles para mejorar las habilidades de redacción.

4. La carga mental y la complejidad lingüística[6]

En general, los recursos mentales, o la capacidad mental, se suponen limitados. Con *carga mental* se alude a la parte de esa limitada capacidad central de procesamiento que se emplea en ejecutar una tarea. Al realizar actividades mentales complejas, la cantidad de información e interacciones que se procesan simultáneamente puede sobrecargar y hasta agotar esa cantidad finita de recursos mentales. La investigación sobre la carga mental ha estado presente implícitamente desde los inicios de la investigación de la interpretación, pero la versión más completa y actualizada es el modelo de esfuerzos de Gile, que muchas contribuciones intentan corregir o ampliar.

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6. El término habitual en la investigación de traducción es *cognitive effort* (esfuerzo cognitivo) y en la investigación de interpretación, *cognitive load* (carga cognitiva). Aquí se utiliza *carga mental (mental load)* para referirse a ambos. Para una introducción al tema en TPR, véase Muñoz (2012).

Wu & Wang (2009) argumentan que a veces los intérpretes expertos obtienen rendimientos superiores a los posibles con las postuladas limitaciones de los recursos cognitivos, y también que los intérpretes destacan más por su gestión del ejecutivo central que por su capacidad de memoria. Partiendo de la naturaleza recursiva de los elementos que se pueden mantener activos en memoria, sugieren que cada segmento de discurso se procesa realmente como un discurso en sí mismo, y se apoyan en la teoría de las macroestructuras de Van Dyck y en la gramática funcional de Halliday para formular ciclos repetitivos de tres reglas discursivas transformacionales de eliminación, construcción y generalización para explicar el rendimiento que supera las supuestas limitaciones mentales.

El modelo de esfuerzos de Gile se basa en la idea de que los recursos mentales proceden de una sola fuente general. Por el contrario, Seeber (2011) se basa en la hipótesis de que las fuentes de recursos cognitivos son múltiples y que tales recursos entran más en conflicto cuando comparten alguna dimensión particular de procesamiento. Seeber ofrece una matriz de conflictos para predecir la cantidad de superposición y de interferencia entre tareas cognitivas. Su Modelo de Carga Cognitiva recoge y cuantifica la carga mental en función de las características de *input* y producción, que Seeber ilustra con estimaciones de la asignación de recursos cognitivos en estructuras sintácticas coincidentes y divergentes (SVO/no SVO). Seeber (2013) revisa los métodos psicofisiológicos, analíticos, subjetivos y de rendimiento para identificar y medir la carga mental. De entre ellos se inclina por la pupilometría, aunque advierte que requiere una exhaustiva preparación previa de los datos. Además, la pupilometría parece más fiable cuando se evalúa la carga mental local, esto es, la inducida por estímulos cortos (nivel de la oración e inferiores) y no permite atribuir la carga mental a componentes individuales de la tarea.

Pym (2009) vuelve a analizar los datos de uno de los experimentos de Gile. Se centra en las omisiones, cuyos segmentos correspondientes en el TO clasifica como de alto o bajo riesgo, en función de su grado de amenaza para conseguir la finalidad comunicativa del discurso. Pym sugiere que la gestión de los recursos cognitivos al interpretar también responde a factores contextuales como los objetivos del discurso, las estrategias de los oradores y los riesgos variables de los segmentos de texto. Pym espera que el marco de estudio se expanda para cubrir también a los traductores, y enumera varios puntos en común entre la traducción y la interpretación, como las restricciones temporales, la superposición de esfuerzos, las correcciones sobre la marcha y la simultaneización de tareas, así como la documentación y el uso

de herramientas electrónicas. Muchos investigadores han trabajado en esta ampliación, a menudo estudiando la carga mental en la post-edición y la traducción a la vista, vinculándola con la complejidad lingüística.

O'Brien (2006) indagó en la forma de evaluar la carga mental al posteditar traducciones automáticas usando Translog (centrándose en las pausas) y el Análisis de Redes de Decisión (*Choice Network Analysis*, CNA) de Campbell, que se basa en la hipótesis de que las diferencias en los segmentos de TM derivados de un mismo segmento del TO apuntan al grado de dificultad de tales segmentos del TO. O'Brien halló que las pausas son relativamente útiles como indicadores de la carga mental al posteditar, pero también que es muy difícil correlacionar la carga mental con las pausas, la dificultad del TO y la calidad del TM. Concluye que hay que complementar el análisis de las pausas con otros métodos, como el CNA y otros aspectos de la actividad en el teclado. Jensen (2009) clasificó tres textos por sus resultados en siete índices de legibilidad, en cálculos de frecuencia de sus palabras y en la cantidad de algunas formas de lenguaje figurado (modismos, metáforas, metonimias) y halló que todos los indicadores ofrecían resultados similares. Los resultados no fueron concluyentes, pero plantean varias cuestiones interesantes para futuras investigaciones, como si los modismos, las metáforas y las metonimias son, en general, más difíciles de traducir que las expresiones literales.

La metáfora era ya un tema estudiado en TPR (revisión en Schäffner & Shuttleworth 2013), incluidas las posibles dificultades que pueden plantear a los traductores. Rydning & Lachaud (2011) hallaron que los sujetos lograban una mayor claridad conceptual con significados literales que con significados figurativos, y que también era mayor con metáforas primarias que con las complejas, aunque también detectan más claridad conceptual en los significados literales primarios que en los significados primarios complejos. Sjørup (2011) descubrió que las fijaciones oculares eran más prolongadas con las metáforas que con expresiones literales (véase el siguiente apartado). Aduce que no está claro si las diferencias se debían a la comprensión o a la producción, pero también comprobó que los sujetos prefieren traducir las metáforas con equivalentes metafóricos directos y señala que parafrasear probablemente implica una mayor carga mental. Zheng & Xiang (2013) hallaron que las metáforas deceleran la producción y reducen la calidad, y relacionan los resultados con la comprensión y con la reasignación de recursos cognitivos.

Otras investigaciones relativas a la complejidad del texto y la carga mental se ocupan de la sintaxis. Shreve, Lacruz & Angelone (2010, 2011) encontraron que la traducción a la vista es más sensible a perturbaciones cognitivas

debidas a la complejidad sintáctica y también que, al traducir a la vista, las interferencias visuales afectan más a los sujetos. Hild (2011) comparó el rendimiento de expertos y novatos al interpretar dos textos caracterizados según varios parámetros sintácticos. Todos los parámetros incidían el rendimiento de los principiantes. En los expertos, por otro lado, la redundancia parece modular tales efectos. Meuleman & Van Besien (2009) encontraron interesantes correlaciones en la elección de estrategias de afrontamiento (*coping strategies)* al interpretar: los sujetos de sus pruebas preferían efectuar *tailing* (aumentar la velocidad sin reestructurar el discurso) al hacer frente a altas velocidades de elocución en los oradores, y segmentar el TO cuando lidiaban con una sintaxis compleja. Dragsted (2012) estudió el número de interpretaciones alternativas de las palabras en traducciones de un mismo TO (esto es, CNA) en ocho estudiantes de traducción y encontró correlaciones muy significativas entre la variación en los segmentos del TM y el número de fijaciones oculares, su duración y la longitud de las pausas. Chmiel & Mazur (2013) estudiaron los movimientos oculares de estudiantes de interpretación de dos niveles de formación cuando traducían a la vista y concluyeron que el nivel de legibilidad puede incidir más en el procesamiento que la diferencia entre oraciones simples y complejas y también el orden de las palabras (SVO/no SVO). Esta es el área a la que Alves, Gonçalves & Szpak han contribuido en este volumen. Usando la Teoría de la Relevancia como marco referencial, se centran en las posibles diferencias en la carga mental derivadas de procesar clases de palabras abiertas y cerradas.

5. Avances en la metodología de la investigación

Para los investigadores de TPR, la fiabilidad, la validez y el uso apropiado de herramientas y métodos de investigación han sido una preocupación prioritaria desde los años noventa. Por supuesto, los métodos de investigación son parte de todos los informes empíricos, pero un 13% de los trabajos de la muestra se centran en ellos.

Dentro de los métodos introspectivos, Sun (2011) no encuentra pruebas irrefutables de que pensar en voz alta influya o cambie significativamente el proceso de traducción. Sin embargo, Jääskeläinen (2011) aboga por estudiar sistemáticamente estos métodos introspectivos y presenta un proyecto para poner a prueba la validez de pensar en voz alta. Englund Dimitrova & Tiselius (2009) comparan la retrospección en la interpretación simultánea y la traducción y describen las diferencias en los resultados, aunque advierten que sus sujetos eran estudiantes inexpertos. Concluyen que los datos retrospectivos no pueden tomarse como único indicio de los procesos

cognitivos o del uso de estrategias, pero que pueden ofrecer resultados interesantes al combinarlos con otros métodos (véase también Hansen 2006). Ehrensberger-Dow & Künzli (2010) compararon el pensamiento en voz alta y la retrospección. Concluyen que pensar en voz alta puede informar más sobre la revisión y que la retrospección puede ser más adecuada para acceder a información explícita sobre uso de fuentes, estrategias y resolución de problemas. En cualquier caso, coinciden en que para interpretar y clasificar con precisión las verbalizaciones es esencial combinar varias fuentes de datos. Sin embargo, Sun (2011) también señala que los diferentes procedimientos de recogida de datos sirven para diferentes propósitos y que los enfoques multimétodo, hoy considerados óptimos a menudo, también pueden albergar algunas desventajas. En definitiva, todavía hay puntos de vista contradictorios sobre el uso de métodos introspectivos y parece necesario reflexionar más sobre ellos y seguir investigando. En este monográfico, Englund Dimitrova y Tiselius presentan un estudio en el que contrastan datos retrospectivos con los datos del proceso de traductores e intérpretes (estudiantes y profesionales) que trabajan con un mismo texto. En este caso, la fuente para inducir la retrospección fue una transcripción del TO, y no a los datos del proceso, con el fin de asegurarse de que estaban accediendo a la memoria a largo plazo.

Pavlović (2009) retoma los protocolos dialogados y colectivos utilizados por Séguinot, House, Hönig y principalmente Kussmaul a finales de la década de 1980 y comienzos de la década de 1990, que denomina *protocolos de traducción colaborativa*. Son transcripciones de las grabaciones de los intercambios comunicativos de personas que traducen juntas el mismo TO, tomando decisiones por consenso. Así, no sólo se accede a procesos individuales, sino también a la interacción entre los implicados. Siguiendo a Séguinot, Pavlović argumenta que las racionalizaciones que conlleva comunicarse con otros no invalidan el enfoque. Esto se puede generalizar a todos los métodos introspectivos en TPR. Quizás no permiten acceder a los procesos mentales «reales», pero proporcionan información de gran valor para sustentar inferencias e hipótesis sobre los procesos mentales conjeturados, una información que es difícil de obtener, cuando no imposible, con métodos de observación. Por otra parte, también permiten averiguar el modo en que los sujetos conciben sus procesos mentales, lo que a su vez puede incidir en el modo de ejecutar las tareas (véase sección 7).

En cuanto a los métodos observacionales, muchos artículos metodológicos se refieren al novedoso seguimiento de movimientos oculares, o a su combinación con otros procedimientos de recogida de datos (por ejemplo,

Jakobsen 2011; Lachaud 2011).[7] O'Brien (2009) aborda varios problemas en el uso del seguimiento ocular y propone soluciones para la mayoría. También recuerda que el equipo es relativamente caro y que el modo en que se ejecuta la prueba y los TO (por ejemplo, la longitud del texto, el tamaño de la fuente) pueden socavar la validez ecológica de las pruebas. A veces, los problemas potenciales no son inherentes a la herramienta o al procedimiento en sí, sino a las decisiones tomadas al usarlos. Uno de los indicadores que se utilizan en los estudios de seguimiento ocular es la fijación de la mirada, es decir, dónde y durante cuánto tiempo se posan los ojos al ejecutar la tarea. Por ejemplo, Sharmin et al. (2008) encontraron que la complejidad del texto conducía a fijaciones más frecuentes mientras que al traducir contra reloj las fijaciones eran más cortas. Medir la fijación de la mirada entraña decidir una duración mínima y también el tamaño del área que se considera una unidad. Los valores elegidos se denominan *filtros de ajuste* o simplemente *filtros*. Alves, Pagano & da Silva (2009) muestran que usar distintos filtros incide mucho en los resultados y ponen de relieve la necesidad de estandarizar los parámetros para incluir y excluir datos y así poder comparar datos de muestras distintas. En este volumen, Hvelplund ofrece una introducción general al seguimiento ocular y también un resumen de precauciones y recomendaciones de uso centrado en el análisis e interpretación de los datos.

El seguimiento ocular ha fomentado nuevos estudios sobre la lectura para traducir y sobre la coordinación de lectura y redacción (sección 3). Por ejemplo, Castro (2008) y Jakobsen & Jensen (2008) estudiaron las diferencias en el comportamiento al efectuar cuatro tareas de lectura (desde lectura inmotivada hasta leer mientras se traduce por escrito) y encontraron aumentos sucesivos en la duración de la tarea, la frecuencia y duración de las fijaciones oculares y el promedio de duración de las fijaciones (véase también Dragsted, Hansen & Sørensen 2009).

6. La revisión y la metacognición

En 2006, Shih sólo podía citar un puñado de estudios sobre la revisión [final] a pesar de que, subrayaba, los estudios de los procesos de traducción han observado constantemente comportamientos de [auto-] revisión (panorama en Mossop 2007). Shih halló que los traductores suelen revisar los textos dos veces, sobre todo después de acabar el primer borrador y rara vez más allá del mismo día. Sus entrevistados confirmaron la mayoría de los criterios de

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7. Para una revisión reciente de estudios de TPR con seguimiento ocular, véase Alves, Gonçalves & Szpak (2012).

revisión de las listas elaboradas por docentes de traducción y también añadieron nuevas categorías que mostraban que habían desarrollado hábitos propios de revisión partiendo de la experiencia y la retroalimentación de terceros. Desde entonces, la revisión ha sido objeto de varios estudios, principalmente relacionados con una hipotética tendencia a hiper revisar y con las diferencias entre la revisión final frente a la revisión sobre la marcha (mientras se redacta el borrador, *online revision*).

Künzli (2007) encontró una tendencia a hiper revisar en los profesionales, que también pasaban por alto muchos errores, y también una gran variación inter e intraindividual que Künzli relaciona con la motivación y la falta de una definición adecuada de la tarea y de procedimientos establecidos de revisión. Malkiel (2009) estudió las autocorrecciones en 16 estudiantes de traducción —cada mitad con una L1 diferente— al traducir dos textos, uno en cada idioma. No encontró ningún efecto relacionado con la LO ni con la direccionalidad (no obstante, véase Alves, Pagano & da Silva 2009 para el resultado contrario). Sólo el 20% de autocorrecciones eran previsibles, esto es, correspondían a fenómenos de los que normalmente se postulan dificultades de traducción en ese par de lenguas. La mayoría de autocorrecciones eran sustituciones de palabras y sintagmas por sinónimos. Malkiel vincula estos resultados a la combinación de una actitud madura ante la traducción con una falta de confianza en sí mismos, debida a nociones rudimentarias de lo que implica la traducción profesional.

Koby (2007) estudió la edición en ordenador, en una muestra mixta de informantes profesionales y no profesionales, para buscar tendencias en la revisión final y sobre la marcha. Sus resultados apuntan a que ambos estilos son igualmente rápidos, aunque la revisión sobre la marcha es más eficiente. Antunović & Pavlović (2011) compararon la autorrevisión sobre la marcha con la final en 10 estudiantes que tradujeron desde sus L2 y L3 a su L1. Concluyeron que las destrezas en la LO no guardaban relación ni con la duración relativa de las actividades de redacción y las posteriores, ni con la distribución de autocorrecciones durante estas fases. Más bien les parecían relacionadas con hábitos individuales de comportamiento, por lo que podrían ser un rasgo definitorio de los estilos de los traductores. El número de autorrevisiones sobre un mismo problema, sin embargo, resultó mayor al traducir de la L3.

Los criterios de revisión de Shih (2006), que condensan y amplían propuestas anteriores, y las tendencias a hiper revisar detectadas en muchos estudios apuntan a una concentración en el TT al revisar. ¿Existen diferencias de calidad entre las revisiones que contrastan TO/TM y las realizadas utilizando sólo el TM? Esto es lo que Marashi & Okhowat (2013) buscaron determinar.

Para ello, entregaron un TM a 40 editores y a la mitad de ellos le proporcionaron también el TO. No apreciaron diferencias significativas entre la frecuencia de los comentarios de edición ni en la calidad de las versiones finales, que analizaron dos evaluadores independientes. Curiosamente, los editores de ambos grupos manifestaron que su criterio más importante era la exactitud, por lo que los autores concluyen que para los editores no es crucial dominar completamente la LO, y que más bien se beneficiarían de una formación en la edición en la LM.

Künzli (2007) y otros investigadores señalan que la revisión es muy importante en la formación de traductores. Antes de cambiar los planes de estudios, sin embargo, conviene considerar cómo articular la revisión de manera óptima en los programas de formación. Por ejemplo, revisar implica evaluar y Robinson, López & Tercedor (2006) investigaron los resultados de introducir la evaluación por pares y la autoevaluación en un curso de traducción en línea. Encontraron que los resultados del aprendizaje se mantienen constantes mientras que los nuevos procesos de evaluación aumentan la conciencia sobre el proceso de traducción en los estudiantes. Fernández & Zabalbeascoa (2012) encontraron una correlación positiva entre los resultados de los estudiantes y la calidad de su autoevaluación en un cuestionario metacognitivo.

Dam-Jensen & Heine (2009) proponen modos de usar las herramientas de investigación del proceso de traducción como recursos pedagógicos para aumentar su conciencia como estudiantes, pensadores y solucionadores de problemas. Pym (2009) informa de tres experimentos informales efectuados en clase con fines pedagógicos, gracias a los cuales los estudiantes pueden derivar sus propias conclusiones sobre el progreso de sus capacidades y también fijar sus propias metas de aprendizaje a corto plazo (véanse también Hansen 2006 y Massey & Ehrensberger-Dow 2011). Angelone (2013) combina las líneas anteriores —la revisión y la aplicación de herramientas de investigación en la formación de traductores— para comparar la eficacia del Informe Integrado de Problemas y Decisiones de Gile (IPDR, por sus siglas en inglés), la grabación de verbalizaciones y las grabaciones de pantalla como herramientas de apoyo a la revisión, para reconocer problemas de traducción y mitigar errores. Seis estudiantes tradujeron 9 TO de unas 250 palabras, alternando cada una de las herramientas. Luego analizaron los protocolos que habían creado, buscando indicadores de problemas para, con su apoyo, introducir revisiones a voluntad, y después entregaron las versiones finales. Se analizaron los errores de los TM y, al cruzar los datos con la herramienta utilizada, la grabación de la pantalla resultó la más eficaz como apoyo a la actividad de auto reflexión para mitigar errores, tal vez porque las grabaciones de pantalla suponen una

atención visual guiada que promueve una mayor conciencia de la actividad. En este monográfico, Shreve, Angelone & Lacruz informan de una réplica parcial del experimento de Angelone, centrada ahora en la revisión a terceros, en lugar de la auto revisión.

7. La cognición, más allá del pensamiento racional y consciente

"No hay nada más práctico que una buena teoría." Esta cita, atribuida a Kurt Lewin, el padre de la psicología social moderna, es adecuada para iniciar esta sección porque uno de los avances más notables en los últimos años ha sido teórico. Un cambio de perspectiva que ha propiciado una cascada de efectos y ampliaciones en TPR. En los últimos años, muchos investigadores han abandonado gradualmente la visión de la mente como un ordenador, que había separado el estudio de la mente tanto de sus fundamentos neurológicos como de sus dimensiones personal, social y cultural (críticas en Vandaele 2007; Muñoz 2010a; Halverson 2013; Risku & Windhager 2013). Los avances en las bases neurológicas son todavía modestos (o no tanto; véanse Diamond & Shreve 2010; Lehr 2010; Moser-Mercer 2010; Hervais-Adelman, Moser-Mercer & Golestani 2011; García 2012). Restituir los aspectos personales, sociales y culturales a la cognición, no obstante, ha tenido un enorme impacto de inmediato, fomentando un buen número de nuevas líneas de investigación.

Las estrategias de traducción, la solución de problemas, la toma de decisiones y la creatividad siguen atrayendo, y con razón, mucho interés (por ejemplo, Halverson 2007; Jääskeläinen 2009; Pavlović 2010; Horváth 2010; Bayer-Hohenwarter 2012), pero ahora la enorme variación del comportamiento de los sujetos se puede abordar también desde la perspectiva de sus emociones, intuiciones y estilos individuales. Durieux (2007) explica que la toma de decisiones no es resultado exclusivo de un pensamiento racional puro y de estrictas reglas de inferencia. Las decisiones están condicionadas por las limitaciones cognitivas humanas, la disponibilidad de información y el lapso de tiempo disponible para tomarlas. Además, la toma de decisiones se rige también por las emociones, controlada por la atención selectiva en un ciclo que Durieux esboza así: *percepción > evaluación > emoción > atención selectiva > procesamiento de la información > decisión*. Davou (2007) también argumenta que la evaluación primaria del impacto emocional de la información precede a su procesamiento y condiciona el modo en el que se procesa. Davou afirma que las emociones negativas pueden aumentar el esfuerzo de procesamiento y reducir los recursos cognitivos disponibles, mientras que las emociones positivas amplían la atención y la creatividad. En este volumen, Rojo & Ramos informan de un experimento de tiempo de reacción para comprobar

si el proceso de traducción se decelera al traducir palabras y expresiones contrarias a la postura política del traductor.

La incertidumbre ha sido objeto de algunos trabajos recientes. Una forma de definir la incertidumbre es como una falta de información sobre un hecho. La incertidumbre puede conducir a una estado de aversión a menudo vinculado a sentimientos de ansiedad y estrés, por lo que quienes lo sienten tienden a intentar reducirlo. Angelone (2010) exploró unos indicadores de comportamiento relacionados con la gestión de la incertidumbre en la traducción. Encontró que a menudo estos indicadores se agrupan en tríadas de reconocimiento del problema, propuesta de solución y evaluación de la solución, que pueden interrumpirse. También halló efectos derivados de la experiencia no en la cantidad, sino en la forma en que se usa la metacognición para regular la solución de problemas. En un estudio de seguimiento, Angelone & Shreve (2011) encuentran que los patrones de gestión metacognitiva de la incertidumbre de los traductores pueden vincularse a la calidad del TM.

Otro supuesto de las perspectivas tradicionales sobre toma de decisiones y solución de problemas es que son procesos conscientes. Hubscher-Davidson (2013) argumenta que, si el conocimiento adquirido conscientemente se puede interiorizar o automatizar mediante la práctica, entonces el procesamiento no consciente de la información es un recurso válido para resolver problemas. Por tanto, aborda la intuición como un componente quizás crucial del comportamiento de los traductores, que podría contribuir a predecir su eficacia. Hubscher-Davidson lo ilustra analizando extractos de protocolos de pensamiento en voz alta de uno de los estudiantes que participaron en un experimento previo, en el que los sujetos tradujeron y cumplimentaron el cuestionario *indicador de tipo Myers Briggs* para medir su preferencia por la intuición holística o por el pensamiento abstracto y racional.

Tanto las emociones como la intuición se nutren de las experiencias pasadas de los sujetos. ¿Puede haber diferencias sistemáticas en las formas de ejecutar las tareas que dependan de la experiencia y el conocimiento acumulados? Van Besien & Meuleman (2008) estudiaron el comportamiento de dos intérpretes y concluyeron que algunas estrategias locales, como la anticipación, se distribuían por igual mientras que en otras, como la transcodificación y la marcha atrás, había preferencias personales. Tales preferencias personales también parecen incidir en la forma de usar las estrategias globales, tales como adiciones y omisiones. Los autores sugieren que estas diferencias apuntan a dos estilos de interpretar (véase también Kajzer-Wietrzny 2013; para traducción, véase Dragsted & Carl 2013). PACTE (2011b) se centra en

los modos en que los sujetos abordan la traducción de textos completos y unidades lingüísticas menores, con entrevistas retrospectivas y también con un cuestionario donde los sujetos manifestaron sus prioridades al ejecutar la tarea. Luego cruzaron los resultados con los del *índice de dinamismo de conocimientos de traducción* (véase la sección 2) y encontraron una estrecha relación entre el enfoque de los sujetos y sus creencias. En otras palabras, las creencias, conscientes o implícitas, también influyen en los estilos de los traductores y en su toma de decisiones. Siguiendo esta línea, en este volumen Presas y Martín de León estudian el papel de las teorías implícitas [creencias] en la toma de decisiones. Combinando varias tareas y procedimientos de recogida de datos, trazan las teorías de los estudiantes sobre la traducción y estudian su evolución, intentando discernir en qué medida influyen en el proceso de traducción (y, en su trabajo en curso, en los resultados).

Schrijver, Van Vaerenbergh & Van Waes (2012) exploran la transedición en los procesos de traducción de los estudiantes. En su interpretación original, por *transedición* se entienden las operaciones destinadas adaptar los TM a 1) los niveles de eficiencia en la expresión en la LM, 2) la función prevista para el TM en su nuevo contexto; y 3) las necesidades y convenciones de los destinatarios previstos. Los autores ven conexiones entre transedición y nociones como la *traducción encubierta* de House, la *traducción instrumental* de Nord e incluso la *traducción indirecta* de Gutt, por lo que es cuestionable que haga falta un concepto distinto (cf. Schäffner 2012). En cualquier caso, Schrijver, Van Vaerenbergh & Van Waes encontraron que los sujetos varían en cuanto a la fase (pre redacción, redacción y post redacción) en la que prefieren efectuar ciertas operaciones de transedición, como adiciones y reestructuraciones generales del texto, y atribuyen estas diferencias a sus estilos de trabajo. La mayoría de las operaciones detectadas pertenecían a la transedición situacional y cultural (tipos 2 y 3 anteriores). Curiosamente, no encontraron ningún nexo claro entre el uso de la transedición y los conocimientos y la experiencia de los sujetos. Así pues, ¿qué lleva a los traductores e intérpretes a adaptar su producción a sus destinatarios previstos? En este volumen, Apfelthaler revisa los estudios sobre la orientación de los textos a la audiencia prevista y afirma que tal orientación podría estar relacionada con la *empatía cognitiva,* que ahora está investigando con un enfoque multi-método que describe en detalle.

8. La investigación, recontextualizada

Risku (2010) sostiene que una vez que nos alejamos del procesamiento de la información en entornos de laboratorio para abarcar las acciones reales

completas, en entornos específicos y mediatizadas por tecnologías, tenemos que ampliar nuestros intereses de investigación para cubrir áreas como la cooperación entre agentes, el uso de herramientas y la interacción con el entorno. Por ejemplo, Roziner & Shlesinger (2010) evaluaron el uso de la interpretación a distancia en grandes instituciones multilingües y encontraron que los efectos sobre la calidad de la interpretación y también sobre la salud y los niveles de estrés físico de los intérpretes eran pequeños. No obstante, también encontraron considerables efectos psicológicos como, por ejemplo, un aumento de los sentimientos de aislamiento y alienación. Mouzourakis (2006) sugiere que la alienación del intérprete está vinculada a la falta de concentración y motivación y que, en la interpretación a distancia, la percepción de la sala de reuniones por los intérpretes, mediatizada por imágenes en pantalla, determina esa alienación.

Mouzourakis (2006) señala que este tipo de efectos psicológicos y las molestias físicas que los acompañan no son exclusivos de la interpretación a distancia, sino que los comparten todos los operadores humanos que trabajan en entornos virtuales. Traducir es un ejemplo primordial de teletrabajo y los entornos virtuales y la interacción con herramientas electrónicas tienen un poderoso efecto en los procesos mentales y el comportamiento de los traductores.[8] Por ejemplo, Plassard (2007) muestra que las listas de distribución han modificado los modos tradicionalmente individuales de solventar problemas de traducción, que ahora también se abordan y resuelven colectivamente. Para estudiar los cambios en las formas de trabajo, Mouzourakis (2006) argumenta convincentemente que comparar las condiciones normales o basales de trabajo con las modificaciones en los modos actuales de trabajo o con nuevas formas de mediación lingüística pasan por definir un conjunto mínimo de parámetros comunes (en realidad, Mouzourakis se refiere a la comparación entre la interpretación presencial y a distancia, pero su argumento es válido para todas las tareas investigadas en TPR).

Al sacar la traducción y la interpretación del laboratorio, nos hemos encontrado con que tal vez no sabemos tanto de los modos reales de trabajo. Por ejemplo, Ma & Wu (2008) concluyen que el supuesto generalizado de que los intérpretes son más precisos si planifican antes de interpretar o mientras lo hacen podría no tener tanta base. En este monográfico, Risku muestra las complejas redes sociales en las que se insertan los traductores autónomos, y el modo en que externalizan partes del proceso [mental] y así transforman

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8. Christensen (2011) revisa los estudios sobre los efectos de usar herramientas TAO en el procesamiento mental.

el procesamiento "interno" en una interacción con estímulos externos que generan ellos mismos.

Restituir los entornos de trabajo de los sujetos en la investigación también ha allanado el camino para estudiar el contenido real del trabajo en agencias de traducción y la interacción entre los agentes en el proceso, en aspectos tales como los modos de comunicarse en proyectos de traducción y el trabajo de equipo en cabina (véanse, por ejemplo, Kuznik & Verd 2010; Zehrer 2012; Chmiel 2008). Una vez reintegrada la cognición a su plenitud (en lugar del procesamiento individual, racional y consciente de la información), hay que reconsiderar los métodos de investigación, a menudo centrados en instancias cognitivas mínimas y aisladas en condiciones de laboratorio. Hansen (2010) sugiere que TPR debe ir más allá de los datos cuantitativos y adoptar un enfoque más integrador que abarque también el historial de los sujetos (para la opinión contraria, véase House 2013). Hubscher-Davidson (2011) argumenta de forma convincente que, junto con los métodos cuantitativos, los estudios de TPR podrían beneficiarse de los métodos etnográficos para acceder mejor a aspectos menos tangibles del proceso de traducción, tales como los auto-conceptos, perspectivas e intenciones de los traductores, sus visualizaciones o sus respuestas emocionales e intuitivas. A pesar de ello, si es obvio que los procesos de traducción e interpretación comprenden más elementos y factores de los que se puede operativizar en una tarea, desplumada para adaptarla a condiciones de laboratorio, también es cierto que tales condiciones de laboratorio arrojan a menudo resultados interesantes y útiles. La cuestión no es si un método es mejor que otro, sino si el elegido o los elegidos son adecuados para cada objetivo de investigación particular.

En este período, los enfoques multimétodo para la recogida de datos ya han desdibujado las barreras entre introspección y observación, y entre investigación cuantitativa y cualitativa, al combinar a menudo varios o todos. Además, la oposición entre la investigación del proceso y del producto —que fue el argumento fundacional para acrisolar unos incipientes estudios de TPR dentro de los ETI en la década de 1980— ya no es válida. El lenguaje es comportamiento y, en consecuencia, también lo son sus productos orales y escritos. La investigación de los procesos mentales en la traducción y la interpretación no puede ignorar los productos o restringir su papel a evaluar la calidad o el rendimiento (véase, por ejemplo, Halverson 2010).

¿Cómo establecer una correspondencia óptima entre los temas de investigación y los métodos para su estudiarlos? Muñoz (2010b) propone organizar las investigaciones en TPR en tres niveles: 1) el conjunto de estados y operaciones mentales relevantes al traducir e interpretar, y las formas en que se

construyen y realizan, como la comprensión, la solución de problemas y la escucha dicótica; 2) el conjunto variable de subtareas y operaciones observables, que a menudo conllevan combinar y gestionar los estados mentales y las operaciones del nivel anterior, como la lectura, la revisión y la monitorización propia, y 3) las funciones, los aportes cognitivos y las relaciones de todos los agentes que interactúan en la producción de traducciones e interpretaciones. Chesterman (2013), por su parte, propone una triple distinción entre *a)* los *actos cognitivos de traducción* (procesos mentales); *b)* los *eventos de traducción,* donde se inscriben sociológicamente; y *c)* los *usos de traducción,* donde los eventos de traducción se insertan en la historia y la cultura. Son propuestas distintas, la primera circunscrita a una aproximación cognitiva, la segunda ubicando el lugar de TPR dentro de los ETI. En cualquier caso, necesitamos conocer de primera mano sus implicaciones, porque las propuestas de estándares metodológicos en un nivel o perspectiva pueden ser totalmente inadecuadas en otros. Un ejemplo de aplicación lo encontramos en Massey & Ehrensberger-Dow (2011) quienes, en su proyecto «Aprehensión de los Procesos de Traducción», recogieron datos sobre 1) la situación que rodea la actividad de traducción; 2) las actividades de los traductores; 3) sus comentarios sobre los procesos de traducción, y 4) los propios TO y TM.[9] Su equipo observó a los traductores de plantilla en sus lugares de trabajo habituales, pero también los sometió a pruebas en condiciones de laboratorio. En este volumen, Ehrensberger-Dow aborda los retos de investigar los procesos de traducción en el lugar de trabajo.

9. Corolario

Contemplemos esta instantánea movida por un instante. Los avances en nuestros conocimientos sobre la competencia y la pericia están ofreciendo una imagen más clara de qué se necesita para llegar a ser un traductor o un intérprete excelentes. También se ha estudiado la carga mental en varias tareas y situaciones y desde diferentes perspectivas. Su relación con las herramientas profesionales, y con las características del lenguaje y de textos y discursos es particularmente informativa. Concentrarse en ella ha resultado un acierto, pues incide en la productividad, en la calidad y en el bienestar de los traductores e intérpretes. La metodología sigue mejorando y refinándose. Los procedimientos establecidos de recogida de datos, como los introspectivos, se han probado a fondo para determinar su óptima aplicación. Nuevos

9. «Capturing Translation Processes», ZHAW.

procedimientos han hecho posible estudiar vertientes poco investigadas del proceso, como la lectura, la redacción y su interacción. También ha cobrado particular importancia el estudio de la revisión, la postedición y la traducción a la vista. En todos ellos parece haber una tendencia a centrarse más en las diversas expresiones del control mental, como la monitorización propia y la metacognición, que en capacidades relativamente estables, como la memoria.

Pausada pero inexorablemente, el campo está adoptando nociones actualizadas de la cognición que desafían el lugar preeminente del pensamiento racional consciente y aislado, y han abierto la puerta al estudio de las emociones, la intuición y la incertidumbre, y su influencia en el modo de traducir e interpretar. Se ha comprobado que la experiencia y las creencias de los traductores y los intérpretes guardan relación con su forma de ejecutar las tareas, aunque no necesariamente con sus productos, y se ha abierto el camino a estudiar rasgos psicológicos y preferencias individuales, que contribuyen a conformar estilos personales de trabajo. Muchas investigaciones se efectúan en condiciones de laboratorio y seguirán haciéndolo, pero ahora se está observando también el entorno y las condiciones de las tareas al completo, y los investigadores han llegado a los lugares de trabajo. Actualizar las perspectivas y ampliar los temas de investigación demandan un ajuste en los métodos, y ya se están aplicando algunas estrategias multimétodo que pronto podrían arrojar luz sobre las formas más adecuadas de aproximarse a los diferentes objetivos de investigación. Quizás no tengamos muchas respuestas todavía, pero estamos aprendiendo a formular bien las preguntas. De estos temas hablamos en el TPRW3 y de estos temas tratan los siguientes artículos.

Demos ahora un paso atrás, para ampliar la perspectiva. En los últimos ocho años, las contribuciones cognitivas y psicolingüísticas al estudio de los procesos de traducción e interpretación se han duplicado, y su calidad se ha elevado en paralelo también. Siguen siendo un conjunto difuso de esfuerzos que solo coinciden parcialmente, pero esta es precisamente la situación normal en cualquier ámbito de investigación a la vanguardia. Son las diferencias las que hacen progresar los campos de investigación. De todos modos, la convergencia comienza a ser notoria, y muestra que no sólo los resultados, sino también los objetivos y los modos de investigar en TPR son relevantes en unas sociedades aceleradas donde la traducción y la interpretación se han convertido en una necesidad, no sólo para las élites, sino también para los ciudadanos de a pie, en su vida cotidiana. En mi opinión, todo lo anterior es prueba de que, de hecho, los TPR importan, y que importan más que nunca.

Esta foto tiene también algunos claroscuros. El análisis de las publicaciones muestra que más del 60% son de mano de un solo investigador y que otro

28% fue obra de solo dos. Muchos de los trabajos en coautoría están firmados por las mismas personas, parejas intelectuales de hecho, muy a menudo de las mismas instituciones o equipos de investigación. Esto apunta a una falta de intercambio y cooperación que sólo últimamente parece estar perdiendo terreno.[10] No sólo estamos tomando prestado de disciplinas vecinas (cf. O'Brien 2013) sino también, y mucho, de entre nosotros, como era de esperar. Las investigaciones de TPR a menudo mezclan muchas tendencias diversas de modos que las hacen fascinantes, pero también particularmente difíciles de enmarcar y cotejar. Muchas investigaciones mencionadas en una u otra sección de este artículo podrían haber figurado en otras secciones también. En ocasiones, algunos temas de investigación parecen volátiles, y no siempre porque se haya avanzado en ellos.

Un comentario más sobre las publicaciones. Casi la mitad de las contribuciones de la muestra dedicadas a la interpretación se publicaron en *Interpreting,* como cabía esperar. La otra mitad se reparte principalmente entre los volúmenes editados, las actas de la EST y el resto de revistas. Esto se explica en parte por el creciente interés en la interpretación social o de enlace que, en los últimos años, ha tenido un número mayor de publicaciones que la investigación del proceso de interpretación en todas las revistas. Pero su concentración en *Interpreting* también apunta a la necesidad de reestructurar un paisaje dominado por revistas generalistas, donde a veces las contribuciones de nuestra área no las arbitran especialistas fiables y donde a menudo compiten con escaso éxito con otras de enfoques muy diferentes. Es evidente que la revista *Interpreting* ha servido también para vertebrar unos emergentes Estudios de Interpretación. Aun así, Napier (2011: 12) lamenta que muchas investigaciones excelentes sobre interpretación permanecen inéditas. Uno sólo puede preguntarse cuántas investigaciones interesantes en TPR desfilan directamente de la imprenta a la literatura gris académica o simplemente caen en el olvido. En los últimos años, muchas contribuciones de los 85 autores con más de una publicación relacionada con TPR han aparecido en revistas «secundarias», y algunos textos de investigadores muy productivos y citados se pueden encontrar en otros lugares también. Es hora de preguntarse si no hace falta una revista dedicada a los estudios cognitivos y psicolingüísticos de los procesos de traducción e interpretación.

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10. Por ejemplo, en 2011 y a iniciativa del grupo de investigación PACTE, se fundó la red temática de investigación empírica y experimental en traducción «Translation / Research / Empiricsm / Cognition» (TREC), que hoy reúne a 13 grupos de investigación en TPR de 10 países.

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BIONOTES / NOTAS BIOGRÁFICAS

Ricardo Muñoz Martín ha sido traductor autónomo desde 1988, casi siempre a tiempo parcial. Tras su formación en filología y traducción, obtuvo un doctorado en Lingüística Hispánica en la Universidad de Berkeley en 1993. Desde entonces ha formado a traductores en diversas universidades. En la actualidad, es Catedrático de Traducción en la Universidad de Las Palmas de Gran Canaria. Desde 2002 coordina el grupo de investigación «Pericia y Entorno de la Traducción» (PETRA), dedicado a la investigación empírica de los procesos de traducción. Entre sus principales intereses de investigación destacan la traductología cognitiva y la formación de traductores. Muñoz ha publicado artículos en varias revistas, como Babel, Meta, The Translator, Translation Spaces y Perspectives, y capítulos en libros publicados por editoriales como John Benjamins, Mouton de Gruyter, Routledge y Samfundslitteratur.

Ricardo Muñoz Martín has been a freelance translator since 1988, mostly part-timing. After his training in languages and translation, he received his PhD in Hispanic Linguistics from UC Berkeley in 1993. He has trained translators at several universities ever since. Currently, he is Professor of Translation Studies at the University of Las Palmas de Gran Canaria, Spain. Since 2002, he coordinates the Research Group "Expertise and Environment in Translation" (PETRA, Spanish acronym), devoted to empirical research into translation processes. His main research interests include cognitive translatology and translator training. Muñoz has published articles in several journals, such as Babel, Meta, The Translator, Translation Spaces and Perspectives, and chapters in books by publishers such as John Benjamins, Mouton de Gruyter, Routledge and Samfundslitteratur.

A BLURRED SNAPSHOT OF ADVANCES IN TRANSLATION PROCESS RESEARCH

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Abstract

This article offers an overview of some advances in cognitive and psycholinguistic approaches to translation and interpreting process research between 2006 and 2013, in order to provide context to the contributions to this volume. It provides some figures on publications and initiatives and then focuses on competence and expertise; writing; mental load and linguistic complexity; advances in research methods; revision and metacognition; cognition beyond conscious, rational thought; and recontextualized empirical research. The article closes with some notes on the overall trends in the area, within the sample of contributions, and on publishing.

Resumen

Este artículo brinda un panorama de los avances en las investigaciones sobre los procesos de traducción e interpretación desde enfoques cognitivos y psicolingüísticos entre 2006 y 2013, con el fin de contextualizar las restantes contribuciones a este monográfico. Ofrece algunas cifras sobre publicaciones e iniciativas y luego se centra en la competencia y la pericia, la redacción, la carga mental y la complejidad lingüística, los avances en los métodos de investigación, la revisión y la metacognición, la cognición más allá del pensamiento racional y consciente, y la recontextualización de la investigación empírica. Para concluir se ofrecen algunas notas sobre las tendencias generales en el área, en las publicaciones de la muestra y en el campo de la edición académica.

Keywords: Translation and interpreting. Cognition. Process. Empirical research. Research methods.

Palabras clave: Traducción e Interpretación. Cognición. Proceso. Investigación empírica. Metodología.

In 2006, translation and interpreting scholars gathered in Ljubljana at an EST Congress with the motto *Why Translation Studies Matters*, where many partial answers were provided to this question. Federici (2013: 106) summarizes such answers by stating that "Translation matters now more than ever before because research is uncovering alternative, previously under-researched areas in which translating has an impact." This applies to all areas of Translation Studies (TS) but perhaps even more to a cluster of closely-knit research trends dealing with mental aspects of translating and interpreting, with factors affecting the behavior and performance of human translators and interpreters, and with scientific research. They globally cover cognitive and psycholinguistic approaches to translation and interpreting, and Translation Process Research. They are not the same, but I will simply and loosely use TPR to refer to these combined, often tangled and overlapping territories.

This text will be pursuing two aims. First and foremost, it seeks to contextualize the contributions in this volume. Second, it attempts to offer a panoramic view of advances in TPR. Fortunately, and also unfairly, the first aim restricts the scope of the second one, because it will leave out many topics simply because no direct reference is made to them in this volume (like in the case of reading). Even so it would be literally impossible to review all TPR publications in the space of one article. I thus chose a timeframe of eight years, starting in 2006, the year the question was posed. In doing so, many important, even seminal papers for the evolution of the area will inevitably be left outside. However, this span is also roughly the time a student takes to start and complete an MA and a PhD, and start publishing. Since such young researchers propel many research efforts, there should be some noticeable progress.

Furthermore, an effort was made to restrict this account to contributions published as articles in indexed journals or as chapters in edited volumes. This is no place to address how research quality is determined, how translation and interpreting journals are ranked, or how edited books sometimes achieve higher standards through careful and coherent selection of contributors and thorough editing. Suffice it to say that, by accepted standards, the quality of the research covered can reasonably be assumed to be quite good. In

sum, what this text is offering is a very partial snapshot of a number of inter-woven research trends in constant movement, so the snapshot will naturally be blurred.

The following sections will focus on competence and expertise (2), mental load and linguistic complexity (3), advances in research methods (4), writing (5), revision and metacognition (6), cognition beyond conscious, rational thought (7), and recontextualized research (8). The article closes with a corollary where a blurred snapshot is provided (9). Let us first have a look at some TPR initiatives and figures about some TPR publications through the period (1).

1. An upsurge of efforts and publications

Between 2006 and 2013, at least 11 books compiled more than 100 chapters devoted to TPR:

- 2007. *Interpreting Studies and Beyond* (Pöchhacker, Jakobsen & Mees, eds.)
- 2008. *Looking at eyes. Eye-Tracking Studies of Reading and Translation Processing.* (Göpferich, Jakobsen & Mees, eds.)
- 2009: *Behind the Mind: Methods, Models & Results in Translation Process Research* (Göpferich, Jakobsen & Mees, eds.)
- 2009. *Efforts and Models in Interpreting and Translation Research* (Hansen, Chesterman & Gerzymisch-Arbogast, eds.)
- 2009. *Methodology, Technology and Innovation in Translation Process Research* (Mees, Alves & Göpferich, eds.)
- 2010. *New Approaches in Translation Process Research* (Alves, Mees & Göpferich, eds.)
- 2010. *Translation and Cognition* (Shreve & Angelone, eds.)
- 2011. *Advances in Interpreting Research. Inquiry in Action* (Nicodemus & Swabey, eds.)
- 2011. *Cognitive Explorations of Translation* (O'Brien, ed.)
- 2011. *Methods and Strategies of Process Research: Integrative Approaches in Translation Studies* (Alvstad, Hild & Tiselius, eds.)
- 2013. *Cognitive Linguistics and Translation. Advances in some theoretical models and applications* (Rojo & Ibarretxe-Antuñano, eds.)

Most books in the list were published by John Benjamins or by Samfundslitteratur. Several journals published special issues like this one, e.g., *Across Languages & Cultures* 12/2 (2011), *Target* 25/1 (2013) and *Translation and*

Interpreting Studies 8/2 (2013). There were also dedicated sections in the *Journal of Translation Studies* 10/1 (2007), *Hermes* 42 (2009) and in the *Journal of Writing Research* 5/1 (2013). Regular issues in indexed translation and interpreting journals often included papers in this area, which added up to at least 200 between 2006 and 2013 (table 1).[1]

journal	year	06	07	08	09	10	11	12	13	total
Meta		2	9	4	5	1	2	10	0	**33**
Interpreting		4	6	1	1	2	9	2	2	**27**
Target		3	2	1	1	2	2	4	*11	**26**
Across Languages & Cultures		2	3	3	0	2	*7	4	0	**21**
TIS		5	1	3	0	1	1	0	*8	**19**
Perspectives		1	2	2	1	0	2	5	3	**16**
The Translator		1	2	2	0	1	2	2	1	**11**
Hermes		0	0	0	3	6	0	1	0	**10**
TTR		1	2	3	0	0	3	0	0	**9**
The Interp. & Trans. Trainer		0	0	0	7	1	0	0	1	**9**
Babel		0	0	1	3	1	0	1	2	**8**
Machine Translation		1	1	0	1	1	3	0	0	**7**
New Voices in TS		0	0	0	1	0	0	0	2	**3**
Translation Studies		0	0	1	0	0	0	0	0	**1**
total journal articles/year		**20**	**28**	**21**	**23**	**18**	**31**	**29**	**30**	**200**
trans-kom		0	0	4	1	1	0	3	1	**10**
book chapters		0	8	7	23	23	28	0	18	107
Total contributions		**20**	**36**	**32**	**47**	**42**	**59**	**32**	**49**	**317**

Table 1. TPR papers in SJR indexed T&I journals and selected books, 2006–2013
(* journal special issues)

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1. Journals with SJR index according to the online EST list (JCR only includes *Interpreting* and *Target*). *Translation and Literature* yielded no results. Data from *New Voices in Translation Studies* only covers full articles, not dissertation abstracts (1 in 2007; 1 in 2011; 2 in 2012; 5 in 2013). Data from *trans-kom* are offered as an ilustration of an open, online, non-indexed journal. Book chapter figures include contributions to the EST congress proceedings.

Figures in table 1 logically imply a selection and other TPR colleagues might reach slightly different figures, but the aim is not to offer a precise and exhaustive account, but rather a panoramic overview of tendencies, and the tendency—a steady growth both in terms of quantity and of quality—would probably be quite similar in other counts.[2] Regarding quantity, when all journals listed by the EST are considered (more than one hundred), articles in non-TS venues are computed, and single-authored books and published dissertations are added to the bottom line, TPR publications actually may have been twice as many as the total figure in Table 1. As for research quality, it has been a constant concern in TS, in general, and in TPR in particular, in the last years. *Cadernos de Traduçao* 1/17 (2006) and *The Interpreter & Translator Trainer* 3/1 (2009) dealt with (empirical) research training, and at least four books on empirical research methods have been published since 2006: Göpferich (2008), Hale & Napier (2013), Rojo (2013) and Saldanha & O'Brien (2013). Special emphasis on TPR was given in the PhD Summer Schools of Universitat Autònoma de Barcelona in 2010, 2011 and 2012, and the CBS offered PhD Summer courses in 2011, 2012 and 2013.

With all of the above, it can be no surprise that our area has also gained visibility. The proceedings of EST congresses were comparatively rich with TPR articles, and dedicated panels and workshops featured in all AIETI, ATISA and IATIS conferences throughout the period, and in the conference "Research Models in Translation Studies II" (Manchester 2011). This growing interest in TPR also shows, for instance, in that Miriam Shlesinger held the CETRA chair in 2007, and Arnt Lykke Jakobsen will do so in 2014. There were also TPR panels in other international conferences, such as AILA (Essen 2008), AESLA (Salamanca 2011), the 20th International Symposium on Theoretical and Applied Linguistics (Thessaloniki 2011), and ABRAPT (Florianópolis 2013). There were also smaller, more focused venues. The CBS organized at least two workshops, on expertise in translation and post-editing research and application (2012) and on speech and gaze in translation (2013), and Aston University organized two online TPR meetings in 2011 and 2013.

This was the context in which Susanne Göpferich called for the first TPR workshop (TPRW1, University of Graz, Austria; 2009), where 16 presentations were offered by researchers from 9 countries, and later published in different ways. In 2011, Göpferich called for a TPRW2 (University of Giessen,

2. For example, Javier Franco (personal communication) tells me that searching in BITRA with my own criteria yields 5 more books and 218 articles. To date, BITRA lists 514 TPR texts published during this period.

Germany). This second meeting saw 15 papers presented by researchers from 11 countries, which would be published in different venues as well. TPRW3 was organized by the PETRA Research Group and held in Puerto de Mogán (Gran Canaria, Spain; 2013). As in previous editions, the total number of attendees was between 30 and 40, many of them presenting their works. In this case, the workshop was formally a section of the AIETI6 conference that immediately followed, and some TPRW3 attendees presented their papers in one of the 5 TPR panels of the general conference. Thus, this volume includes a selection of TPR contributions to AIETI6 by authors who attended TPRW3. Let us see what were the topics addressed. We will start with competence and expertise, perhaps the most popular TPR notions in TS.

2. Competence and expertise

These two concepts are closely intertwined in the literature, and many researchers will use either one or both to mean whatever it is that leads some people to translate or interpret well. PACTE (2000) offered the most popular definition of competence, described as "the underlying system of knowledge and skills needed to be able to translate." Lesznyák (2007) reviews and classifies nine popular competence models and states that none of them is inherently better, and that choosing one or another depends on the aims of the researcher or trainer. Just to further complicate things, scholars may, intentionally or inadvertently, use the term to refer to different understandings of competence. Even so, some competence models do stand out from the rest because they are based on empirical research, such as PACTE's—something that Lesznyák also underscores. Interestingly, some of the outliers in Lesznyák's review, that also seem to belong to Pym's (2003) category of "competence as no such thing," seem closer to the tradition of expertise research.

Expertise is a research construct from cognitive psychology to underpin the potential range of cognitive, motivational and personal traits, habits and dispositions that will yield sustained outstanding performance. Determining sustained outstanding performance in translation and interpreting, or what characteristics translation and interpreting experts share is not an easy endeavor. Anyway, translation and interpreting expertise do not have a precise content because it will depend on the details of the task and on circumstances in the environment. Popular expertise and competence approaches in TPR tend to agree in that they are envisioned as clusters of specialized cognitive abilities, and tend to differ as to their sources, their internal coherence, the psychological reality of their postulated sub-constructs, and the possibility to operationalize them.

Let us start with expertise in interpreting (review in Liu 2009). In our timeframe, Köpke & Nespoulous (2006) tested a variety of memory tasks in trainee and expert interpreters and two control groups, with special attention to both semantic and phonological capacities. Their results show no difference between (trainee and professional) interpreters and the control groups in some memory tasks, whereas in some other working-memory (WM) tasks trainee interpreters slightly outperformed professionals. They did find significant group effects supporting that the Central Executive or focalized attention play a key role in interpreting.[3] Köpke & Nespoulous hypothesize that, once a certain degree of expertise has been attained, the high specialization of simultaneous interpreting skills might no longer depend on WM but rather on specific routines or highly specialized schemes.

Tiselius & Jenset (2011) explored whether 9 subjects evenly distributed between those with no experience (NE), with short experience (SE) and with a very long experience (LE) in interpreting showed performance differences in reported processing problems, instances of monitoring, and interpreting strategies. In processing problems, the NE struggled more with comprehension and simultaneity issues; the SE, with finding linguistic equivalents; and the LE, with input rate and syntactic processing. The LE displayed more control of the accuracy before utterance than the NE and SE, and the SE were better than the NE in time management issues. As for strategies, the LE favored overgeneralization and the NE, creative interpreting. All differences were statistically significant. The interpretings were rated as to their informativeness and intelligibility. In informativeness, there appears to be a cumulative benefit of experience, while in intelligibility, experience vs. lack of experience has an effect, but once a minimum experience threshold is reached, there is no added effect. Tiselius & Jenset suggest that the ability to monitor and accuracy in delivery are candidate components of performance that might be used as indicators of expertise.

In translation, Jääskeläinen (2010) reviews and reinterprets TPR evidences in the light of the expertise framework. She notes that in earlier studies, sometimes translation trainees and untrained bilinguals outperformed professionals. This may be so because not all professionals are experts, but also because of the subjects' specialties (a notion with different understandings and implications in research and the professional world), and because subjects

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3. In Baddeley's model of memory, the *central executive* in a flexible attentional system that coordinates, distributes and regulates cognitive resources. It is responsible for aspects such as planning performance, linking scattered bits of information, task-switching, inhibiting automatic responses and focalizing attention.

with steady work in familiar situations might stagnate their development and become routine experts (who tend to perform very well only in those familiar situations). Inflexibility, over-confidence and bias are other reasons why professionals and experts might fail in TPR tests. Automaticity, usually regarded as a trait of expertise, does not necessarily make translation easier for experts, since mental resources freed by automatization are often devoted to addressing other difficulties and issues in the task. Strong monitoring skills are also associated to experts.

Dragsted, Hansen & Sørensen (2009) seem to confirm some points of Jääskeläinen's analysis. They studied the behaviors of three expert translators with different levels of experience on speech recognition in three tasks and under heavy laboratory conditions: sight translation, sight translation with speech recognition, and written translation. They found that only the translator used to speech recognition differed from the other two in time consumption and general behavior. The authors suggest that the most demanding complication of the translation process was not the drafting of the text, but the constant monitoring and editing of TT output.

As for research on competence, Alves & Gonçalves (2007) build on PACTE's competence model, on Relevance Theory and on connectionist approaches to cognition to suggest a *general translator's competence,* comprising all knowledge, abilities and strategies mastered by translators that lead to adequate performance. They also suggest a *specific translator's competence* that is directly proportional to the production of contextual effects generated from two counterpart SL-TL units and also directly proportional to the overlapping of the two sets of effects, i.e., to the maximization of their interpretive resemblance. In their view, competence is not a *component* of the translator's mind, but a particular cognitive configuration that gradually develops from the dynamics experienced by the translator.

Göpferich (2009) lays out a model of translation competence as a referential framework for her longitudinal research project TransComp. In view of their early findings, Göpferich et al. (2011) underscore problems such as comparing groups of subjects with assumed levels of competence. Göpferich (2013) applies Dynamic Systems Theory to discuss the results of the TransComp project, focusing on the strategic sub-competence. They found that in nearly all decision-making categories, the students are considerably less successful than the professionals. In particular, the professionals invested less effort but were more successful in low-effort decision-making (routines) than the students, whereas in high-effort decisions (problem-solving), the professionals' success rate was only slightly higher than the students'. As

for the longitudinal perspective, students did not reveal progress in their problem-solving strategies and their creativity and routine values between semesters 1–4. With regard to the variables analyzed, professionals were not found to have yet achieved expertise, which Göpferich describes as the highest level of competence.

PACTE has thoroughly researched its competence model by contrasting the behaviors and products of 35 professional translators and 24 language teachers. PACTE (2008) focused on the 'knowledge of translation' sub-competence. In order to measure it, they developed a Dynamic Translation Index, by classifying and scoring the answers to a questionnaire on the subjects' beliefs and knowledge about translation. Two poles were considered: a dynamic approach (comprising textual, communicative and functionalist concepts) and a static approach (that combines linguistic and literalist notions). Translators turned out to have a much more dynamic approach to translation methods than language teachers do. PACTE (2008) also checked the efficacy of the translation process, as an indicator for the strategic sub-competence. No group effects were found, but further analysis of the 15 best subjects in each group yielded significantly better scores for the translators.

In PACTE's model, decision-making entails activating sub-competences while at task, so it reflects both strategic and instrumental sub-competences. PACTE (2009) studied the acceptability of translation solutions and decision-making. When translating into their L1, translators generally outperformed language teachers. When translating into their L2, translators were still somewhat better, but the difference was not important. Only 26% of the translators with the best L2 > L1 score obtained a comparable score in the L1 > L2 task. PACTE (2009) also reports on sequences of actions, where they distinguished between *internal support* (drawing on one's own mental resources) and *external support* (using reference materials) and two intermediate categories. They found that language teachers tend to rely more on internal support and that translators tend to consult materials but take their decisions mainly based on internal support. Translating into the L2 triggered many more decisions based on reference materials in both groups.

PACTE (2011a) found that translation problems identified by subjects varied greatly depending on the individual and that directionality plays a role in the definition of the difficulty of translation problems. The subjects' perception of the overall difficulty of a ST and the acceptability of their solutions to translation problems were unrelated. PACTE (2011a) also concluded that the characterization of translation problems does not seem to be a feature of

translation competence. In this volume, PACTE presents its results on the acquisition of declarative knowledge of translation.

3. Writing

Advances in forensic stylistics have proved that texts and speech producers display certain idiosyncratic regularities. This is also true for translators and interpreters who, for example, may prefer certain lexico-grammatical features and a more or less varied lexical choice (Shlesinger 2009). Henriksen (2007) shows that the variable stock of formulaic language that EU interpreters use is acquired as part of their process of professional socialization and that it often correlates with higher value judgments about their abilities.

Comparing monolingual writing and translating was a pending subject in TPR that key logging finally made possible. Text segments processed at once, usually flanked by pauses, are often viewed as a cognitive or processing unit. Hence, pauses have usually been interpreted as potential indicators of mental activity related to the text segments neighboring that pause. Immonen (2006) compared the distribution of pausing time in fluent monolingual writing and in translation by 18 professional translators. The writing task was based on a brochure and the subjects also had a copy of the magazine where the text would be published. Immonen found that, in both tasks, pause duration is longest between paragraphs and successively decreases when it separates smaller linguistic units. When the tasks were contrasted, translating displayed a particular pattern: pauses in paragraph and sentence boundaries, which are assumed to be used mostly for macro-planning, were considerably shorter than in monolingual writing, whereas pauses at clause level and lower, where word choice and grammatical structures are decided, were longer.

Immonen & Mäkisalo (2010) studied the same data to focus on pause length in phrases (categorized as to their type, function, and length) and in clauses, categorized as to their type. In general, translators seem prone to process enough text to be able to start writing and to pause longer during the actual writing of the text. In monolingual writing, pauses preceding subordinate clauses tend to be much shorter than those preceding main clauses. When translating, both types of pauses are roughly of the same length. Hence, when translating, subordinate clauses seem to be processed as separate clauses. When phrases are considered, Immonen & Mäkisalo suggest that verb phrases are probably processed during sentence initial pauses, whereas noun phrases—which demand more processing time than verb phrases— and adpositional phrases (e.g., prepositional phrases) seem to be processed locally and may result in (longer) phrase medial pauses.

One of the main potential differences between free monolingual writing and translating is that, in the latter, the coordination of reading and writing should tax translators' cognitive resources. Dragsted & Hansen (2008) found that, when translating, the reading and writing activities did not match and that pauses seemed to signal coordination efforts to move from comprehension to production modes. In a follow-up study, Dragsted (2010) suggested that there are differences in coordination between professionals and translation trainees: Professionals would continuously shift between ST and TT, and their comprehension and production processes would overlap; in contrast, students would favor sequential activities, probably to reduce cognitive effort.

With a similar approach to that in her previous studies, Immonen (2011) compared the monolingual writing processes and the translating processes of 28 translators, this time individually before the group was considered. She found no correlation between the processes of both tasks in individuals, who also displayed a large variation in their processing units. Differences between monolingual writing and translating were in general more important at syntactic processing, probably due to the search for equivalents to accommodate SL structures to the TL.

We can thus hypothesize that translating and monolingual writing are similar in several respects, but that they also entail behavioral differences related to their goals and to the coordination of reading and writing. Could skills developed for one task transfer or support the other task? Göpferich, in this volume, explores whether the subjects' ability to express themselves in their L1 and their L2 are different, and whether translation exercises are useful to improve writing skills.

4. Mental load and linguistic complexity[4]

Mental resources, or mental capacity, are generally assumed to be limited. Mental load refers to the portion of the limited central-processing capacity engaged on task execution. During complex mental activities, the amount of information and interactions that are processed simultaneously can overload and even deplete this finite amount of mental resources. Research on mental load has implicitly been present since the beginnings of interpreting research, but the fullest current version is Gile's effort model, that many contributions try to redress or enlarge.

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4. *Cognitive effort* is the usual term in translation research, and so is *cognitive load* in interpreting research. Here *mental load* is used to refer to both. An introduction to the subject in TPR in Muñoz (2012).

Wu & Wang (2009) argue that sometimes expert interpreters will out-perform beyond the postulated limitations of cognitive resources, and also that interpreters stand out from other people in their central executive management functions, rather than in their memory capacity. Departing from the recursive nature of the chunks that can be held active in memory, they suggest that each discourse segment is actually processed as a discourse of its own, and they draw from Van Dyck's theory of macro-structures and Halliday's functional grammar to formulate three recursive discourse-transformational rules for deletion, construction and generalization that help explain performance beyond conjectured limitations.

Gile's efforts model is based on the notion that mental resources form a single, undifferentiated pool. In contrast, Seeber (2011) draws from the hypothesis that cognitive resources are multiple and may conflict more when they share some particular processing dimension. Seeber offers a conflict matrix to predict the amount of overlap and interference between cognitive tasks. His Cognitive Load Model reflects and quantifies mental load as a function of both input and output features, which Seeber illustrates with estimations of cognitive resource allocation in coincident and diverging syntactic structures (SVO/non-SVO). Seeber (2013) reviews and discusses analytical, subjective, performance and psycho-physiological methods to identify, isolate and measure mental load. He favors pupillometry as a means to objectively measure cognitive load, although he cautions that it requires comprehensive data preparation. Also, pupillometry seems more reliable when assessing local mental load induced by short stimuli (sentence level and below) and does not help to attribute mental load to individual component tasks.

Pym (2009) reanalyzes the data from one of Gile's experiments. He focuses on omissions, whose corresponding ST segments he classes as high risk or low risk, depending on their threat to achieving the communicative aim of the discourse. Pym suggests that cognitive management at interpreting also responds to contextual factors such as the aims of the discourse, the strategies of the speakers, and the variable risks of the text items. He hopes for a slightly larger framework that will fit translators as well and he lists several points in common between translation and interpreting, such as time constraints, over-lapping of efforts, online repairs, multi-tasking, and also documentation and use of electronic tools. This is what many researchers have tried to do, often studying mental load in post-editing and in sight-translation, and linking it to linguistic complexity.

O'Brien (2006) explored how to assess mental load when post-editing MT output by using Translog (to focus on pauses) and Campbell's Choice Network

Analysis (CNA), which rests upon the hypothesis that the differences in TO segments from the same ST segments point to the degree of difficulty of such ST segments. O'Brien found that pauses are somewhat useful as indicators of mental load in post editing, but also that it is very difficult to correlate mental load with pauses, source text difficulty and target text quality. Other methods, she concludes, are necessary to supplement pause analysis, such as CNA and other aspects of keyboard monitoring. Jensen (2009) ranked three texts as to their results in seven readability indices, in word frequency calculations, and in the counts of some instances of figurative language (idioms, metaphors, metonyms) and found that all indicators offered similar results. His work is inconclusive, but raises several interesting questions and suggestions for further research, such as whether idioms, metaphors and metonyms are, on the whole, more difficult to translate than literal expressions.

Metaphor was already a popular topic in TPR (review in Schäffner & Shuttleworth 2013), and the potential difficulties it may pose to translators have also been studied. Rydning & Lachaud (2011) found that subjects achieved more conceptual clarity with literal meanings than with figurative meanings, and that conceptual clarity was also higher with primary metaphors than with complex metaphors, although they also detected more conceptual clarity in literal primary meanings than in complex primary meanings. Sjørup (2011) discovered that eye fixation times were longer for metaphors than for literal expressions (see next section). She argued that it was not clear whether differences were due to comprehension or to production, but found that subjects preferred translating metaphors with direct metaphorical equivalents and also argued that paraphrasing probably involves higher mental loads. Zheng & Xiang (2013) found that metaphors slowed down production and compromised quality, and that such results were related to comprehension and to the reallocation of cognitive resources.

Other research efforts related to text complexity and mental load concentrate on syntax. Shreve, Lacruz & Angelone (2010, 2011) found sight translation to be more sensitive to cognitive disruptions due to syntactic complexity and also that subjects were more affected by visual interference when sight translating. Hild (2011) compared the performance of experts and novices when interpreting two texts that had been profiled according to several syntactic parameters. She found that all parameters affected the performance of the novices, and that redundancy seems to modulate such effects in experts. Meuleman & Van Besien (2009) found interesting behavioral correlations in the choice of coping strategies in interpreting: the subjects in their tests preferred tailing when they had to cope with high-speed delivery,

and segmentation when they had to deal with complex syntax. Dragsted (2012) studied the number of alternative renditions of words in the translations of the same ST (i.e., CNA) by eight translator trainees and found highly significant correlations between high target text variability and high fixation counts, long gaze time and long pauses. Chmiel & Mazur (2013) eye-tracked interpreting students at two stages of training when sight-translating and found readability to be potentially a more important factor in processing than the distinction between simple/complex sentence structure and also SVO/ non-SVO word order. This is the area to which Alves, Gonçalves & Szpak have contributed in this volume. Using Relevance Theory as a referential framework, they focus on the potential differences in mental load caused by processing open and closed word classes.

5. Advances in research methods

Reliability, validity, and appropriate use of research tools and methods have been a primary concern for TPR researchers since the nineties. Research methods are of course part of all empirical reports, but 13% of the papers in the sample centered on them.

Within introspective methods, Sun (2011) finds no strong evidence suggesting that thinking aloud significantly changes or influences the translation process. Nevertheless, Jääskeläinen (2011) argues for a systematic study of verbal report methods and presents a project to test the validity of thinking aloud. Englund Dimitrova & Tiselius (2009) explore retrospection in simultaneous interpreting and in translation and describe the differences in the results, although they caution that subjects were inexperienced students. They conclude that retrospective data cannot be taken as sole evidence for cognitive processes or strategy use, but that it can yield interesting results when combined with other methods (see also Hansen 2006). Ehrensberger-Dow & Künzli (2010) compared thinking aloud and retrospection. They suggest that thinking aloud may yield more information on revision, and that retrospection may be better suited to access explicit information on the use of sources, strategies and problem solving. In any case, they agree that combining several data sources is essential to accurately interpret and categorize verbalizations. However, Sun (2011) also notes that different data-collection procedures serve different purposes and that multi-method approaches, now often regarded as optimal, may also have some disadvantages.

In sum, there are still conflicting views on the use of introspective methods and more research and reflection seem in order. In this volume, Englund Dimitrova & Tiselius present a follow-up study in which they contrast

retrospective data with process data from professional and trainee translators and interpreters working on the same text. The cue for retrospection in this case was a transcription of the TO, and not the process data, so as to ensure they were tapping from long-term memory.

Pavlović (2009) retakes the dialog and joint protocols used by Séguinot, House, Hönig and (mainly) Kussmaul by the end of the 1980s and the beginning of the 1990s, which she terms *collaborative translation protocols.* They are transcriptions of the recorded communicative exchanges of people translating the same source text together, who base their decisions on mutual consensus. Hence, they not only tap on individual processes, but also on the interaction between the subjects involved. Following Séguinot, Pavlović argues that rationalizations do not invalidate the approach. This might be generalized to all introspective methods in TPR. They may not grant access to "real" mental processes, but they provide extremely valuable data to support inferences and hypotheses on conjectured mental processes, a kind of information that is hard to impossible to access with observational methods. Furthermore, they may also let researchers know how subjects envision their processes, which may in turn impinge on the ways the carry out their tasks (see section 7).

As for observational methods, many methodological papers deal with the use of the latest newcomer, eye tracking, or with the combination of eye tracking with other data-collection procedures (e.g., Jakobsen 2011; Lachaud 2011).[5] O'Brien (2009) addresses several problems in using eye-trackers and suggests solutions for most of them. She also notes that the equipment is relatively expensive and that what and how participants translate (e.g., text length, font size) may challenge ecological validity. Sometimes potential problems are not inherent to the tool or the procedure itself, but to decisions taken when they are used. One of the indicators used in eye-tracking studies is gaze fixation, i.e., where and for how long do subjects set their eyes while at task. For example, Sharmin et al. (2008) found that text complexity led to more frequent fixations, whereas when subjects translated under time pressure, fixations were shorter. Gaze-fixation measurements entail decisions as to their minimal duration and also as to the area to be considered a unit. The chosen values are referred to as *filter settings* or simply *filters.* Alves, Pagano & da Silva (2009) show that using different filters has a strong impact on the results, and they underline the need to standardize parameters to include and exclude data, in order to allow for reliable comparisons across data samples.

5. For a recent review of TPR studies using eye-trackers, see Alves, Gonçalves & Szpak (2012).

In this volume, Hvelplund offers a general introduction to eye tracking and a summary of usage recommendations and cautions that zooms on the challenges in the analysis and interpretation of eye-tracking data.

Eye-tracking has fostered new studies on reading-for-translating and on the coordination of reading and writing. For instance, Castro (2008) and Jakobsen & Jensen (2008) studied behavioral differences in four reading tasks—from unmotivated reading to reading while performing written translation—and found consistent increases in task duration, eye fixation frequency, gaze time and average fixation duration (see also Dragsted, Hansen & Sørensen 2009).

6. Revision and metacognition

In 2006, Shih could only point to a few studies on [end-] revision, even though, she remarked, [self-] revision behaviors were constantly observed in process studies (review in Mossop 2007). Shih found that translators revised their output mostly twice, mainly right after producing their first drafts and rarely beyond overnight. Her interviewees confirmed most criteria in trainers' checklists and also added new categories that showed that they had developed their own revision habits from experience and feedback. Since 2006, revision has been the subject of several studies mainly related to a hypothesized tendency to over-revise and to the differences between end-revision vs online revision (revising while drafting).

Künzli (2007) found a tendency to over-revise in professionals, who also missed many errors, and also a large inter- and intra-individual variation that he related to motivation and a lack of an appropriate task definition and of established revision procedures. Malkiel (2009) studied self-corrections in 16 translation trainees—each half with a different L1—who translated two texts, one in each language. She did not find any ST or directionality effect (but see Alves, Pagano & da Silva 2009 for the opposite result). Only 20% of self-corrections were predictable, in that they corresponded to phenomena that usually posit difficulties in that language pair, and most self-corrections were word and phrase replacements with synonyms. This she linked with a combination of a mature attitude to translating and a lack of self-confidence due to a rudimentary appreciation of what professional translation entails.

Koby (2007) studied computer editing in a mixed sample of professional and non-professional informants in order to find tendencies in on-line revision or end-revision. He found both styles to be equally fast, although online revision was more efficient. Antunović & Pavlović (2011) studied online versus end- self-revision in 10 translation trainees working from the

L2 and L3 into their L1. They concluded that the relative duration of drafting and post-drafting activities, and the distribution of self-correction over these phases were independent of SL command; they rather seemed related to individual subjects' habitual behavior, so they might be a defining trait of translators' styles. The number of self-revisions undertaken per one problem, though, was higher when translating from the L3.

The revision categories in Shih (2006)—who condenses and enlarges previous proposals—and the tendencies to over-revise found in many studies point to a concentration on the TT when revising. Are there differences in quality between revisions that contrast ST/TT and those made by only using the TT? This is what Marashi & Okhowat (2013) set out to determine. To this purpose, 40 editors where handed a TT, and half of them were also provided with the ST. There was no significant difference between the frequency of the editing comments, nor in the quality of the final versions, evaluated by two independent raters. Interestingly, editors in both groups stated that accuracy was their most important criterion, so the authors conclude that editors do not essentially need to have a thorough mastery of the source language, but would rather benefit from training in TL editing.

Künzli (2007) and other authors point out that revision is very relevant to translator training. Before syllabi are changed, however, it is worth considering how to optimally articulate revision in training programs. For instance, revising entails assessment, and Robinson, López & Tercedor (2006) investigated the results of introducing self- and peer-assessment in an online translation course. They found that, while learning outcomes remain constant, the new assessment procedures increase students' awareness of the translation process. Fernández & Zabalbeascoa (2012) found a positive correlation between the performance of translator trainees and the quality of their self-evaluation in a metacognitive questionnaire.

Dam-Jensen & Heine (2009) suggest how translation process research methods can be used as pedagogical tools in order to increase students' understanding of themselves, as learners, thinkers and problem solvers. Pym (2009) reports on three "lousy" experiments carried out in class for pedagogical purposes, whereby students can draw their own conclusions about their own developing abilities and set their own short-term learning goals (see also Hansen 2006 and Massey & Ehrensberger-Dow 2011). Angelone (2013) combined the previous research topics —i.e., revision and the application of research tools in translator training— in order to explore the efficacy of (Gile's) Integrated Problem and Decision Reporting logs, recorded verbalizations, and screen recordings as revision tools to recognize problems and

mitigate errors. Six students translated 9 ST of ca. 250 words while alternatively using each of the research tools. Then they analyzed the protocols they had created, looking for problem indicators, and finally they entered revisions at will and turned in final versions. TTs were analyzed for errors and, when cross-referenced with the tool they had used, screen recording turned out the most efficacious self-reflection activity type for purposes of error mitigation, perhaps because the guided visual attention promoted by screen recordings catalyzes a heightened state of cognitive awareness. In this volume, Shreve, Angelone & Lacruz report on a partial replication of Angelone's experiment, now focused on other-revision, instead of on self-revision.

7. Cognition beyond conscious, rational thought

 "There is nothing more practical than a good theory." This quote is attributed to Kurt Lewin, the father of modern social psychology, and it is appropriate to start this section because one of the most notable advances in the last years has been theoretical. It is a change of perspective that has brought about a whole range of effects and expansions in TPR. In the last years, many TPR researchers have gradually abandoned the view of the mind as a computer, which had isolated the study of the mind from both its neurological foundations and its personal, social, and cultural framings (see criticisms in Vandaele 2007; Muñoz 2010a; Halverson 2013; Risku & Windhager 2013). Advances in the neurological foundations are still modest (see, however, Diamond & Shreve 2010, Lehr 2010; Moser-Mercer 2010; Hervais-Adelman, Moser-Mercer & Golestani 2011; García 2012), but reinstating the human, social and cultural dimensions of cognition has had an enormous impact, by fostering quite a number of new research trends.

Translation strategies, problem-solving, decision-making and creativity rightly continue to attract much interest (e.g., Halverson 2007; Jääskeläinen 2009; Pavlović 2010; Horváth 2010; Bayer-Hohenwarter 2012), but now the enormous variation found in subjects' behavior can be addressed from the perspective of their emotions, intuitions and individual behavioral styles. Durieux (2007) explains that decision-making is not the result of pure rational thought and strict inference rules. The process is conditioned by human cognitive limitations, the availability of information, and the time span available to make such decisions. Decision-making is also governed by emotions and controlled by selective attention in a cycle that Durieux sketches as *perception > appraisal > emotion > selective attention > information processing > decision*. Davou (2007) also argues that primary appraisals of the emotional impact of the information precede information processing and set the mode in which it will be processed.

She states that negative emotions may increase processing effort and decrease available cognitive resources whereas positive emotions will expand attention and creativity. In this volume, Rojo & Ramos report on a reaction time experiment to test whether the translation process slows down when translating words and expressions contrary to the translator's political stance.

Uncertainty has been the subject of some recent research efforts. One way to define uncertainty is as a lack of information about an event. Uncertainty may lead to an aversive state often linked to feelings of anxiety and stress, so people tend to try to reduce it. Angelone (2010) explored behavioral indicators associated with uncertainty management in translation. He found that these indicators are often bundled in triads of problem-recognition, solution-proposal, and solution-evaluation, which may be interrupted. He also found an expertise effect not in the quantity, but in the ways subjects use metacognition to regulate problem solving. In a follow-up study, Angelone & Shreve (2011) argue that TT quality may be associated to the patterns found in the translators' metacognitive management of uncertainty.

Another assumption of traditional views on decision-making and problem-solving is that they are conscious processes. Hubscher-Davidson (2013) argues that if knowledge acquired consciously can be interiorized or automatized through practice, then nonconscious information processing is a valid resource for problem solving. Thus, she discusses intuition as a potentially vital component of translator behavior that could help to predict effectiveness. She illustrates this by analyzing extracts from the TAP of a student who participated in a previous experiment that involved translating and answering the Myers Briggs Type Indicator questionnaire to measure preferences for holistic intuition or for abstract, rational thought.

Both emotions and intuition draw from past experiences of the subjects. Could there be systematic differences in the ways the tasks are carried out that depend on accumulated experience and knowledge? Van Besien & Meuleman (2008) studied the behaviors of two interpreters and concluded that some local strategies, such as anticipation, were equally distributed, whereas others, such as transcoding and backtracking, showed personal preferences. Such personal preferences also seem to comprise the way they use global strategies, such as additions and omissions. The authors suggest that these differences point to two interpreting styles (see also Kajzer-Wietrzny 2013; for translation, see Dragsted & Carl 2013). PACTE (2011b) focuses on the ways subjects approach the translation of whole texts and lower linguistic units comprised in such texts, with retrospective interviews and also by means of a questionnaire where subjects stated their priorities in the task. Then they

cross-referenced these results with those of the Dynamic Translation Index (see section 2). They found close relationships between subjects' approach and beliefs. In other words, conscious and also implicit beliefs have a bearing in translators' styles and in their decision-making. Following this trend, in this volume Presas & Martín de León study the role of implicit theories [beliefs] in decision-making. Combining several data-collection procedures and tasks, they trace translator trainees' theories about translation and their evolution, and try to discern to what extent they influence the translation process (and, in current work, their outcomes).

Schrijver, Van Vaerenbergh & Van Waes (2012) explore *transediting* in students' translation processes. In its original understanding, transediting seems to refer to the operations carried out by translators in order to adapt their TTs to (a) the standards of efficiency in expression in the TL; (b) the intended function of the TT in their new context; and (c) the needs and conventions of the intended addressees. The authors see connections between transediting and House's *covert translation,* Nord's *instrumental translation*, and even Gutt's *indirect translation,* so the need for a separate concept is questionable (cf. Schäffner 2012). In any case, they found that the subjects varied as to the phase (pre-writing, writing, and post-writing) where they would perform certain transediting operations, such as macro-level restructuring and additions, and ascribed such differences to the subjects' working styles. Most operations belonged to situational and cultural transediting (types b and c above). Interestingly, no clear link was found between the use of transediting and the subjects' declarative knowledge and experience. So, what is it that makes translators and interpreters adapt their production to their envisioned addressees? In this volume, Apfelthaler reviews studies on target audience orientation and claims that such orientation might be related to cognitive empathy, which he is now researching with a multi-method approach that he describes in detail.

8. Recontextualized research

Risku (2010) argues that once we move from information processing in laboratory settings to full real actions mediated by technologies in specific environments, we need to enlarge our research interests to cover areas such as agent cooperation, tool usage and the interplay with the environment. For example, Roziner & Shlesinger (2010) evaluated the use of remote interpreting in large multilingual institutions and found small effects on the quality of the interpreting and on interpreters' physical health and levels of stress, but also considerable psychological effects, e.g., an increase in feelings of

isolation and alienation. Mouzourakis (2006) suggests that interpreter alienation is associated with lack of concentration and motivation and that, in remote interpreting, alienation is determined by the interpreters' perception of the meeting room as mediated by image displays.

Mouzourakis (2006) notes that such psychological effects and related physical complaints are not unique to remote interpreting, but rather shared by all human operators working in virtual environments. Translating is a paramount example of teleworking, and virtual environments and the interaction with electronic tools have a powerful effect on translators' behavior and mental processing.[6] For instance, Plassard (2007) shows that distribution lists have modified traditional individual approaches to translation problem solving, for now problems may also be tackled and solved collectively. In order to study changes in the ways people work, Mouzourakis (2006) cogently argues that we need to define a minimum common set of parameters so as to be able to compare normal or baseline conditions with the modified conditions of actual working practices or new forms of language mediation—he actually refers to comparing interpreting with remote interpreting, but this can be generalized to all tasks researched in TPR.

By taking translation and interpreting out of the laboratory, we have found that perhaps we do not know so much about actual working practices. For example, Ma & Wu (2008) found that the generalized assumption that interpreters will reach higher accuracy when planning before or during task execution might not be totally justified. In this volume, Risku shows the complex social network freelance translators are part of, and how they will externalize parts of the process and thus transform the "internal" processing into an interaction with self-produced outer stimuli.

Restoring the subjects' working environments in research has also paved the way to study real work content in translation agencies and the interaction between agents in the process, such as their communication patterns in translation projects and booth teamwork (e.g., Kuznik & Verd 2010; Zehrer 2012; Chmiel 2008). Once full-fledged cognition (rather than individual, rational, conscious information-processing) has been reinstated in the study of the translation and interpreting processes, research methods—often devised for studying isolated, minimal units in laboratory settings— need to be reconsidered. Hansen (2010) suggests TPR should go beyond quantitative data to adopt a more integrative approach involving the subjects' life story as well (but see House 2013). Hubscher-Davidson (2011) convincingly argues that, alongside

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6. Christensen (2011) reviews studies on mental processing when using CAT tools.

quantitative methods, TPR scholars might benefit from using ethnographic methods to better tap less tangible aspects of the translation process, such as translators' self-concepts, perspectives and intentions, their visualizations or their emotional and intuitive behaviors. Nevertheless, while it is obvious that translation and interpreting processes comprise more elements and factors than what can be operationalized in a task trimmed for laboratory conditions, it is also true that such conditions often yield interesting and useful results. The question is not whether one method is better than another one, but whether they do justice to a particular research aim.

In this period, multi-method approaches to data collection have already blurred the distinction between introspection and observation, and between quantitative and qualitative research, by combining them all. Also, the opposition between process and product research, which used to be the backbone argument for the budding TPR strand within TS in the 1980s, is no longer valid. Language is behavior and, consequently, so is written and oral language production. Research on mental processes in translation and interpreting cannot ignore products or restrict their use to just evaluating quality or performance (see, e.g., Halverson 2010).

How do we establish an optimal correspondence between research topics and the methods applied to study them? Muñoz (2010b) suggests that TPR might be organized in three levels: (a) the set of mental states and operations that play a role when translating and interpreting, and the ways they are constructed and carried out, such as understanding, problem-solving and dichotic listening; (b) the variable set of sub-tasks and observable operations that often entail combining and managing the mental states and operations in the previous level, such as reading, revising, and self-monitoring; and (c) the roles, cognitive contributions, and relationships of all relevant agents who interact in the production of translations and interpretings. Chesterman (2013) proposes a three-fold distinction between (a) *cognitive translation acts* (mental processes); (b) *translation events,* where mental processes are sociologically embedded, and (c) *translation practices* (where translation events are embedded in history and culture). These are different suggestions; the first one maintains a cognitive approach across levels, whereas the second places current TPR studies within the larger landscape of TS. In any case, we need hands-on knowledge of what they entail, because methodological standards at one level or perspective might be totally inappropriate at another level. This is what Massey & Ehrensberger-Dow (2011) did in their project "Capturing Translation Processes." They collected data on (1) the situation surrounding the translation activity; (2) the practices the translators engaged

in; (3) the comments about translation processes; and (4) the translation products. Massey and Ehrensberger-Dow monitored staff translators at their usual workplaces, but they also tested them in controlled conditions in their lab. In this volume, Ehrensberger-Dow addresses the challenges of TPR research at the workplace.

9. Corollary

Let us contemplate this blurred snapshot for a minute. Advances in our knowledge on competence or expertise are yielding a clearer picture of what it takes to become an excellent translator or interpreter. Mental load has been tested in several tasks and situations, and from different perspectives. In particular, the relationship between mental load and professional tools, and between mental load and language and text/discourse features has been particularly informative. Concentrating on mental load has proved to be a good move, because it seems to impinge on both productivity and quality, and also on the welfare of translators and interpreters. Established data-collection procedures, such as introspective methods, have been thoroughly tested to determine their optimal application. New procedures have made it possible to study under-researched process components, such as reading and writing, and their interaction. Revision, sight translation and post-editing have also emerged as particularly interesting areas of study. In all of them, there seems to be a tendency to focus more on diverse expressions of mental control, such as monitoring and metacognition, than on assumed stable capacities, such as memory.

The field is slowly but steadily moving towards updated understandings of cognition that have challenged the focus on isolated, conscious rational thought, and have opened the door to the study of emotions, intuition and uncertainty, and their influence on the ways people translate and interpret. The translators and interpreters' experience and beliefs have been shown to have a bearing on the way they carry out their tasks, but not necessarily on their products. This has paved the way to study individual psychological traits and preferences, which compound into personal working styles. Much research is and will be carried out in labs, but now the full environment and conditions are also being observed, and research has also reached the working place. New settings and research topics call for an adjustment in research methods, and some multi-method strategies are being implemented that may soon shed light on the most appropriate ways of tackling different research goals. We may still not have the answers to many questions, but we are learning how to ask the right questions. These were the topics we addressed in TPRW3, and these are the topics addressed by the following articles.

Let us now zoom out a little bit and widen our scope. In the last eight years, contributions to cognitive and psycholinguistic approaches to translation and interpreting processes have doubled, and their quality has also risen in parallel. They are still a fuzzy set of only partially overlapping efforts, but that is just the normal state of affairs in any cutting-edge research domain: differences are what make research fields progress. Convergence is, however, already noteworthy and shows that not only TPR results, but also its ways and goals are relevant for fast-paced societies where translation and interpreting have become a must not only for the elites, but also for ordinary citizens in their everyday life. In my view, all of the above proves that, indeed, TPR matters, and that it matters more than ever before.

This snapshot also has some darker areas. The analysis of the publications shows that single researchers signed more than 60% of the contributions, and that a further 28% was written by only two. Many co-authored papers were written by the same people, intellectual partners who very often belong to the same institutions or research teams. This hints at a lack of exchange and cooperation that only lately seems to be losing ground.[7] We are not only borrowing from neighboring disciplines (cf. O'Brien 2013), but also—and heavily—from each other, as was to be expected. Nonetheless, research projects often mix many trends in ways than make them highly interesting, but also particularly difficult to frame or contrast. Many research efforts mentioned in a given section of this text might have featured in other sections as well. Research topics seem sometimes volatile, and not always thanks to advances in our knowledge.

A final word on publishing. Nearly half of the contributions in the sample related to interpreting were unsurprisingly published in *Interpreting.* The other half was scattered mainly between edited volumes, EST proceedings, and the rest of the journals. This may be partially explained by the growing interest in community interpreting, which had more publications than interpreting process research in all journals throughout this period, but their concentration in *Interpreting* also hints at a need to restructure a publication landscape dominated by generalist journals, where sometimes TPR contributions are not refereed by reliable specialists, and where they need to enter in an unfair competition with articles from very different approaches. The journal *Interpreting* has obviously provided a backbone to the emergent Interpreting Studies.

7. For instance, in 2011 the international research network "Translation / Research / Empiricism / Cognition" (TREC) was created with 13 TPR groups from 10 countries. It was an initiative of PACTE Research Group.

Even so, Napier (2011: 127) remarks that many excellent research efforts in interpreting remain unpublished. One can only wonder how many valuable research efforts in TPR march directly from the press into the academic grey literature or simply sink into oblivion. In this period, many contributions by the 85 authors with more than one TPR-related publication have been published in "secondary" venues, and some contributions by very productive and cited TPR authors are to be found elsewhere too. The time seems ripe to consider whether it would be good to have a focused TPR research journal.

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BIONOTES / NOTAS BIOGRÁFICAS

Ricardo Muñoz Martín has been a freelance translator since 1988, mostly part-timing. After his training in languages and translation, he received his PhD in Hispanic Linguistics from UC Berkeley in 1993. He has trained transla-tors at several universities ever since. Currently, he is Professor of Translation Studies at the University of Las Palmas de Gran Canaria, Spain. Since 2002, he coordinates the Research Group "Expertise and Environment in Translation" (PETRA, Spanish acronym), devoted to empirical research into translation processes. His main research interests include cognitive translatology and translator training. Muñoz has published articles in several journals, such as Babel, Meta, The Translator, Translation Spaces and Perspectives, and chapters in books by publishers such as John Benjamins, Mouton de Gruyter, Routledge and Samfundslitteratur.

Ricardo Muñoz Martín ha sido traductor autónomo desde 1988, casi siempre a tiempo parcial. Tras su formación en filología y traducción, obtuvo un doc-torado en Lingüística Hispánica en la Universidad de Berkeley en 1993. Desde entonces ha formado a traductores en diversas universidades. En la actuali-dad, es Catedrático de Traducción en la Universidad de Las Palmas de Gran Canaria. Desde 2002 coordina el grupo de investigación «Pericia y Entorno de la Traducción» (PETRA), dedicado a la investigación empírica de los procesos de traducción. Entre sus principales intereses de investigación destacan la traductología cognitiva y la formación de traductores. Muñoz ha publicado artículos en varias revistas, como Babel, Meta, The Translator, Translation Spaces y Perspectives, y capítulos en libros publicados por editoriales como John Benjamins, Mouton de Gruyter, Routledge y Samfundslitteratur.

FIRST RESULTS OF PACTE GROUP'S EXPERIMENTAL RESEARCH ON TRANSLATION COMPETENCE ACQUISITION: THE ACQUISITION OF DECLARATIVE KNOWLEDGE OF TRANSLATION

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Abstract

This paper presents the first results of empirical-experimental research into the Acquisition of Translation Competence (ATC): the acquisition of declarative knowledge about translation. This study is based on our previous research about Translation Competence (TC). Some of the data collection instruments have, however, been adapted for current use. Details of our research design include type of study, universe and sample population, study variables, data collection instruments, and data analysis processes. The dependent variables were knowledge of translation; translation project; identification and solution of translation problems; decision-making; efficacy of the translation process; and use of instrumental resources.

The results of the first variable analysed ("Knowledge of Translation") will be presented. A questionnaire with 27 items was used to obtain data on translator trainees' knowledge of translation: their concept of translation and TC; translation units; types of translation problems; the different phases involved in the translation process; methods required; procedures used (strategies and techniques); and the role of the translation brief and the target reader. Indicators of this variable were 'dynamic index' and 'coefficient of coherence'. We understand a 'dynamic' concept of translation to

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1. PACTE members, in alphabetical order: A. Beeby, L. Castillo, O. Fox, A. Galán-Mañas, A. Hurtado Albir, A. Kuznik (Uniwersytet Wroclawski), G. Massana, W. Neunzig, Ch. Olalla, P. Rodríguez-Inés, L. Romero, M. Taffarel & S. Wimmer. Principal Researcher: A. Hurtado Albir.

be textual, interpretative, communicative and functional; as opposed to a 'static' concept that may be defined as linguistic and literal. The dynamic index allows us to see whether a subject's implicit knowledge about how translation works is more dynamic or more static, whereas the coherence coefficient allows us to see whether the subject's vision of different aspects of translation is coherent.

Resumen

Este trabajo presenta los primeros resultados de una investigación empírico-experimental sobre la Adquisición de la Competencia Traductora (ACT): la adquisición de conocimientos declarativos sobre la traducción. Este estudio se basa en nuestra investigación anterior sobre Competencia Traductora (CT), si bien, algunos instrumentos de recogida de datos sobre CT se adaptaron para investigar la ACT. La información sobre el diseño de la investigación incluye tipo de estudio, universo y muestra, variables de estudio, instrumentos para la recogida de datos y proceso de análisis de datos. Las variables dependientes son conocimientos de traducción, proyecto traductor, identificación y resolución de problemas de traducción, toma de decisiones, eficacia del proceso de traducción, y uso de recursos instrumentales.

Aquí se presentan los resultados de la primera variable analizada ("Conocimientos de traducción"). Se usó un cuestionario de 27 ítems para obtener datos sobre los conocimientos de los estudiantes en torno a: concepción de traducción y de la CT, unidad de traducción, tipo de problemas de traducción, etapas que intervienen al traducir, métodos requeridos, procedimientos utilizados (estrategias y técnicas), función del encargo de traducción y del destinatario. Los indicadores de esta variable son: "Índice de dinamismo" y "Coeficiente de coherencia". Diferenciamos entre una concepción "dinámica" de la traducción (textual, interpretativa, comunicativa y funcional) y una concepción "estática" (lingüística y literal). El Índice de dinamismo nos permite determinar si los conocimientos implícitos de los sujetos sobre el funcionamiento de la traducción son más dinámicos o más estáticos, mientras que el Coeficiente de coherencia nos permite saber si la visión de los sujetos sobre diferentes aspectos de la traducción es coherente.

1. Introduction and research objectives

This paper presents the first results of PACTE Group's empirical-experimental research into the Acquisition of Translation Competence. The results presented here deal with the acquisition of declarative knowledge about translation, the dependent variable 'knowledge of translation' that was studied earlier in PACTE's Translation Competence experiment. This variable is related to the 'knowledge-of-translation' sub-competence, i.e., the subject's implicit knowledge about the principles of translation. We want to investigate how students' concepts of translation evolve during the process of translation competence acquisition. We grouped these concepts into two main blocks: dynamic concepts (textual, interpretative, communicative, and functional) and static concepts (linguistic and literal).

The overall goal of our research is to study the Acquisition of Translation Competence. In order to reach this goal, we broke the work into two stages: (1) Translation Competence (TC) and (2) the Acquisition of Translation Competence (ATC). The ATC studies include a pilot test (June 2011) and the experiment proper (November 2011). Our ATC research uses the same TC model, variables, indicators and instruments validated in our TC research, although some instruments have been adapted. Thus, some information about this previous research is needed in order to contextualise the ATC results and to allow us to concentrate on our latest results. Therefore, we will begin with a brief summary of the salient aspects of our TC research. More information can be found in PACTE's publications (e.g., PACTE 2008, 2009, 2011a, 2011b.)[2]

2. Research into Translation Competence

2.1. Definitions and theoretical model

PACTE defines TC as the underlying system of knowledge, skills and attitudes required to translate. We believe that TC: (a) is expert knowledge; (b)

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2. See <http://grupsderecerca.uab.cat/pacte/en/content/publications>

is predominantly procedural knowledge, i.e., non-declarative; (c) comprises different inter-related sub-competences; and (d), includes a particularly important strategic component. In our model (PACTE 2003), TC comprises five sub-competences (bilingual, extra-linguistic, knowledge of translation, instrumental and strategic) as well as psycho-physiological components. Like all expert knowledge, TC is applicable to problem solving. Solving translation problems involves different cognitive operations within the translation process and requires constant decision-making on the part of the translator.[3] Expert translators thus possess the ability to solve problems, which forms part of TC. Since all bilinguals possess knowledge of two languages and may also possess extra-linguistic knowledge, we consider the sub-competences specific to TC to be strategic competence, instrumental competence and knowledge of translation. Our research, therefore, focuses on these three competences. We believe the strategic sub-competence to be the most important of all of them, with which it interacts during the translation process, since it serves to make decisions and to solve problems.

2.2. Research design[4]

2.2.1. General hypothesis

Our general hypothesis is that the degree of TC is reflected in both the process and the product of translating. Our empirical and operational hypotheses are based on PACTE's (2003) TC model.

2.2.2. Variables and indicators

One independent variable and five dependent variables were selected for the TC project and have been maintained for the ATC project. The independent variable was the degree of expertise in translation. As there are no external criteria or standardised tests to establish expertise in translation, we started from the premise that translators with a certain amount of professional experience are more expert than those without it. The independent variable has been manipulated accordingly, in terms of a higher or lower degree of experience. Thus, it is a bimodal variable with two categories: more professional

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3. Krings (1986) reports that, when analysing translation processes, problems may be detected through the subjects' behaviour: pauses, use of strategies, omissions, corrections, etc.
4. For background information about the conceptual framework used for the research design, see Neunzig (2011).

translation experience (translators with guaranteed professional experience); less professional translation experience (other foreign language specialists with no professional translation experience).

The dependent variables are: (1) 'knowledge of translation'; (2) 'translation project'; (3) 'identification and solution of translation problems'; (4) 'decision-making'; (5) 'efficacy of the translation process'; and (6) 'use of instrumental resources'. Based on data from our exploratory and pilot tests, a total of 18 indicators related to the six dependent variables were analysed in the TC and ATC studies. Two more indicators have been added, the *(transversal) acceptability indicator* and the *dynamic translation index,* related to the 'knowledge of translation' and 'translation project' variables. Thus, a total of 20 indicators have been analysed.

2.2.3. Universe and sample

The universe for our TC sample was that of professionals working with foreign languages. From this universe, two experimental groups were selected: professional translators, and foreign-language teachers. Thirty-five professional translators (N= 35) and twenty-four foreign-language teachers (N= 24) participated in the experiment on TC.

2.2.4. Tasks, instruments and types of analysis

Subjects performed the following tasks: (1) direct translation; (2) completion of a questionnaire about problems found in the translation; (3) inverse translation; (4) completion of a questionnaire about problems found in the translation; (5) completion of a questionnaire about translation knowledge; (6) participation in a retrospective interview. Hence, data-collection instruments included source texts and translations, questionnaires, and interviews. Further data were obtained by monitoring the translation process with Proxy, making real-time recordings of subjects' actions with Camtasia, and direct observation.[5] Data were then triangulated by (a) comparing results for the indicators of study variables; (b) comparing translators' and teachers' performance; (c) comparing their performance in direct and inverse translation; (d) comparing results for indicators of all variables and for 'acceptability'.

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5. Proxy was a Windows-compatible program to remotely control computers and terminals connected to a network. Camtasia records the subject's actions on the computer in real time and stores these recordings for later study (see <http://www.techsmith.com/camtasia.html>).

2.2.5. Prototypical translation problems: 'Rich points'

We view translation as a problem-solving process, so we focused on data collection and acceptability analysis of specific source-text segments that contained translation problems. Inspired by Nord (1991), we decided to refer to these segments as *rich points*. Focusing data collection on selected rich points also aimed to facilitate the collection process, following Giegler's (1994) concept of 'scientific economy,' and triangulation of data (cf. PACTE 2008, 2009; Neunzig 2011).

The rich points were selected as a result of exploratory studies and pilot tests carried out before the experiment (PACTE 2002, 2005a, 2005b). In order to identify rich points in each text, the following types of translation problems were taken into account:

- Linguistic problems: lexical (non-specialised) and morphosyntactic
- Textual problems: coherence, cohesion, text type and genre, and style
- Extralinguistic problems: cultural, encyclopaedic and subject-domain knowledge
- Problems of intentionality: difficulty in understanding information in the source text (speech acts, presuppositions, implicature, intertextual references)
- Problems relating to the translation brief and/or the target-text reader (affecting reformulation) that, from a functionalist point of view, would affect all Rich Points.

The experimental source texts (a Spanish source text for translation into English, French, or German; and English, French and German source texts for translation into Spanish or Catalan), together with five rich points in each of them, were trialled in a 2004 pilot study (reported in PACTE 2005a, 2005b).

2.2.6. Acceptability as a transversal indicator

Acceptability is defined in terms of whether or not the solution effectively communicates (a) the meaning of the source text; (b) the function of the translation (within the context of the translation brief, the readers' expectations, and genre conventions in the target culture); and (c) makes use of appropriate language. Thus, 'acceptability' is associated to the quality of the translation product, and these criteria have been used to identify acceptable, semi-acceptable and not acceptable solutions for the rich points selected in the texts. The quantitative and qualitative analysis of data from our exploratory tests (PACTE 2002) and pilot study (PACTE 2005a, 2005b) confirmed

the importance of this indicator in measuring the subjects' TC. It is the only indicator used in conjunction with specific indicators of each variable.

Results from the TC experiment (PACTE 2008, 2009) showed that the group of translators obtained more acceptable results in their translations than the group of foreign-language teachers, both in direct and inverse translation. However, the difference in the acceptability of the results between both groups is much greater in direct translation (see table 1).

'Acceptability'		Translators	Teachers
Direct translation	**Mean**	**0.73**	**0.49**
	Median	0.80	0.45
Inverse translation	Mean	0.52	0.48
	Median	0.50	0.40

Table 1. Acceptability scores for direct and inverse translation.

2.3. Results. Validation of texts and sample

Results for the variables in the TC experiment can be found in PACTE (2008, 2009, 2011a, 2011b, and in progress). Here we will just mention some methodological results that validate the experimental design in relation to the selection of texts and subjects. As explained above, acceptability is evaluated in relation to selected rich points in the texts. Rich points were also used to ensure that the three source texts (English, French and German) for the direct translation task were really comparable. Test subjects answered a questionnaire for each text they translated, where they marked the global difficulty of the text on a scale of 30 points. Perception of difficulty was calculated on a scale between values 0 (easiest) and 1 (most difficult). Table 2 shows the results for the group of translators. No significant difference in text difficulty was perceived among the three STs. The comparability of the texts was thus validated by the subjects' perception of the global difficulty of the ST they were given to translate.

Translators' group (translating from)	ST global difficulty perceived
English ST	0.27
French ST	0.30
German ST	0.30

Table 2. Perception of ST global difficulty in direct translation.

Table 3 displays results of the group of translators for the ST in inverse translation. All subjects were evaluating the same ST and they all perceived it to be "relatively difficult to translate." This result seems not only to validate the experimental texts but also the sample, for there was no important language-dependent difference in the perceived ST difficulty in both directions; the questionnaire used to select subjects for the experimental group of translators was therefore appropriate. This method could be used in other contexts where comparable or parallel texts are needed, for example, evaluating or predicting the difficulty of texts for teaching or testing.

Translators' group (from Spanish ST into)	ST global difficulty perceived
English	0.63
French	0.59
German	0.59

Table 3. Perception of ST global difficulty in inverse translation.

3. Research into the Acquisition of Translation Competence

We are still processing and analysing data from our ATC experiment, carried out in November 2011. As stated, results in this article focus on the 'knowledge-of-translation' variable.

3.1. Definitions and theoretical model

The TC general theoretical model and experimental design seems to have been validated by the TC experiment (see above and PACTE 2008, 2009, 2011a, 2011b). Given the productivity of the TC model, the sub-competences, variables and indicators used in the TC study was the basis for our ATC research. As represented in figure 1, the ATC is conceived as a spiral, a non-linear process integrating sub-competences and learning strategies.

This model, developed in 1998, includes insights from research into learning processes and postulates that ATC is a process of restructuring and developing sub-competences of TC. PACTE (2000) defined ATC as:

1. A dynamic, spiral process, that, like all learning processes, evolves from novice knowledge (pre-translation competence) to expert knowledge (translation competence); it requires learning competence

(learning strategies). During the process, both declarative and procedural types of knowledge are integrated, developed, and restructured.
2. A process in which the development of procedural knowledge—and, consequently, of the strategic sub-competence—is essential.
3. A process in which the TC sub-competences are developed and restructured.
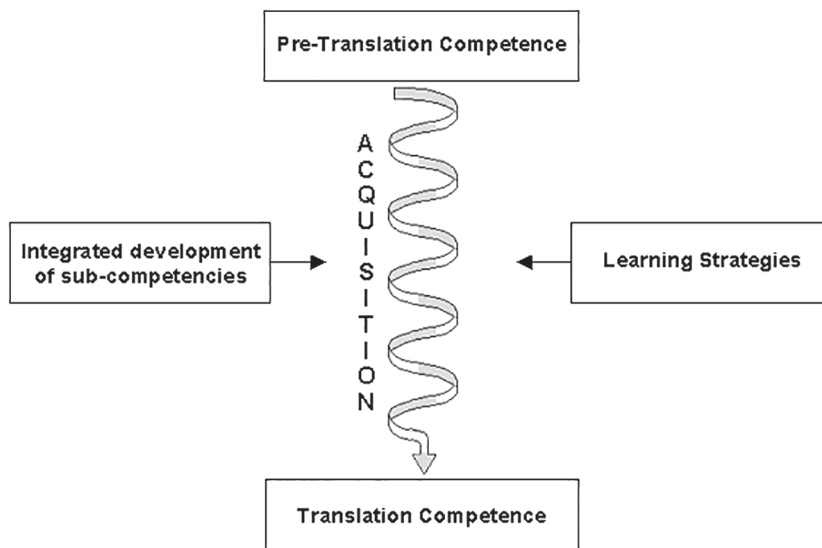
Figure 1. The ATC Model (PACTE 2000).

The process of acquiring sub-competences also involves relations, hierarchies and variations between them. In the ATC, the sub-competences: (1) are inter-related and compensate for each other; (2) do not always develop in parallel; (3) are organised hierarchically; (4) variations occur in relation to translation direction, language combinations, specialisation and the learning context. Therefore, the ATC process may not be parallel for direct and inverse translation. Furthermore, depending on the language combinations, the process may evolve at different speeds and, depending on the translation speciality (legal, literary translation, etc.), one sub-competence may be more important than another. The learning context (formal training, self-learning, etc.) has an influence on the acquisition process, as does the methodology used by teachers.

3.2. Acquisition of translation competence research design

3.2.1. General hypotheses

The general hypothesis is that TC is acquired as a result of a process of development and restructuring of different sub-competences. Other hypotheses for the ATC study include:

1. TC comprises several inter-related sub-competences.
2. The development of the strategic, instrumental, and knowledge-of-translation sub-competences is particularly important.
3. Not all sub-competences develop in parallel, i.e., at the same time and at the same rate.
4. Learning-to-learn strategies must also be acquired.
5. The ATC is dependent upon directionality (direct/inverse translation), language pairs in use, the field of specialized translation (legal, literary translation, etc.) and the learning environment.

3.2.2. Variables

Table 4 (adapted from PACTE 2005a, 2005b) summarises definitions, indicators, data-collection instruments and data sources on the dependent variables selected for the TC and ATC experiments.

KNOWLEDGE OF TRANSLATION *Related to the knowledge-of-translation sub-competence*	
definition	The subject's implicit knowledge about the principles of translation
indicators	Dynamic index of knowledge of translation; Coherence coefficient of knowledge of translation
instruments	Knowledge-of-translation questionnaire
TRANSLATION PROJECT *Related to the strategic sub-competence*	
definition	The subject's approach to the translation of a specific text and of the units it comprises in a specific context
indicators	Dynamic index of the overall translation project; Dynamic index of the translation project for translation problems; Coherence coefficient of the translation project; Acceptability
instruments	Translations; Translation problems questionnaire; and Retrospective interview

IDENTIFICATION AND SOLUTION OF TRANSLATION PROBLEMS *Related to the strategic sub-competence and the knowledge-of-translation sub-competence*	
definition	Subjects' identification and solution of difficulties when carrying out a translation task
indicators	Perception of the difficulty coefficient; Identification of prototypical translation problems; Characterisation of prototypical translation problems; Satisfaction coefficient; Acceptability
instruments	Translations; Translation problems questionnaire; and Retrospective interview
DECISION-MAKING *Related to strategic and instrumental sub-competences*	
definition	Decisions made during the translation process that involve the use of automatized and non-automatized cognitive resources (internal support) and the use of different sources of documentation (external support) (Alves, 1995, 1997)
indicators	Sequences of actions; Type of internal support; Acceptability
instruments	Translations; Direct observation chart; PROXY; and Camtasia
EFFICACY OF THE TRANSLATION PROCESS *Related to the strategic sub-competence*	
definition	Relationship between time taken to complete a translation task and the acceptability of the solution
indicators	Total time taken; Time taken at each stage: orientation, development, revision (based on Jakobsen 2002); Acceptability
instruments	Translations; Direct observation chart; PROXY; and Camtasia
USE OF INSTRUMENTAL RESOURCES *Related to the instrumental sub-competence*	
definition	Documentation strategies used when consulting resources in electronic format (websites, dictionaries and encyclopaedias in CD-ROM)
indicators	Number of resources; Total time taken on searches; Time taken on searches at each stage; Number of searches; Variety of searches; Acceptability
instruments	Translations; *Camtasia*

Table 4. Variables, indicators and instruments.

The dependent variables were the same as in the TC experiment, namely knowledge of translation; translation project; identification and solution of translation problems; decision-making; efficacy of the translation process; and use of instrumental resources. However, the independent variable in the TC experiment was defined as the degree of translation expertise, in terms of

years of experience translating and the percentage of income from translation, whereas in the ATC experiment it was defined as years of translator training (first, second, third, fourth-year, and recently graduated students).

3.2.3. A simulation of a longitudinal study

The obvious choice to study the acquisition of a competence is a longitudinal study with several measurements at regular intervals. In our case, this option would have entailed taking repeated measurements from one sample of students over a period of five years and then to compare their results with those from the translators in the TC experiment. We would have followed one group of 30 students when they started the four-year degree at the UAB School of Translation and Interpreting, testing them before they started and then at regular yearly intervals. However, this kind of study has several practical and technical problems. The first problem relates to the time it would take to collect the data, because five years is a long time for a university research group. Second, comparable instruments would have to be developed and tested for each measurement. Creating five batteries of texts, questionnaires, and so on is no easy task. Third, difficulties would arise associated with the control of extraneous variables, such as external influences that might affect students' language and translation skills, or technological changes in hardware and software. The results of the TC experiment showed important differences between translators and teachers with regard to the instrumental sub-competence. Since the development and integration of this sub-competence is taken to be essential to ATC, technological changes, e.g., in documentation tools may affect this process. Fourth, attrition rates would probably be quite high, for maintaining the same group of subjects over five years is quite problematic.

Given all these problems, it was decided to carry out a simulation of a longitudinal study by taking simultaneous measurements from groups of first-year, second-year, third-year, and fourth-year students, as well as from a group of recent graduates, a total of 130 subjects (see figure 2). All the data was collected in November 2011, when first-year students had only been in the Faculty for a couple of weeks, so they could still be considered novices. The group of recent graduates had finished their degrees in June and they agreed to come back and do the experimental tasks in November, for a fee. The advantages of this strategy outweighed any disadvantages: all the data could be collected in one month, using the tasks and instruments validated in the TC experiment.

3.2.4. Universe and sample

A pilot study in June 2011 comprised 15 fourth-year students. The experiment was carried out in November 2011 with 130 students from the five groups described above. The language combinations were the same as in the TC experiment. The experimental sample was screened with an initial questionnaire. A group of approximately 30 students for each year were selected from those students that passed the filter. Selected students had Spanish or Catalan as their A language; were within the average age group for their year; had not transferred from another degree course; had passed at least 80% of the previous year's subjects (including translation and A and B language subjects). The control group consisted of the 35 professional translators from the TC experiment

3.2.5. Tasks and instruments

The experimental tasks—also the same as in the TC experiment—were:

1. The knowledge-of-translation questionnaire.
2. Direct translation (B-A), followed by a questionnaire on the translation problems found.
3. Inverse translation (A-B), followed by a questionnaire on the translation problems found.

Most instruments had been validated in the TC experiment: the observation instrument (*Camtasia*); the initial questionnaire (revised); the translation problems questionnaire (revised); the knowledge-of-translation questionnaire; texts (rich points and criteria for acceptable, semi-acceptable and non acceptable solutions). All the questionnaires were filled in on-line.
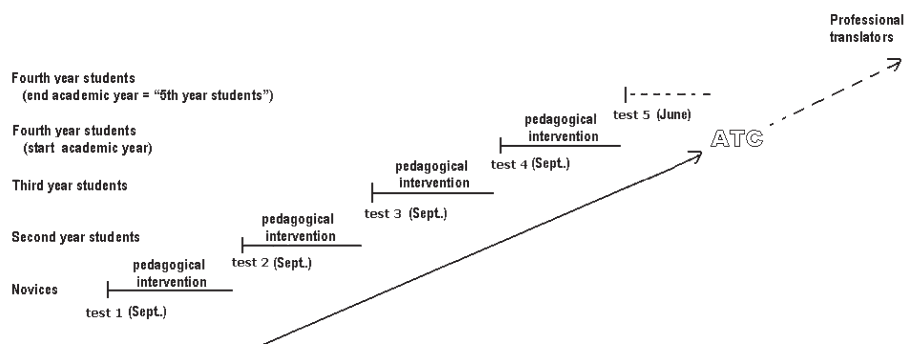
Figure 2. Simulation of a longitudinal study.

4. Declarative knowledge of translation: Translation Competence

This variable provides data on the sub-competence 'knowledge of translation'. Defined in terms of the subject's implicit knowledge of the principles of translation, the indicators are the dynamic index and the coherence coefficient. The dynamic index of 'knowledge of translation' allows us to see whether a subject's implicit knowledge about translation is more "dynamic" (textual, interpretative, communicative and functional concept of translation), or more "static" (linguistic and literal concept of translation). The coherence coefficient of 'knowledge of translation' allows us to see if the subject's vision of different aspects of translation is consistently dynamic or static, and therefore whether the subject has a coherent concept of translation. The data is obtained from subjects' answers to the knowledge-of-translation questionnaire (see table 5).

4.1. Instrument: Knowledge-of-translation questionnaire

For the full questionnaire, results of this variable, and information on how the questionnaire was developed, see Neunzig and Kuznik (2007) and PACTE (2008, 2011a). The questionnaire is based on seven factors related to knowledge about translation: concept of translation and TC; translation units; translation problems; phases in the translation process; methods required; procedures used (strategies and techniques, etc.); role of the translation brief; and the role of the target reader. For each factor, statements were formulated based on two paradigms or ways of thinking about translation. One was labelled *dynamic* (D)—textual, interpretative, communicative, functionalist concepts—and the other one, *static* (S)—linguistic and literal concepts. The following two items from the questionnaire reflect these paradigms: (D) *A text should be translated in different ways depending on who the target reader is* (Item 10); (S) *The aim of every translation is to produce a text as close in form to the original as possible* (Item 4).

A questionnaire of 36 items was drawn up using test theory and item-theory criteria. The subjects' opinions were measured using Likert scaling in a forced choice method: *I strongly disagree*; *I disagree*; *I agree*; *I strongly agree.*

KNOWLEDGE OF TRANSLATION Related to the knowledge-of-translation sub-competence	
objective	Collect data about declarative knowledge of translation
definition	The subject's implicit knowledge about the principles of translation

hypotheses	EMPIRICAL There is a relationship between the degree of translation competence and knowledge of translation OPERATIONAL 1. Differences can be observed between translators and foreign language teachers in relation to their concept of translation 2. Differences can be observed between translators and foreign language teachers in relation to the coherence of their concept of translation
indicators	**1. Dynamic index of Knowledge of Translation.** Numeric indicator; values: -1 to +1; data per subject: 1. **2. Coherence coefficient of Knowledge of Translation.** Numeric indicator; values: 0 to 1; data per subject: 1.
instruments	Knowledge-of-translation questionnaire
data	Subjects' answers to the knowledge-of-translation questionnaire

Table 5. Knowledge-of-translation variable.

The questionnaire was later validated in the following stages. After trialling the questionnaire amongst lecturers and students in the UAB School of Translation and Interpreting (Stage 1), a pilot study (Stage 2) was carried out with three translators and three foreign language teachers who took part in the 2004 TC pilot study (PACTE 2005a, 2005b). The analysis of the data from this study suggested that neither the instrument nor the type of analysis were very effective at differentiating the two experimental groups.

Pair	Dynamic item	Static item
1st brief and TT audience	**Item 3** *The client conditions how the translator translates a text.*	**Item 24** *When you translate a text, you should not be influenced by the target reader.*
2nd methods	**Item 10** *A text should be translated in different ways depending on who the target reader is.*	**Item 4** *The aim of every translation is to produce a text as close in form to the original as possible.*
3rd methods	**Item 23** *If you begin to translating a text with certain criteria (e.g. respecting the format of the original text, adapting the text to the target reader, etc.) these should be kept to throughout the translation.*	**Item 11** *All translated texts should keep the same paragraphs and order of sentences in the target text as in the original text.*

4th methods	**Item 14** *When translating a specialised text, terminology is not the biggest problem.*	**Item 5** *Most translation problems can be solved with the help of a good dictionary.*
5th methods	**Item 27** *If you find a word in a text you don't understand, you should try to work out its meaning from the context.*	**Item 16** *As soon as you find a word you don't know the meaning of, you should look it up in a bilingual dictionary.*

Table 6. Five pairs of selected opposing items.

A validation test (Stage 3) was designed to see if the questionnaire could really be used to measure our theoretical model in the experimental groups. The questionnaire was given to a sample of ten university science lecturers who were likely translation users. These subjects were chosen because they all knew foreign languages and were translation users but had no experience in translating or language teaching. The results confirmed that the tool did not collect data that distinguished the universe of foreign language professionals (translators and language teachers) from the universe of translation users (science lecturers).

Since the overall results of the questionnaire pilot study and the validation test did not clearly differentiate between the opinions expressed by the groups of subjects, the decision was taken to select five pairs of items that had differentiated the groups of subjects in earlier tests and that are conceptually clearly opposed. Table 6 displays the five pairs of items, which are mutually exclusive from a conceptual point of view and therefore give a clearer image of the subjects' opinions. In the TC experiment, our analysis is based on the answers given to these five pairs of items.[6]

Following scale-construction theory, items that did not provide relevant information in the pilot study were eliminated. The final version of the questionnaire (Stage 4) comprises 27 items, 12 of which indicate a dynamic concept of translation and 15 indicate a static concept (see appendix).

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6. This approach has additional advantages: on the one hand, only 10 items are analysed (thereby saving time and effort). On the other, it is a more effective means of controlling 'missing' items since, when an item remains unanswered, its pair is automatically eliminated, thus ensuring the reliability of the data.

4.2. Results

The subjects' answers were analysed for evidence of general tendencies among translators and teachers. Statistical analysis pointed to more dynamic tendencies among the translators and more static tendencies among the teachers (PACTE 2008, 2011a). These tendencies can be illustrated with the pair of items related to the 'methods required' provided as an example in section 4.1 above (item 10, dynamic; item 4, static). The translators had a much more dynamic concept of translation methods than the teachers. For the dynamic item, *A text should be translated in different ways depending on who the target reader is,* 13 translators and only 2 teachers chose 'I strongly agree', whereas the category 'I strongly disagree' was chosen by 7 teachers and only 1 translator. For the static item in the same pair, *The aim of every translation is to produce a text as close in form to the original as possible,* 8 teachers chose 'I strongly agree' and 11 more chose 'I agree', while 14 translators selected 'I disagree'.

4.3. Dynamic index for translation competence

The dynamic index allows us to see if a subject's implicit knowledge about how translation works is more dynamic or more static. In order to compute the dynamic index, numerical values (-1 to +1) were attributed to the answers *I strongly disagree*; *I disagree*; *I agree*; *I strongly agree*. First the indicator was calculated for pairs of items for each subject and then for the experimental group. A comparison was made between the values of these indicators in the two experimental groups. Figure 3 shows the dynamic index of the subjects in the two groups.
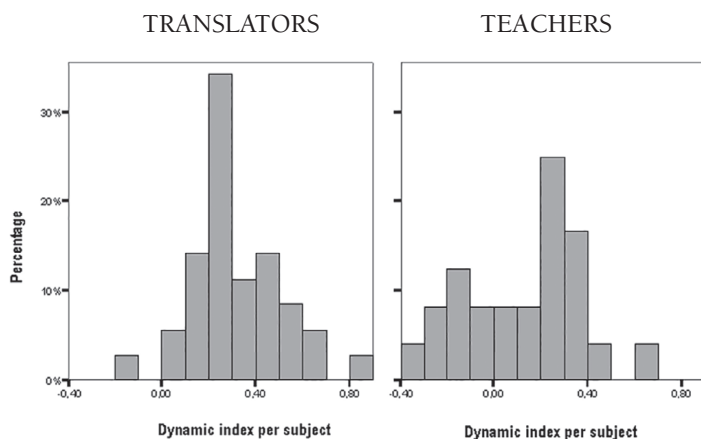
Figure 3. Dynamic Index of subjects in the two TC experimental groups.

The mean dynamic index for translators is 0.273 and for teachers, 0.088. The dynamic index of the translators' group is significantly higher than that of the teachers (p-value < 0.012), at the significance level of 5%, therefore it would seem that the translators as a group have a more dynamic concept of translation. Furthermore, if we look at the dynamic index of the first quartile of the sample in acceptability, the 9 'best' translators, the index rises from 0.27 to 0.36. All the translators in this quartile have a high Acceptability Index between 1 and 0.9. They only have 'acceptable' or 'semi-acceptable' solutions and no 'non-acceptable solutions'. We could therefore conclude that a dynamic concept of translation is a characteristic of TC and affects translation quality.

	Dynamic Index
All translators	0.27
Best translators	**0.36**
Language teachers	0.09
Translation users	- 0.20

Table 7. Dynamic Index.

4.4. *Coherence Coefficient for Translation Competence*

The coherence coefficient allows us to see if the subject's vision of the different functions is coherent or not. In order to compute the coherence coefficient, numerical values were attributed to three categories of coherence: 1, 'totally consistent' (the subject's concept of translation was totally static or totally dynamic); 0.5, 'partially consistent' (the subject's concept of translation was partially static or partially dynamic); and 0, 'totally inconsistent'.

There is no relevant difference in the coherence coefficient between the language teachers (0.27) and the translators (0.37), both are positive, even though one may be more dynamic and the other more static. Therefore it could be assumed that both groups, as language professionals, have a coherent concept of what it means to mediate between two cultures, although the teachers tend towards a literal, linguistic concept of translation and the translators towards a more communicative and functional concept. However, if we compare the teachers with the 9 'best' translators, the differences are significant as the first quartile of translators have a coherence coefficient of 0.50, i.e., they have a more coherent concept of translation. It is interesting to

compare these results with those of the translation users (science teachers). Their mean coherence coefficient was only 0.05, suggesting that they had no clear ideas about language or translation.

These results validate the criteria used in the TC experiment to select subjects and the sample. The two groups of language specialists held similarly coherent if different views on translation, the translation subjects tending to a dynamic concept and the language teachers to a static concept. These two groups were much more coherent than the translation users.

Subjects	Coherence Coefficient
All translators	0.37
Best translators	**0.50**
Language teachers	0.27
Translation users	0.05

Table 8: Coherence Coefficient.

5. Declarative knowledge of translation: Acquisition of Translation Competence

In this section, we present the data for the dynamic index and the coherence coefficient in the ATC experiment, compare the results with those from the TC experiment, and indicate some further lines of inquiry that have emerged from this study.

5.1. Dynamic index for the acquisition of translation competence

The dynamic index results for the students are rather reassuring for translator trainers who take a functional, communicative stance. The students' concept of translation becomes increasingly dynamic through their training. On a scale from 0 to 1, the mean measurement for the 1st-year group is 0.10 (almost as static as the teachers in the TC test, with 0.09), while 4th-year students had a mean measurement of 0.36 (i.e., they were as dynamic as the 'best translators' in the TC experiment). Results for recent graduates were even higher, with 0.41.

TC			ATC		
subjects	N	Mean	**students**	N	Mean
Translators	35	0.27	1st Year	24	0.10
Best translators	9	0.36	2nd Year	26	0.33
Teachers	24	0.09	3rd Year	26	0.37
Users	10	- 0.20	4th Year	30	0.36
			Graduates	22	0.41

Table 9. Results for the dynamic index in TC and ATC experiments.

The difference between the beginning of the 1st year and the beginning of the 2nd year is noteworthy, with the index jumping from 0.10 to 0.33. This dramatic change between the 1st and the 2nd year can also be seen in the coherence coefficient.

5.2. Coherence coefficient for the acquisition of translation competence

In the case of the coherence coefficient, the jump between 1st year and 2nd year students is even more remarkable—from 0.16 to 0.42—but then the value remains more or less at the same level. It is as if after a year in the School of Translation, their views on language and translation had changed for good—or, at least, until the end of their degrees.

TC			ATC		
subjects	N	Mean	**students**	N	**Mean**
Translators	35	0.37	1st Year	24	0.16
Best translators	9	0.50	2nd Year	26	0.42
Teachers	24	0.27	3rd Year	26	0.42
Users	10	0.05	4th Year	30	0.39
			Graduates	22	0.41

Table 10. Results for the coherence coefficient in TC and ATC experiments.

5.3. Further lines of inquiry and results

As explained, five pairs of items were selected to calculate the dynamic and coherence indicators and so get 'a picture' of the subjects' views. In all of

them there was a similarly abrupt change between the 1st-year 'novices' and more advanced students. We have also looked at the other statements in the Questionnaire to see what types of items showed a significant difference over the five years, so as to get a clearer picture about where the students' concept of translation changes. As the students are in the process of consolidating their ideas about translation, it was decided to convert the Likert scaling used to measure the subjects' opinion into a binary option. Thus, the answers "I strongly disagree," or "I disagree," are both interpreted as "Disagreement" and given 0 points and the answers "I agree" or "I strongly agree" are both interpreted as "Agreement" and count as 1 point. We are still analyzing this data and combining TC and ATC results. The following examples of items show a variety of trends and here offered to hint at possible future lines of inquiry.

5.3.1. Items where nothing very interesting happens

The responses to dynamic items 19 and 8—tables 11 and 12—do not seem to change over the ATC process, and novices and translators agree.

When you translate, you must bear in mind the text conventions of the target language.

Item 19	Missing		Disagree		Agree	
	N	*% Row*	N	*% Row*	N	*% Row*
1st Year	.	.	.	.	24	*100*
2nd Year	1	*4*	.	.	24	*96*
3rd Year	.	.	3	*10*	25	*89*
4th Year	.	.	1	*3*	29	*96*
Graduates	.	.	4	*18*	18	*81*
Translators	1	*2*	.	.	34	*97*

Table 11. Item 19 (dynamic).

If the characteristics of the source text are very different from those of the target culture (e.g., business letters, instruction manuals, etc.) you should adapt the target text accordingly.

Item 8	Missing		Disagree		Agree	
	N	*% Row*	N	*% Row*	N	*% Row*
1st Year	.	.	2	8	22	*91*
2nd Year	.	.	1	*4*	24	*96*
3rd Year	.	.	2	7	26	92
4th Year	.	.	5	*16*	25	83
Graduates	.	.	.	.	22	*100*
Translators	.	.	1	2	34	97

Table 12. Item 8 (dynamic).

5.3.2. Items hinting at growing dynamism

The responses to items 12 (static) and 19 (dynamic)—tables 13 and 14—point to an increasingly dynamic translation concept, with significant increases between the first and the second years.

Idiomatic expressions are the biggest problem in translation.

Item 12	Missing		Disagree		Agree	
	N	*% Row*	N	*% Row*	N	*% Row*
1st Year	.	.	.	.	24	*100*
2nd Year	.	.	5	*20*	20	*80*
3rd Year	.	.	4	*14*	24	85
4th Year	.	.	11	*36*	19	63
Graduates	1	*4*	6	*27*	15	*68*
Translators	.	.	20	*57*	15	*42*

Table 13. Item 12 (static).

A text should be translated in different ways depending on who the target reader is.

	Missing		Disagree		Agree	
Item 10	N	*% Row*	N	*% Row*	N	*% Row*
1st Year	.	.	9	*37*	15	*62*
2nd Year	.	.	1	*4*	24	*96*
3rd Year	.	.	2	*7*	26	*92*
4th Year	.	.	5	*16*	25	*83*
Graduates	.	.	4	*18*	18	*81*
Translators	.	.	7	*20*	28	*80*

Table 14. Item 10 (dynamic).

5.3.3. Items reflecting formal training and professional experience

The responses to items 9 and 16, related to the use of bilingual dictionaries (tables 15 and 16), show a sharp increase in dynamism between the first and second year that is maintained up until the end of the degree course. However, the translators (and the graduates, in item 16) show decreased dynamism. This might simply be due to trainers teaching their students not to trust bilingual dictionaries, whereas professional experience has taught translators to trust their internal support strategies and to use them well when consulting a bilingual dictionary, without accepting automatically the first solution they find.

Since you can't be expected to know all the words, a good bilingual dictionary is the best way to ensure a good translation.

	Missing		Disagree		Agree	
Item 9	N	*% Row*	N	*% Row*	N	*% Row*
1st Year	.	.	1	*4*	23	*95*
2nd Year	.	.	9	*36*	16	*64*
3rd Year	.	.	14	*50*	14	*50*
4th Year	.	.	20	*66*	10	*33*
Graduates	1	*4*	19	*86*	2	*9*
Translators	.	.	18	*51*	17	*48*

Table 15. Item 9 (static).

As soon as you find a word you don't know the meaning of, you should look it up in a bilingual dictionary.

Item 16	Missing		Disagree		Agree	
	N	*% Row*	N	*% Row*	N	*% Row*
1st Year	.	.	7	*29*	17	*70*
2nd Year	1	*4*	17	*68*	7	*28*
3rd Year	.	.	23	*82*	5	*17*
4th Year	1	*3*	24	*80*	5	*16*
Graduates	.	.	15	*68*	7	*31*
Translators	.	.	19	*54*	16	*45*

Table 16. Item 16 (static).

This brief look at some of the 27 items in the knowledge-of-translation questionnaire has lead us to think that it may be worth looking further into the seven factors we took as our starting point when designing the questionnaire: concept of translation and TC, translation units, translation problems, phases in the translation process, methods required, procedures used (strategies and techniques, etc.), role of the translation brief, and the role of the target reader.

6. Conclusions

This article has presented the results related to the knowledge-of-translation variable in PACTE's ATC experiment. These results have been compared with those in the TC experiment. The TC results showed that TC implies a dynamic concept of translation. They also revealed a relationship between the knowledge-of-translation variable (declarative knowledge) and another variable, that of the translation project (procedural knowledge). These results showed a close relationship between a dynamic concept of translation (*dynamic index of knowledge of translation*), a dynamic translation project for a specific text (*dynamic index of the overall translation project*), and a dynamic project for the translation problems posed in the text (*dynamic index of the translation project for translation problems*). We labelled the relationship between the three indicators the *dynamic translation index*. We also established a correlation between this index and the acceptability of the solutions to these problems (PACTE 2011a, in progress). The more dynamic the index is, the more acceptable the translations are.

We have come to the conclusion that these findings corroborate the theoretical models proposed by those pioneers who, in the second half of the 20th century challenged the linguistic models that were dominant in Translation Studies and introduced communicative and functionalist paradigms. These models include Nida's (1964) dynamic equivalence; Seleskovitch's (1968) and Seleskovitch & Lederer's (1984) equivalence of meaning; Reiss & Vermeer's (1984) and Nord's (1991) functional equivalence; Hatim & Mason's (1990) communicative translation, etc. This communicative, functionalist paradigm continues to provide a useful framework for translation practice and research in the 21st century.

The ATC results analysed thus far seem to confirm the importance of a dynamic concept of translation in TC. They show that the progression from a static to a dynamic declarative knowledge of translation is a characteristic of the ATC. The students' *dynamic index of knowledge of translation* develops consistently throughout the translation program, from 0.10 in 1st-year students to 0.41 in recent graduates. After initial training, all students, including the 2nd-year students, have more dynamic results than the group of professional translators in the TC experiment. The recent graduates are even more dynamic than the 9 "best" translators (the experts).

Of particular interest is the important leap between the 1st and 2nd-year students' (from 0.10 to 0.33). At UAB, 2nd-year students have only had one semester of practical translation courses but none in translation theory, so it would seem that they develop implicit theories about the dynamic nature of translation from their own experience in translation. These implicit theories are reinforced throughout their training and seem to become ingrained.

To learn more about this progression from static to dynamic notion in the ATC, we plan to take the following steps:

1. Analyze the data from the translation project variable. This includes the approach to the translation of a specific text (*dynamic index of the overall translation project)* and the approach to units of the text (*dynamic index of the translation project for translation problems)*.
2. Cross this data with the *dynamic index of knowledge of translation* to obtain the *dynamic translation index* in the ATC.
3. Analyze the data of the transversal acceptability indicator, the quality of the translations.
4. Cross the data of the acceptability indicator with the *dynamic translation index*.

Once we have analysed this data, we will have a better idea of when students are able to convert this dynamic declarative knowledge of translation into an overall dynamic approach to the translation of a specific text and to finding acceptable solutions to translation problems in a text within a given context. How and when translator trainees acquire a dynamic concept and approach to translation (declarative and procedural knowledge) is an important aspect of the ATC study. We believe it is a key element in the move from 'novice' knowledge (pre-translation competence) to translation competence.

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Appendix

Knowledge-of-translation questionnaire[7]

What is your opinion about the following statements?

1. As you read the source text, you are already thinking about how you are going to translate it.
☐ *I strongly disagree* ☐ *I disagree* ☐ *I agree* ☐ *I strongly agree*

2. You always lose something in translation since words do not normally mean exactly the same in the source language as in the target language.
☐ *I strongly disagree* ☐ *I disagree* ☐ *I agree* ☐ *I strongly agree*

3. The client conditions how the translator translates a text.
☐ *I strongly disagree* ☐ *I disagree* ☐ *I agree* ☐ *I strongly agree*

4. The aim of every translation is to produce a text as close in form to the original as possible.
☐ *I strongly disagree* ☐ *I disagree* ☐ *I agree* ☐ *I strongly agree*

5. Most translation problems can be solved with the help of a good dictionary.
☐ *I strongly disagree* ☐ *I disagree* ☐ *I agree* ☐ *I strongly agree*

6. When you translate a text you must satisfy target reader expectations.
☐ *I strongly disagree* ☐ *I disagree* ☐ *I agree* ☐ *I strongly agree*

7. In order to understand the source text, the most important thing to do is to solve vocabulary problems.
☐ *I strongly disagree* ☐ *I disagree* ☐ *I agree* ☐ *I strongly agree*

8. If the characteristics of the source text are very different from those of the target culture (e.g. business letters, instruction manuals, etc.) you should adapt the target text accordingly.
☐ *I strongly disagree* ☐ *I disagree* ☐ *I agree* ☐ *I strongly agree*

9. Since you can't be expected to know all the words, a good bilingual diction-ary is the best way to ensure a good translation.
☐ *I strongly disagree* ☐ *I disagree* ☐ *I agree* ☐ *I strongly agree*

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7. The original questionnaire is in Spanish. 'Dynamic' questions are # 1, 3, 6, 8, 10, 14, 17, 19, 20, 21, 23 and 27; 'Static' questions are # 2, 4, 5, 7, 9, 11, 12, 13, 15, 16, 18, 22, 24, 25 and 26.

10. A text should be translated in different ways depending on who the target reader is.
☐ *I strongly disagree* ☐ *I disagree* ☐ *I agree* ☐ *I strongly agree*

11. All translated texts should keep the same paragraphs and order of sentences in the target text as in the original text.
☐ *I strongly disagree* ☐ *I disagree* ☐ *I agree* ☐ *I strongly agree*

12. Idiomatic expressions are the biggest problem in translation.
☐ *I strongly disagree* ☐ *I disagree* ☐ *I agree* ☐ *I strongly agree*

13. The best way to translate is to concentrate on the words and syntax of the original and then reproduce them in the target language.
☐ *I strongly disagree* ☐ *I disagree* ☐ *I agree* ☐ *I strongly agree*

14. When translating a specialized text, terminology is not the biggest problem.
☐ *I strongly disagree* ☐ *I disagree* ☐ *I agree* ☐ *I strongly agree*

15. With the exception of proverbs, idioms, and metaphors, the best way to translate is always word for word.
☐ *I strongly disagree* ☐ *I disagree* ☐ *I agree* ☐ *I strongly agree*

16. As soon as you find a word you don't know the meaning of, you should look it up in a bilingual dictionary.
☐ *I strongly disagree* ☐ *I disagree* ☐ *I agree* ☐ *I strongly agree*

17. One of the biggest problems when translating a novel is cultural references (e.g. institutions; typical dishes, etc.).
☐ *I strongly disagree* ☐ *I disagree* ☐ *I agree* ☐ *I strongly agree*

18. When you translate, you concentrate on one sentence and translate it, then the next, and so on until you have translated the whole text.
☐ *I strongly disagree* ☐ *I disagree* ☐ *I agree* ☐ *I strongly agree*

19. When you translate, you must bear in mind the text conventions of the target language.
☐ *I strongly disagree* ☐ *I disagree* ☐ *I agree* ☐ *I strongly agree*

20. It is not enough to know two languages well to be able to translate well.
☐ *I strongly disagree* ☐ *I disagree* ☐ *I agree* ☐ *I strongly agree*

21. When you translate an essay you must ensure that target readers react to the text in the same way as the source text readers.
☐ *I strongly disagree* ☐ *I disagree* ☐ *I agree* ☐ *I strongly agree*

22. When you find a cultural reference in a text (e.g. a typical dish) you should try to find a similar reference in the target culture.
☐ *I strongly disagree* ☐ *I disagree* ☐ *I agree* ☐ *I strongly agree*

23. If you begin translating a text with certain criteria (e.g. respecting the format of the original text, adapting the text to the target reader, etc.) these should be kept to throughout the translation.
☐ *I strongly disagree* ☐ *I disagree* ☐ *I agree* ☐ *I strongly agree*

24. When you translate a text, you should not be influenced by the target reader.
☐ *I strongly disagree* ☐ *I disagree* ☐ *I agree* ☐ *I strongly agree*

25. The best way to translate a text is to translate sentence by sentence.
☐ *I strongly disagree* ☐ *I disagree* ☐ *I agree* ☐ *I strongly agree*

26. The same translation problems come up in every text.
☐ *I strongly disagree* ☐ *I disagree* ☐ *I agree* ☐ *I strongly agree*

27. If you find a word in a text you don't understand, you should try to work out its meaning from the context.
☐ *I strongly disagree* ☐ *I disagree* ☐ *I agree* ☐ *I strongly agree*

BIONOTE / NOTA BIOGRÁFICA

PACTE has been a competitive research group since 1997. PACTE's main research interests are empirical and experiment-based research on translation competence and its acquisition in written translation; translator training; empirical and experimental research in Translation Studies; and the use of new technologies in translation research. The group was awarded the Universitat Autònoma de Barcelona Prize for Outstanding Research (PREI2010 UAB) for the article "Results of the validation of the PACTE translation Competence Model: Acceptability and decision-making," published in 2009 in *Across Languages and Cultures* 10:2.

PACTE es un grupo de investigación competitivo desde 1997. Los intereses investigadores fundamentales del grupo son la investigación

empírico experimental sobre la competencia traductora y su adquisición en la traducción escrita; la formación de traductores; la metodología empírica y experimental en Traductología, y el uso de las TIC en la investigación de la traducción. El grupo ha sido galardonado con el Premio a la Excelencia investigadora (PREI2010 UAB) otorgado por la Universidad Autònoma de Barcelona (Área de Humanidades) por el artículo "Results of the validation of the PACTE translation Competence Model: Acceptability and decision-making," publicado en 2009 en *Across Languages and Cultures* 10:2.

THE LANGUAGE-(IN)DEPENDENCE OF WRITING SKILLS: TRANSLATION AS A TOOL IN WRITING PROCESS RESEARCH AND WRITING INSTRUCTION[1]

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Abstract

A pilot study was conducted in which 6 students with L1 German had to produce a German version of a text they had composed in their L2 English. The goals were to explore (a) in what respects the ability of advanced university English students to express themselves in their L2 English differs from their ability to do so in their L1 German, and (b) for which aspects of writing the implementation of translation exercises is useful as a tool to improve writing skills. The methods of data collection used were think-aloud and keystroke logging. In the analysis, special emphasis was placed on text-level errors as opposed to formal, lexical and grammatical errors. In their L1 versions, students were consistently able to avoid errors of implicitness and sense but displayed no improvements in other areas such as text coherence and functional sentence perspective. Though some of the errors could be attributed to the special requirements of the translation assignment, translation was also found to have certain advantages that make it a useful tool in writing didactics.

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1. For a German version of this article, see Göpferich & Nelezen (2013).

Kurzreferat

In einer Pilotstudie mit sechs fortgeschrittenen Anglistikstudierenden, deren Muttersprache Deutsch ist, wurde untersucht, in welcher Hinsicht sich deren Ausdrucksfähigkeit in ihrer L2 Englisch von derjenigen in ihrer L1 Deutsch unterscheidet. Darüber hinaus wurde erhoben, auf welche Komponenten der Textproduktionskompetenz sich Übersetzungsübungen förderlich auswirken. Die Versuchspersonen waren aufgefordert, eine deutsche Version eines von ihnen verfassten englischsprachigen Textes zu erstellen. Als Datenerhebungsmethoden kamen lautes Denken und Tastatur-Logging zum Einsatz. Die Analyse konzentriert sich auf Fehler auf der textlinguistischen Ebene im Gegensatz zu formalen, lexikalischen und Grammatikfehlern. In ihren muttersprachlichen Versionen gelang es den Versuchspersonen, Implizitheitsfehler und Sinnfehler zu vermeiden; es waren jedoch keine Verbesserungen in anderen Bereichen, wie der Textkohärenz und der funktionalen Satzperspektive, festzustellen. Obwohl einige der in den deutschsprachigen Versionen aufgetretenen Fehler eindeutig interferenzbedingt sind, zeigte sich, dass das Übersetzen für die Entwicklung von Textproduktionskompetenz bestimmte Vorteile besitzt, die es zu einer nützlichen Methode in der Schreibdidaktik machen.

Keywords: Writing vs. translating. Writing in L2. Text-level errors. Academic writing. Translation as a tool in writing instruction.

Schlagwörter: Schreiben vs. Übersetzen. Schreiben in der L2. Fehler auf der Textebene. Wissenschaftliches Schreiben. Übersetzen als Methode in der Schreibdidaktik.

1. Background, literature review and research questions

At Justus Liebig University (Giessen, Germany), as well as at many other universities, students pursuing degrees in the fields of English literature, culture and linguistics are generally required to write their term papers and final theses in English. These students are thereby immediately confronted with two concurrent challenges: the challenge of writing 'academically', which requires the students to adapt to a specific form of discourse with which they are not yet familiar, neither in their native language (L1) nor their foreign language (L2) English; and the very challenge of first having to do this in their L2. It is well known that writing, even in one's mother tongue, is a highly complex process. Therefore, writing assignments devised to foster writing competence are frequently subdivided into sub-tasks of lower complexity. Against this background, the question arises as to whether the requirement of writing academic texts in the L2, before having mastered this skill in the L1, leads to such an increase in task complexity that it overburdens students, which could have consequences reaching beyond the poorer linguistic quality that L2 compositions inevitably display: Having students write term papers in their L2 may further result in a less profound analysis of the subject matter, not to mention a less profound treatment of the L2 literature associated with the subject matter. These potential consequences of requiring students to write academic texts in their L2 are, in turn, detrimental to the epistemic function of writing.

The few studies conducted to date which have compared L1 and L2 text production have indicated that—aside from the additional lexical and grammatical challenges associated with foreign language production in general—L2 text production processes are strikingly similar to L1 text production processes. As Arndt (1987: 259) points out, "It is the constraints of the composing activity, or of the discourse type, which create problems for students writing in L2, not simply difficulties with the mechanics of the foreign language." However, Silva (1992) surveyed university students about their own L2 writing processes and observed that exactly these difficulties with lexis and grammar, as well as interference between the L1 and L2, are

so cognitively demanding that not only the *form* but the *content* of L2 written work, and thus the epistemic function of writing, suffers. This leads to texts that are "less sophisticated" and express the ideas of the writer less effectively (Silva 1992: 33). Devine, Railey & Bischoff (1993) compared the written compositions of 20 first-year college students in the United States, half of whom had English as their L1 and half as their L2, and came to a similar conclusion. These subjects were further required to complete a questionnaire addressing their writing processes in order to investigate the metacognitive writing models used by L1 and L2 writers. The students writing in their L2 reported having to omit certain content from their texts when they felt they did not possess the linguistic means to express this content correctly, a problem the L1 writers did not have. Unsurprisingly, the L1 essays were also rated more highly than their L2 counterparts (see also the literature review by Cumming 2001). Such findings provide support for the assumption that the epistemic benefits of writing are less pronounced when this writing takes place in the L2.

Several studies have established a correlation between the level of L2 competence and the varying amounts of attention given to different aspects of the writing process. From an analysis of English and French texts produced by native English-speaking university students while thinking aloud, Whalen & Menard (1995) found that L2 writers with insufficient L2 competence tend to neglect important macro-level writing processes, including planning, evaluation, and revision, in order to focus on lower-level processes. Schoonen et al. (2003) provide further support for this finding from a study in which 281 8th-grade pupils composed texts in both their L1 and L2, the quality of which was then compared with their overall language competence:

> The L2 writer may be so much involved in these kinds of 'lower-order' problems of word finding and grammatical structures that they may require too much conscious attention, leaving little or no working memory capacity free to attend to higher-level or strategic aspects of writing, such as organizing the text properly or trying to convince the reader of the validity of a certain view. The discourse and metacognitive knowledge that L2 writers are able to exploit in their L1 writing may remain unused, or underused, in their L2 writing (Schoonen et al. 2003: 171).

Roca de Larios, Manchon & Murphy (2006) arrived at a similar interpretation after analyzing the L1 and L2 (English) texts and accompanying think-aloud protocols (TAPs) of 21 Spanish-speaking subjects who were separated into three groups based on their levels of English competence:

> In L2 writing […] the patterns emerging from the data indicate that the lower the proficiency level of the writer, the more he or she engages in compensating

for interlanguage deficits vis-à-vis ideational or textual occupations (Roca de Larios, Manchon & Murphy 2006: 110).

Such results warrant the assumption that L2 writing processes only strongly resemble L1 writing processes after a certain L2 competence level has been reached (cf. Kohro 2009: 16).

In order to explore whether the ability of university-level English students to express themselves in written form in their L2 differs from their ability to do so in their L1, and, if this is the case, in which aspects of the writing process these differences can be observed, a pilot study was conducted to explore L1 and L2 text composition. For this study, six native-speaking German students from an advanced English linguistics seminar titled "Developing Writing Skills", which was offered at the Department of English at the University of Giessen in the 2011/12 winter semester, volunteered to take part in an experiment after the seminar had ended. These six students had English as their major subject in either a master's program or a high school teacher-training program. Their task during the experiment was based on an assignment they had completed during the seminar in teams of two which required them to write a popular-science article based on one of the term papers one of the two students had written in a previous semester. The goal of the article was to inform 12th-grade pupils (of about 18 years of age) about topics that are typically dealt with in university English programs. They were explicitly instructed to write these texts so that they would be comprehensible for 12th graders and at the same time arouse interest in the topic (see assignment below). The challenge of this writing assignment was three-fold: First, the students had to reduce the length of what they had covered in their term papers to approx. 500 words and thus select only certain aspects of the term paper to be dealt with in the popular-science article. Second, they had to transform an academic text into a popular-science text. And third, they had to make sure that their popular-science text was self-contained, i.e., met the readers' expectations that were established by the author at the beginning of the text.

To provide the students with a framework of assessment criteria, they were familiarized with the Karlsruhe comprehensibility concept (Göpferich 2002) and provided a model text. After they had produced their first versions of these articles, each team of two had to exchange their article with another team and provide each other feedback, again based on the Karlsruhe comprehensibility concept, which, as they were informed, also formed the framework for the assessment of their final versions. On the basis of (a) this peer feedback, (b) the think-aloud of two students not attending the seminar

who were required to reverbalize one article each in an optimizing manner while thinking aloud—on the method of optimizing reverbalization, see Göpferich 2006—and (c) the general remarks made by the teacher on how the articles could be improved, they were finally required to produce an optimized version of their articles to be submitted at the end of the semester as part of their portfolio, which was graded. This text production process, following the writing-is-rewriting principle, should ideally have induced the students to give their very best and thus leave few aspects of the text that would require further optimization in the subsequent translation assignment, which will be addressed in the following section.

2. Experimental design

During the experiment, the six students who volunteered to take part in the experiment had to produce a German version of the English text they had produced, following the instructions below:[2]

> Please produce a German version of the English article that you composed in the seminar "Developing Writing Skills". The German version should have the same function and target group as the source text, i.e., it is supposed to provide students in their last year at school insights into topics that are dealt with in an English program at university. Please note that the text you are going to produce should not only be comprehensible but also arouse the students' interest and motivate them to go on reading.

> Please also note that you do NOT have to produce a translation that is as literal as possible. If you have ideas as to how your German version can be improved with regard to, for example, its structure or individual formulations, please feel free to, and please do, put these ideas into practice.

> While composing your German text, please think aloud, i.e., please utter everything that comes to your mind while working on the text. There is no time limit, and you should not rush. Instead, please work for as long as you feel is necessary to produce a version with which you are absolutely satisfied.

> All the best of success and enjoy your work!

It should be noted that the participants were intentionally not instructed to 'translate' the text, but to produce a German version, because the concept of translation might have falsely led them to assume that a literal translation was required and that defects in the source text would thus have to be taken over into the target text. What the participants were rather expected to do was to produce a functional translation, which allows for deviations from the

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2. The participants were provided with these instructions in German.

source text if they contribute to making the target text more suitable for its function. The assumptions underlying these instructions were the following: The participants would experience cognitive relief due to the fact that (a) they were allowed to use their L1, in which they would have a more differentiated repertoire of linguistic means available to them to express their ideas, and that (b) the English text, due to its very existence in an externalized manner, would allow the participants to take a more critical stance towards the structure and line of argumentation of the text. If these assumptions hold true, the German texts should have a more logical structure and be more differentiated semantically than their English source texts.

During the experiments, the participants' think-aloud was recorded using the digital audio recording freeware Audacity and subsequently transcribed in XML following the modified guidelines of the Text Encoding Initiative documented in Göpferich (2010). Their writing processes were furthermore registered using the keystroke-logging software Translog 2006.

3. Data analysis

The first level of analysis concerned the differences in linguistic accuracy in the L1 and L2 texts. For this, the English source texts and the German target texts were marked according to the error classification scheme summarized in table 1.

Every error identified in the English and German texts was highlighted and annotated with a corresponding error tag (for the entire annotated corpus, see Göpferich & Nelezen 2012). To reduce subjectivity, three raters who were already familiar with the error classification scheme marked the texts separately; discrepancies among the raters' marks were discussed and reconciled thereafter.

In order to ensure consistent error classification, errors were always categorized with the largest possible granularity. This means that the attempt was made to categorize errors with regard to the smallest linguistic unit involved in the error, or what could be considered the most elementary linguistic category. Once this was pinpointed, the errors were always classified under their primary cause and/or most specific error type. For example, implicitness errors also tend to cause coherence problems and can thus also be considered coherence errors. The primary cause of this error type, however, is implicitness and not coherence; therefore, they were always marked as such and not as text-coherence errors.

In addition to the classification of error type, the process-oriented data collected (i.e., the think-aloud protocols and keystroke log files) were

analyzed in order to determine whether the subjects reflected upon errors. Errors were considered to have been reflected upon when at least one of the following occurred:

— at least one alternative was generated for the erroneous expression(s) as documented in the think-aloud protocols or the log files,
— at least one pause of more than 5 seconds occurred in connection with the erroneous expression(s), or
— a problem was stated explicitly in the think-aloud.[3]

Error category	Description / Example
Formal errors	
punctuation	missing or wrong punctuation mark; if both a comma at the beginning and at the end of an insertion are missing, this is counted as only one error; repeated comma errors are counted as repetition errors only if they have the same cause
spelling	spelling mistake which is not an obvious typo (e.g., Tauchen Sie das Gehäuse *ihres* Gerätes nie unter Wasser.)
formatting	line break where there should be none (the participants were not required to do any other formatting in the text); italics where there should be none and vice versa
Lexical errors	
semantic	use of words and phrases which do not express the intended meaning either denotatively (semantic: denotation) or connotatively (semantic: connotation). This category includes the use of a wrong register at word level (semantic: connotation). Note: Blendings and wrong illocutionary indicators are classified as separate categories. See also "collocation" and "modality/illocution".
collocation	wrong collocation (e.g., *schnelle Geschwindigkeit* instead of *hohe Geschwindigkeit*). This category only includes cases in which the meanings of the words used are appropriate but in which these words cannot be combined for other reasons, such as idiomaticity or convention.
blending	error caused by melding together parts of linguistic units or constructions which enter working memory simultaneously
preposition	use of a wrong preposition (see also "other grammar")

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3. The alternatives generated or the problem stated explicitly must refer directly to the respective error category to be considered reflected upon.

modality/illocution	wrong illocutionary indicator, such as *sollte* (recommendation) instead of *muss* (instruction). Strictly speaking, these errors could also be classified as idiomaticity/genre errors (genre-convention errors) because the illocutionary indicators to be used may be determined by the genre conventions (see Göpferich 1995: 308 ff.).
redundancy	superfluous repetition of meaning components, ideas, statements or words including tautologies (see also "text coherence")
Grammatical errors	
tense	use of wrong tense
aspect	use of wrong aspect
case, number, agreement	use of wrong case or grammatical number, mostly after prepositions or in appositions; agreement error
mood	wrong mood, e.g., in indirect speech
voice	active voice instead of passive voice and vice versa
word form	morphologically wrong word form, such as adjectives instead of adverbs and vice versa; wrong formation of past tense forms; use of expressions which do not exist; use of words from another language which cannot be expected to be understood in the target culture, etc.
syntax	syntactic error; constructions which are hard to understand due to their length, long parentheses, etc.; utterances which are grammatically correct but which would only make sense if additional lexical elements were inserted, e.g., *The few utterances could not be categorized as either one of the two models.* Comment: For this utterance to make sense it would have to be reformulated into: *The few utterances could not be categorized as belonging to either one of the two models.*
valency	missing actant; use of a lexical element that requires further specification; applicable also to nominalised verbs, e.g., *Aufenthalt* (from *sich aufhalten in*), where the indication of a place is required
specifier (article or determiner)	use of a determiner, e.g., an article, where there should be none; use of a definite article where an indefinite article should be used; etc.
infinitive	grammmatically wrong use of an infinitive construction (e.g., *Das Wetter war zu schlecht, um schwimmen zu gehen.*)
secondary subjectivization	use of verbs expressing human actions in connection with non-human subjects (possible in English but rare in German); e.g., *This book describes* (correct) vs. *Dieses Buch beschreibt* (wrong)
other grammar	other grammatical errors, such as the use of a prepositional phrase instead of a genitive and vice versa (e.g., *von seinem Vater* instead of *seines Vaters*)

Text-level errors	
text coherence	incoherent text segments, e.g., logically wrong connection of clauses and sentences by the use of semantically inappropriate conjunctions; use of wrong pronouns; sentence not related to its context; referent unclear; missing second part of correlative (two-part) conjunctions; repetition of a noun phrase where a pronoun would be sufficient
sense	incomprehensible or nonsensical section longer than a phrase (otherwise it is counted as a semantic error), contradictory statements
implicitness	too much information left implicit, e.g., author does not express something to which a conjunction, etc. refers (e.g., *There are three types of birch trees. Therefore, I will describe only one.* Here, *therefore* refers to a sentence that was left implicit, i.e., *I cannot cover them all.)*
functional sentence perspective (FSP)	wrong topic-comment structure (theme/rheme)
rhetoric	loss of communicative emphasis or effect (e.g., replacing a poem by a mere description of its content); literal repetitions (see, however, "redundancy" and "text coherence")
Other	
idiomaticity/ genre	unidiomatic expression which does not lead to a change of meaning but may make the text hard to understand and betray that it is a translation in a negative sense; use of expressions which do not conform to genre conventions (e.g., *Das Bild ist kein Zufallstreffer.* instead of *Das Bild ist kein Schnappschuss.* and *Anfangend mit Namen* as a title.)
cultural specificity	missing adaptation to the target culture or missing cultural neutralisation

Table 1. Error classification scheme.

The number of errors reflected upon by the subjects is of interest because it provides insight into the subjects' own awareness of the problematic aspects of their texts. When a subject reflected on an error but was still unable to circumvent it, i.e., generate and subsequently choose a correct alternative, it can be assumed that the subject lacked competence in the area of text evaluation but still displayed a certain degree of problem awareness. In contrast, when a subject made an error without reflecting on it, this indicates a lack of problem awareness. The latter shortcoming, i.e., a lack of problem awareness,

is assumed to be more difficult to address didactically than lacking evaluation competence.

The total number of linguistic errors in the texts, while a useful means of comparison, cannot by itself serve as an exhaustive measure of overall text quality. For this reason, a qualitative comparison of the source and target texts was also conducted in which the improvements and deteriorations with respect to the above error scheme were identified and analyzed. The results of this comparison will be illustrated with excerpts in section 4. Finally, as a further text quality measure, the assessment scheme depicted in table 2, based on the Karlsruhe comprehensibility concept, was also implemented.

4. Results and discussion

The contrastive analysis in which the source and target texts were assessed according to the Karlsruhe comprehensibility concept yielded the following results: No noteworthy difference in the scores of the English texts and the German texts could be observed for any of the subjects. In other words, no significant improvements or deteriorations on the textual macro-level, i.e., the level which comprises more than two adjacent sentences, could be observed between the English and German text versions. Out of a maximum score of 45 points, the discrepancy between the source-text- and target-text scores was only found to be between +4 and –2 points; in three cases, the text quality on a macro-level of the English texts was slightly better than that of their German counterparts, and in the three remaining cases, the opposite trend was observed (for the complete results, see Göpferich & Nelezen 2012). This lack of significant change from the English to the German texts arose from the manner in which the subjects composed their German texts: Instead of attempting to make changes on a macro-level, the subjects primarily transferred the contents of the source texts into the target texts on a sentence-to-sentence basis and thus focused on the micro-level, i.e., the level of neighboring sentences. The changes made to the texts at this level had little overall effect on macro-level issues such as the functional adequacy of the texts and their appropriateness for their audience. It should also be noted, however, that the similarity of the L1 and L2 texts on the macro-level may simply signal unawareness on the part of the subjects concerning the structural shortcomings of their texts, both in their L2 and in their L1. If the latter is the case, this would confirm Arndt's (1987) assumption that L1 and L2 writing processes are, on a global level, very similar. The data basis of the analyses presented in this article, however, is too small to draw such conclusions.

Criteria*	Score				
	4	3	2	1	0
Communicative function					
To what extent does the article have a consistent communicative function?	fully	to a great extent	to some extent	to little extent	not at all
Audience					
To what extent does the article take its audience's requirements and interests into account?	fully	to a great extent	to some extent	to little extent	not at all
Mental denotation model (content)					
Is the mental denotation model adequate (superfluous elements, relevant information missing)?	fully	a few superfluous or missing elements	many superfluous or missing elements	so many that comprehension greatly suffers	so many that text is incomprehensible
Structure (argumentation)					
To what extent is the article structured logically at the macro-level?	fully	to a great extent	to some extent	to little extent	not at all
Is the article self-contained (clear beginning and clear ending)?			yes	to some extent	no
To what extent is the article structured logically at the micro-level (functional sentence perspective, connectors)?	fully	to a great extent	to some extent	to little extent	not at all
Simplicity					
To what extent are the lexical elements and grammatical constructions adequate?	fully	to a great extent	to some extent	to little extent	not at all

Motivation					
To what extent does the article attract and hold the audience's attention (motivation)?	adequately	to a great extent	somewhat	vaguely	not at all
Does the article have an attractive title?			yes	somewhat	no
Correctness					
To what extent is the article correct content-wise?		throughout	contains minor errors	contains major errors	completely wrong
To what extent is the article correct at the language level?	**5 points** (perfect) – **0 points** (so poor that it is largely incomprehensible)				
Concision					
Are ideas expressed in a concise manner?	concise text	only few wordy expres-sions or clumsy construc-tions	many wordy expres-sions or clumsy construc-tions	very many	so many that text is difficult to read
Perceptibility					
Is the formatting and layout adequate?			fully	with a few exceptions	with many exceptions
Mental convention model (style)					
Is the style adequate?	fully	to a great extent	to some extent	to little extent	inadequate
Media					
Are the media selected adequately?			fully	with a few exceptions	with many exceptions
Special requirements?					
To what extent have special requirements (legal, formal, etc.) been taken into account?			fully	with a few exceptions	with many exceptions

Table 2. Assessment scheme based on the Karlsruhe comprehensibility concept (* if a criterion is not applicable, e.g., because the correctness on the content-level cannot be assessed by the investigators, *n.* —for *not applicable*—is indicated).

Table 3 provides an overview of the linguistic errors made by every subject in their source and target texts, and further reports on the number of reflected errors in the German texts. The results in table 3 show that, contrary to the assumptions stated in section 2, more errors were made in the German texts (227 total errors) than in the English texts (186 total errors). If the error class "Other", in which no difference was observed between the English and German texts, is disregarded, the number of errors in the German texts is actually higher in every category (formal errors, lexical errors, and grammatical errors) with the exception of text-level errors, of which there were fewer in the German texts. There are many possible reasons for such a result, two of which will be discussed here.

First, the high number of errors in the German texts might have been caused by the translation task itself. Though the term 'translation' was deliberately avoided in the assignment, it is likely that many of the errors were caused by either L2 interference or a strong degree of fixedness on source-text formulations.[4] This is also supported by the fact that students of translation tend to produce errors arising from interference and fixedness at the beginning of their translation training, errors that tend to occur in lesser frequency as translation competence develops. Considering that the subjects in this study had little or no experience in translation, it is reasonable to assume that their behavior greatly resembled that of translation novices. In remaining as close to the source text as possible, the subjects may have been implementing a type of cognitive relief strategy: In order to save cognitive capacity for other processes (such as generating appropriate German renderings of English terms), they may have avoided diverting greatly from the source text, especially on the macro-level.

Second, the higher number of errors in the German texts could have reasons independent of the translation task. It is reasonable to assume that the subjects may simply display certain shortcomings in the areas of, for example, German punctuation rules, word choice, and grammar. One indication of this is that several subjects expressed their desire to use reference materials such as a dictionary or the internet to assist them in finding appropriate expressions and synonyms, a desire which was not granted during this particular experiment. In light of these observations, an analysis focusing specifically on the L1 errors and their causes would be promising, especially in the paradigm of *Situated* or *Embedded Cognition* from the cognitive sciences, which

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4. For more about the phenomenon of fixedness in psychology, see Duncker (1945); for fixedness in translation, see Mandelblit (1994).

postulates that an individual's particular work environment and conditions have a decisive influence on his or her cognitive processes. As a consequence, taking subjects out of their usual work environments can be expected to have negative effects on the results of their work (cf. Hutchins 1995; Clark 1998, 2008; Clark & Chalmers 1998).[5] For reasons of space, this cannot be addressed further in this article.

Further interesting insights into L1 and L2 text composition processes can be gained when closely examining the results regarding the text-level errors, the only category in which an improvement from English to German was observed (45 errors in the English texts versus 39 errors in the German ones). When examining these errors for individual subjects, we see that four of the six subjects performed better in their German texts than in their English texts (see Table 3). This result supports the assumption stated in section 2 that students, at least at the text level, are better able to express themselves in their L1 than in their L2 and seem to take a more critical stance towards their texts' logical structure and argumentation. Another possible explanation for this result is that the subjects may have been able to improve upon the logical structure and argumentation of their German texts because both were already provided in the English texts, offering them a certain amount of cognitive relief by enabling them to carry over the structure and content into the German texts.

	FrSc			InMa			JeCr			LaRe			LaSe			RiDö			Totals		
Error category	E	G	R	E	G	R	E	G	R	E	G	R	E	G	R	E	G	R	E	G	R
Formal errors	5	8	0	3	7	0	5	13	3	9	13	2	3	4	0	2	13	0	27	58	5
punctuation	4	6	0	0	3	0	4	10	2	7	8	1	3	3	0	2	11	0	20	41	3
spelling	1	2	0	3	4	0	1	3	1	2	5	1	0	1	0	0	2	0	7	17	2
formatting	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
Lexical errors	17	20	6	8	16	11	17	20	9	12	6	1	5	11	7	6	5	2	65	78	36
semantic	7	16	6	8	16	11	7	15	8	8	5	1	4	11	7	2	4	2	36	67	35
collocation	2	1	0	0	0	0	2	2	1	0	1	0	0	0	0	1	0	0	5	4	1
blending	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
preposition	3	0	0	0	0	0	3	2	0	2	0	0	1	0	0	2	1	0	11	3	0
modality/ illocution	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	3	1	0

5. If the high number of errors is due to the subjects' not being allowed to use reference materials, this would indicate that the subjects lack problem-avoidance strategies.

	E	G	R	E	G	R	E	G	R	E	G	R	E	G	R	E	G	R	E	G	R
redundancy	4	2	0	0	0	0	4	1	0	2	0	0	0	0	0	0	0	0	10	3	0
Grammatical errors	10	12	5	6	2	1	10	15	4	8	6	2	6	8	4	5	5	2	45	48	18
tense	1	0	0	2	1	1	1	1	0	1	1	0	1	3	2	0	0	0	6	6	3
aspect	1	0	0	0	0	0	1	0	0	0	0	0	2	0	0	1	0	0	5	0	0
case, number, agreement	1	4	2	1	0	0	1	3	1	1	2	1	0	0	0	0	2	1	4	11	5
mood	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	2	1
voice	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0
word form	1	0	0	0	0	0	1	2	1	1	0	0	0	1	0	0	1	1	3	4	2
syntax	2	2	1	2	0	0	2	3	1	3	1	0	0	0	0	0	0	0	9	6	2
valency	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	2	1
specifier	4	3	1	1	0	0	4	2	1	2	1	1	3	1	0	2	1	0	16	8	3
infinitive	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
secondary subjectivization	0	2	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	5	1
other grammar	0	1	0	0	0	0	0	3	0	0	0	0	0	0	0	1	0	0	1	4	0
Text-level errors	6	10	9	2	1	0	6	9	1	21	11	3	8	7	1	2	1	0	45	39	14
text coherence	2	5	4	0	0	0	2	4	1	9	7	2	3	3	0	2	0	0	18	19	7
sense	0	1	1	1	0	0	0	0	0	8	2	0	1	1	0	0	0	0	10	4	1
implicitness	2	0	0	0	0	0	2	2	0	0	0	0	3	0	0	0	0	0	7	2	0
FSP *	0	2	2	1	1	0	0	1	0	1	0	0	1	2	1	0	0	0	3	6	3
rhetoric	2	2	2	0	0	0	2	2	0	3	2	1	0	1	0	0	1	0	7	8	3
Other	0	1	1	2	1	0	0	2	1	1	0	0	0	0	0	1	0	0	4	4	2
idiomaticity/ genre conventions	0	1	1	1	0	0	0	2	1	1	0	0	0	0	0	1	0	0	3	3	2
cultural specificity	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
Totals	38	51	21	21	27	12	38	59	18	51	36	8	22	30	12	16	24	4	186	227	75

Table 3. Number of errors found in the English (E) and German (G) texts and number of reflected errors (R) in the German texts (* Functional Sentence Perspective).

The subjects did not, however, make improvements from English to German in every text-level subcategory. While a notable improvement can be witnessed in the subcategories of sense and implicitness, the point values for the subcategories "text coherence" and "rhetoric" differed by only one point. There was even an increase in functional sentence perspective (FSP) errors from the English to the German texts (3 errors in English, 6 errors in German). The lattermost result is likely due to the differences in English and German in inflectional morphology and hence the ways in which they can obtain certain topic-comment structures. Whereas in English, the S-V-O

word order is relatively fixed, the rich inflectional morphology of the German language allows for a greater degree of syntactic flexibility. Nonetheless, the subjects often seem to have simply imitated the word order used in their English source texts instead of finding an appropriate German alternative. The extent to which these German FSP errors were induced by fixedness on the English syntactic structures will be more closely addressed in section 4.4.

The results regarding errors reflected upon in the German texts are also remarkable. The subjects only reflected upon 9% of formal errors (e.g., punctuation, spelling). In contrast, lexical errors were reflected upon most frequently (46%), followed by grammar errors (38%). Finally, text-level errors were reflected upon in 36% of all cases (though none of the implicitness errors were).

The fact that the percentage of errors reflected upon was lower for errors on the text-level than for those in the categories of lexis and grammar could be due to a greater degree of fixedness on these latter categories. In other words, it appears that the subjects orientated themselves greatly on the surface structures of the English source texts when it came to lexis and grammar, and had to make a deliberate effort (i.e., had to reflect upon these structures) to free themselves from this fixedness and produce appropriate German expressions. For this to occur on the text-level, in contrast, a smaller degree of concerted effort seems to have been necessary. In these cases, the improvements on the text level likely occurred because the subjects were able to focus on the logical relations between the ideas in their texts, not simply the way they were explicitly expressed in English. The relative degrees of fixedness depending on error types will be discussed in greater detail in section 4.1.

The changes made on the text level are those that most greatly affect the structural and argumentative quality of the texts. For this reason, the analysis that follows will focus on these text-level errors in a contrastive manner, specifically the errors in the categories of text coherence, sense, implicitness and FSP.[6]

4.1. Text-coherence errors

With 18 errors in English and 19 in German, text-coherence errors form the largest subcategory among the text-level errors, accounting for 44% of all

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6. Because the types of rhetorical errors vary greatly, they will not be addressed here but can be found in Göpferich & Nelezen (2012).

text-level errors.[7] Though one might assume that the errors in English were simply carried over into the German texts, only four of the 18 errors in the English texts were actually transferred to their German counterparts. This means that the subjects were able to avoid 14 of the 18 (English) errors in their German texts, a seemingly impressive improvement, but that they also made 15 new errors in their German texts that were not the result of direct transfer. Excerpts 1e (English) and 1g (German) below illustrate errors which occurred in the same place in both the English source text and German target text, but the error types that occurred in these places differ: In the English text, the coherence error arises from the use of an illogical connector (adversative instead of additive), whereas in the German text, though a logical connector (*sowohl – als auch)* is used, the second part of this correlative conjunction (*und* instead of *als auch*) does not fit to the first one:[8]

> (1e)   By using contemporary modern [sic] elements like [sic] cubism and incorporating typical African elements, Douglas was able to create an unequal [sic] African American art style, [sic] that was able to address modern issues, *but* also represent the [sic] common identity.[9] (JeCr)

> (1g)   Indem er Elemente des Kubismus und typisch Afro-Amerikanische [sic] Symbole in seiner Kunst vereinte, hat er einen neuen Afro-Amerikanischen [sic] Kunststil entwickelt [sic], der sowohl moderne [sic] Themen portraitiert [sic] und die Identität der Afro-Amerikaner repräsentiert.

In addition to illogical connectors and the inconsistent use of correlative conjunctions, the following text-coherence error types were indentified in the German and English texts:

Reference to an antecedent by means of a noun that does not fit:

> (2g)   Der Hauptgrund lag in der Versklavung von afrikanischen Amerikanern [sic] in der Vergangenheit [sic] und deren geringen [sic] Ansehen und [sic] Stellung in der damaligen [sic] Gesellschaft. *Dieser Rassismus* bestand nahe zu [sic] unverändert bis in die 1920er Jahre und führte

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7. The other text-level errors, e.g., sense and implicitness, also carry negative effects on text coherence, but, as stated in section 3, they were not classified as such because text coherence was not considered to be the primary error.

8. The error in English could also be considered an inconsistent use of the correlative conjunction *not only…, but also…*, a likely assumption considering the similar error made in the corresponding German version.

9. The errors illustrated in this article are italicized, while other errors that occurred in the shown excerpts are marked with *[sic]*. Since the errors marked with *[sic]* are not dealt with in this article, it is not necessary for the reader to understand why they are marked.

zu einem zugespitzten rassistischem [sic] Denken und zu rassistisch motivierter Gewalt. (FrSc)[10]

Use of a full form instead of a pro-form:

(3g)   Wenn ein Mensch also von Leid getroffen wurde [sic], suchte [sic] er in seinen Überzeugungen, die sich aus Ideal, Religion, Philosophie und eben der [sic] Kultur speisten [sic], nach Antworten auf die „Warum?"-Frage des Leids und fand [sic] je nach seinen Überzeugungen unterschiedliche Antworten auf *die „Warum?"-Frage*. (LaRe)

Use of a pro-form whose referent is unclear:

(4g)   Weiterhin [sic] war er ernsthaft daran interessiert [sic] die wichtigen afrikanisch-amerikanischen Fragen darzustellen und als „Schwarzer" [sic] Künstler *deren* Erfahrungen auszudrücken. (FrSc)

Missing coherence-generating element:

(5g)   Wie auch immer du dich entscheidest, die Frage nach dem Leid ist für alle Menschen von höchster Bedeutung, daher ist es *für dich* persönlich wichtig, welche Antwort du dir *selbst* darauf gibst. (LaRe)

In excerpt 5g, it is supposed to be emphasized that *die Frage nach dem Leid* (Engl. *the meaning of suffering*) is important for all people, which is why it is *also* important that the reader finds an answer for himself. Without the inclusion of *auch* (Engl. *also*), the emphasis rather falls on *dir selbst* (it is important which answer you find *for yourself*).

Incorrect pro-form:

(6e)   If the book is an aesthetic novel, then what is the function of the Gothic elements? *It* becomes clear when looking at both in close connection. (RiDö)

Isolated sentence that has no identifiable relation to what is stated before and/or afterwards:

(7e)   Nevertheless, "The Yellow Wall-Paper" is still relevant today since it shows the danger of a declining mental state due to a [sic] wrong or no treatment at all. *This danger is also further reinforced.* Being nameless, the story's protagonist can represent anyone. (LaSe)

(7g)   Dennoch ist diese Kurzgeschichte auch heute noch relevant, da sie sehr eindrucksvoll beschreibt, was passieren kann, wenn depressiv erkrankte [sic] Menschen nicht oder falsch behandelt werden. *Ein weiterer Abschreckungseffekt wird auch dadurch erzielt, dass* die

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10. For the complete English source texts and their translations, see Göpferich & Nelezen (2012).

> Protagonistin von Perkin Gilmans Geschichte keinen Namen erhält und somit jeden Menschen wiederspiegeln [sic] kann. (LaSe)

In 7e, the italicized sentence simply has no apparent connection to the sentence following it. Its German counterpart (7g), in contrast, also has no apparent relevance to the preceding content because of the use of the denotatively incorrect noun *Abschreckungseffekt (deterrent)* in combination with *ein weiterer (a further),* falsely signaling that a deterrent was already referenced in the preceding text.

Table 4 provides an overview of the absolute frequencies of each type of text-coherence error in the English and German texts. The values in parenthesis refer to those errors that were carried over from the English into the German texts, while the remaining errors are those which either could be avoided in the German texts or first appeared in them. The low values concerning English text-coherence errors carried over into the German texts and the high values concerning text-coherence errors first committed in the German texts demonstrate that, when it comes to verbalizing a text in another language, the relations of ideas that occur in the source text are not simply controlled by the formulations in the source text. Instead, the ideas are newly set in relation to each other during reverbalization. The result is that the ability to create coherence in a target text is not as likely to be affected by fixedness as rather seems to be the case in other areas of text composition (e.g., grammar and lexis). However, the fact that so many text-coherence errors still appeared in the German texts that are not the result of fixedness points to the need to address more thoroughly—in both the L2 and the L1 classroom—the methods for expressing logical relations between ideas. This can be achieved with translation exercises that take a contrastive approach to

Text-coherence error type	English	German
illogical connector	13 (3)	8
inconsistent use of a correlative conjunction	–	1
reference to an antecedent that does not fit	1	3
use of a full form instead of a pro-form	–	3
unclear referent	2 (1)	2
missing coherence-generating element	–	1
incorrect pro-form	1	–
isolated sentence	1 (1)	1
Totals	*18 (5)*	*19*

Table 4. Frequencies of text-coherence error types.

creating coherent texts by means of, for example, connectors and pro-forms. For this purpose, writing instructors can create manipulated source texts with disturbed coherence, where the students' task is then to identify and rectify these areas of disturbed coherence during the translation process.

4.2. Sense errors

Sense errors occurred less often in the German texts than in their English counterparts (10 versus 4 respectively). Only one subject (FrSc) made a sense error in her German text that did not occur in the same place in her English text:

(8e)   By capturing the spirit of his time in his works [sic] Douglas was among the first African Americans to explore their history and generating [sic] a common pride in their heritage, for instance [sic] by using symbols that represented their existing political rights. (FrSc)

(8g)   Als einer der ersten afrikanischen Amerikaner [sic] entdeckte er die eigene Geschichte neu und entwickelte [sic] einen gemeinsamen Stolz auf das afrikanische Erbe, *zum Beispiel ihre existierenden, politischen Rechte symbolisiert wurden*.

The fact that the last portion of the sentence in 8g fits neither syntactically nor contextually to what comes before it suggests that FrSc might have left it in by mistake; her keystroke log file reveals, however, that this information was in fact intentionally added on to this sentence, but that she struggled greatly in coming up with a German formulation with which she was satisfied. In comparing the different formulations FrSc considered, it can be assumed that she attempted to create as concise a sentence as possible but sacrificed all coherence to do so, which is probably a result of a lack of motivation to continue refining the sentence to express the intended meaning concisely.

In three cases, sense errors in the English source texts were simply reproduced in the target texts, while in three further cases, the English sentences with sense errors were simply omitted from the German texts, signaling perhaps a lack of comprehension of those sentences on the part of the subjects. These cases will not be further discussed here (but see Göpferich & Nelezen 2012).

The following excerpts illustrate a case in which a subject was only first able to express herself clearly when writing in their L1 German:

(9e)   In Lakoff's linguistic model [sic], a Democratic President [sic] as a 'Nurturant Parent' generally *includes the population into the realm of the national decisive agents* [sic] and resorts to the first person plural pronoun *we*. (InMa)

(9g)   In Lakoffs linguistischem Modell [sic] <u>räumt</u> ein demokratischer Präsident als „Fürsorglicher Versorger" *den Bürgern des Landes entscheidende Mitspracherechte im nationalen Familienverbund ein* und verdeutlicht dies durch die Benutzung des Pluralpronomens WE [wir].

The italicized portion of the sentence in excerpt 9e is incomprehensible, especially to those without a background in Lakoff's theory, for several reasons, including the polysemy of the word *decisive*, which can mean both (a) *having the power or quality of deciding* and (b) *important, crucial*. The author's think-aloud protocol quoted below shows that she becomes aware of this problem once she has to produce a German version and is able to successfully correct it by selecting an expression that appropriately corresponds to the intended meaning, namely *Mitspracherecht*.

> bürger in die: als decisive agents oh man die bürger als maßgebliche, naja, maßgeblich sind sie ja nicht, sie haben einfach nur, sie können mitreden und haben entscheidungsfreiheit oder zumindest ein mitspracherecht. als gleichwertig? und gleichwertig verantwortungsvolle, als mitspracheberechtigt? gibt es dieses wort? als mitspracheberechtigt in into the realm oh man die bürger als mitspracheberechtigt nein die bürger des landes oder gesteht ihnen mitspracherecht zu? räumt ihnen ein räumt () den bürgern des landes ein entscheidendes mitspracherecht ein, ein (ll. 381–394)

Later, the expression *decisive agent* occurs again in her English source text. This time, however, it refers to the president alone and should thus be rendered differently. Again, the author makes the right decision by rendering it this time as *die entscheidende Autoritätsfigur*. These two excerpts show that InMa was able to generate formulations in her German text that display a vast improvement in comprehensibility over her English version, pointing to the utility of translation to help students become aware of the important role their lexical choices have in text comprehensibility.

That fewer sense errors were made in German than in English, and that many of the errors in English were identified by the subjects and subsequently corrected in the German texts, gives further support to the assumption stated in section 2 that the subjects have a higher level of micro-level text-linguistic competence and are better able to differentiate semantically in their L1 than in their L2.

4.3. Implicitness errors

Implicitness errors occurred seven times in English and only two times in German. Remarkably, the two German errors were the result of their English counterparts being more or less directly transferred in the German texts, so

the subjects were able to correct the five remaining source-text errors in their German texts. The two errors that recurred in the German texts were both made by the same subject, JeCr, who reported being raised bilingually. Interestingly, this particular subject committed the highest number of errors of all subjects in her German text, and also had the second-highest number of errors in her English text. JeCr wrote her English source text with another subject in the experiment, FrSc, who was able to avoid both implicitness errors in her German rendering of the text. The following is an example of one such case:

(10e)   *Due to the past enslavement of African Americans*, they were still believed to be uncultured and rough and were denied a cultural identity by White [sic] society. (JeCr and FrSc)

(10g1) *Auf Grund der Versklavung der Afro-Amerikaner in der Vergangenheit [sic]*, [sic] wurden diese noch immer als unkulturell [sic] und ungebildet angesehen. Die weiße Bevölkerung glaubte, dass Afro-Amerikaner keine kulturelle Identität hätten. (JeCr)

(10g2) Die dominierende, [sic] weiße Gesellschaft hielt afrikanische Amerikaner [sic] für grob und kulturlos [sic], daher verweigerte sie ihnen die Anerkennung einer eigenen kulturellen Identität. Der Hauptgrund lag in der Versklavung von afrikanischen Amerikanern [sic] in der Vergangenheit [sic] und deren geringen Ansehen [sic] und [sic] Stellung in der damaligen [sic] Gesellschaft. (FrSc)

In 10e, a cause-and-effect relationship between the enslavement of African Americans and the 'white society's' subsequent opinion of them is established. Indeed, it could be argued that the relationship between the enslavement of African Americans and their reputation as "uncultured and rough" was actually the reverse of what is written in 10e: It was, among many other complex factors, these types of opinions about Africans in the United States that led to the social acceptance of their enslavement in the first place. Furthermore, the fact that white society had not substantially improved their view of African Americans at the beginning of the 20th century was not due to their enslavement itself but (at least partly) to the consequences of this enslavement. Certainly, former slaves and their children and grandchildren were by and large not given the opportunity to receive a high level of education and, due to a different cultural mentality, did not fit into what were considered at that time to be cultural norms. These factors led to an African American generation that was, for the most part, viewed as uneducated and uncultured.

In JeCr's German rendering of the text (10g1), she kept the relation between the two ideas – slavery and the view that African Americans were uncultured and rough – a causal one, not making further thoughts about it during the experiment. FrSc, in contrast, became aware during reverbalization that there

was a problem with the sentence (TAP ll. 680–690) and took measures to try and change it. Instead of establishing slavery the cause of this view, she made this view the cause of their being denied a cultural identity, a causality that is explicitly stated. Though FrSc's German text (10g2) does not, in the end, ideally describe the role of slavery in this situation, both the improvements in her text and her considerations while thinking aloud signal her ability to approach writing in her L1 more critically than she did in her L2.

In 11 there is another case in which the author (LaSe) was, in her German text, able to avoid the implicitness error she had made in her English text:

(11e)   *Though she is seriously ill*, her husband and physician John does not trust her opinion and prescribes her a medication [sic] which insidiously worsens her condition. (LaSe)

(11g)   Obwohl sie ihrer Meinung nach äußerst krank ist, sind alle ihre Bemühungen [sic] ergebnislos. Sie wird von ihrem Mann, der zugleich auch ihr Arzt ist, einfach nicht wahrgenommen [sic].

In 11e, it seems that the author wanted to express that the protagonist believed that she was seriously ill and made every effort to convince her husband of this, but that he, in spite of all her efforts, did not believe her. The conjunction *though* should thus not refer to the assertion that she was seriously ill but to her efforts to convince her husband, an assertion left implicit in this sentence. In 11g, the author is aware of the shortcomings of her expression of ideas in her English sentence and includes both *ihrer Meinung nach (in her opinion)* and *Bemühungen (efforts)* to make the relationship between the two statements more explicit; ideally, however, these efforts should have also been specified more closely (i.e., *efforts* to do what?).

The results concerning implicitness errors, i.e., that only one (bilingual) subject transferred these errors into her German text, while the rest of the subjects were able to avoid them, indicates that the cause of such errors may be the inability for the subjects to express themselves explicitly in a foreign language to the extent they can in their native tongue. As a type of avoidance strategy, perhaps, they may simply omit what they have difficulty expressing in their L2, negatively impacting the comprehensibility of these texts. This exclusion of content also has negative effects on the epistemic function of writing, as students do not practice expressing their ideas precisely and completely.

4.4. Errors concerning functional sentence perspective (FSP)

Of the three FSP errors that occurred in the English texts, two were corrected in the German versions, whereas one was simply taken over in the German

text.[11] This means that of the total six FSP errors in the German texts, five correspond with formulations in the English texts that are not erroneous. Consider first the two following errors that were avoided in the German texts:

(12e) So decide for yourself which paradigm sounds more convincing to you, as they will be explained more in detail *in this article*. (LaRe)

(12g) Diese beiden (Denk-)Muster werden im Folgenden genauer beschrieben, es ist an Dir [sic] zu entscheiden, welche der beiden Erklärungen dem Leiden mehr Sinn geben.

(13e) Women were often kept without love in a domestic sphere and not taken seriously by their husbands. The short story "The Yellow Wall-Paper" [sic] written in 1892 by Charlotte Perkins Gilman (1860–1935), an American writer, *is an outstanding illustration of these attitudes and the treatment of 19th c. women*. (LaSe)

(13g) Oftmals wurden an Depressionen erkrankte Frauen von ihren Ehemännern nicht wahrgenommen und zu Hause einfach eingesperrt. Dies passiert auch in der Kurzgeschichte „The Yellow Wall-Paper" (im Deutschen: „Die gelbe Tapete") aus dem Jahr 1892, welche von der amerikanischen Schriftstellerin Charlotte Perkins Gilman verfasst wurde.

In 12e and 13e, information with relatively low communicative importance is presented at the prominent rheme position at the end of the sentence (italicized text). In 12g and 13g, this information is now presented at an earlier position in the sentence. The expression *in this article* was rendered as *im Folgenden*, and the expression *is an outstanding illustration…* was quite smartly replaced with the deictic expression *dies* to refer back to the entire preceding sentence and to establish it as the topic of the new one. In both cases, the principle of theme-rheme is first instated in the German texts.

The case in 14 exemplifies an error by subject LaSe that, as mentioned in section 4, first occurred in the German text due to the imitation of the English word order. In German, the order in which the information about frequency and location is placed should have been adjusted to create the appropriate communicative dynamism.

(14e) Melancholia, burnout-syndrome [sic], depression – mental diseases seem to be increasingly common in today's society. (LaSe)

(14g) Melancholie, Burnout-Syndrom sowie Depressionen – physische [sic] Krankheiten treten *immer häufiger in unserer Gesellschaft* auf.

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11. This error is not addressed here due to reasons of space. A side-by-side comparison of all the text-level errors in English and German can be found in the data documentation in Göpferich & Nelezen (2012).

The error in 14g seems to be the result of interference from the English source text. In other words, the task of translating itself may have caused the subject to create a German text with syntactical structures the subject, in a free writing situation, would not have created. The error in 15 also very likely occurred because of the translation task.

> (15e) Due to the past enslavement of African Americans, they were still believed to be uncultured and rough and were denied a cultural identity by White [sic] society. (FrSc)

> (15g1) Der Hauptgrund lag in der Versklavung von afrikanischen Amerikanern *in der Vergangenheit* und deren geringen [sic] Ansehen und [sic] Stellung in der damaligen Gesellschaft.

The author's TAP (ll. 640-687) reveals that she struggled greatly with finding an appropriate German equivalent for the modifier *past,* attempting several times in vain to incorporate a pre-nominal modifier before finally settling upon *in der Vergangenheit,* yet still apparently dissatisfied with the result of the sentence. Though semantically correct, the post-nominal position of *in der Vergangenheit* places undue weight on its communicative importance in the sentence; rather, the emphasis should be placed on *Versklavung* ('enslavement') as could easily be achieved in English by the placement of past before *slavery.* One possible solution might have been to express the enslavement in verbal form, as in 15g2.

> (15g2) Der Hauptgrund lag darin, dass die Afro-Amerikaner in der Vergangenheit versklavt worden waren …

Such errors could also be the result of fixedness on the wording in source texts, which, as mentioned in section 4, often occurs among translation novices lacking translation competence. If this is the case, then half of the FSP errors in German (three of six) can be attributed to this cause. In contrast, the FSP error in excerpt 16, which occurred in the first sentence, cannot be ascribed to fixedness.

> (16e) The United States of America is the land where revolutions are born. Aside from politically motivated ones …, important cultural revolutions derive [sic] their origin from America. (FrSc)

> (16g) *Viele Revolutionen* wurden in den Vereinigten Staaten von Amerika geboren. Eine dieser Revolutionen war in der Lage …

Here, the subject did not imitate the word order in the English text but intentionally altered it in the target text. Because revolutions being born is the new information being introduced in this sentence – and is also taken up as the topic of the subsequent sentence in linear progression – it should

have appeared, as it did in the English sentence, at the sentence-final rheme position.

The TAP of the author of 16g clearly reveals her motivation behind diverting from the word order in the source text: Though she generated alternatives that included the revolutions both at the beginning and at the end of this sentence, she was apparently preoccupied with other aspects of the sentence with which she was not satisfied, namely the verb phrase *geboren werden* and the relative pronoun *wo:*

> the united states of america is the land where revolutions are born. OH, noch ein kurzer. würde aber ein bisschen umstellen. ich würde, glaube ich, schreiben ehm also statt in: in den vereinigten staaten von amerika werden revolutionen geboren, obwohl das sich auch nicht schlecht anhört, ich schreibe, glaube ich, beides mal hin. also in den vereinigten staaten von amerika werden ist das, die vereinigten, also übersetzt wäre es ja ganz genau die vereinigten staaten von amerika ist das land, wo revolutionen geboren werden. machen wir erst mal ups, da gehörst du nicht hin, das ist die vereinigten staaten von amerika ist ... ist das land, wo revolutionen geboren werden ... so. das mit dem wo gefällt mir nicht … soh:, man könnte auch umstellen, in revo nicht die, man könnte ja auch die revolutionen nach vorne machen. viele revolutionen ehm wurden in den vereinigten staaten von amerika geboren? vielleicht finde ich noch etwas anderes für geboren. in den viele revolutionen wurden in den vereinigten staaten von amerika geboren. dann gebo:ren. geboren okay, das ist kürzer, ich habe diesen blöden, langen satz nicht drin. (ll. 197–222)

The author's neglect of the requirements of this sentence's communicative dynamism in this case might indicate a lack of awareness for such requirements. In general, the fact that the subjects do not seem to be aware of the principles underlying the arrangement of words from a communicative standpoint may be the cause of their lack of resistance to interference in this area of text grammar. It can be assumed that such errors could be avoided with the help of focused instruction concerning FSP. Topic-comment structures are not a part of the German school curriculum, so it is all the more important to address FSP in writing classes at higher education institutions. This can be accomplished in a contrastive manner, with, for example, translation exercises in which target-text versions require an adaptation of word order due to the requirements of communicative dynamism.

5. Summary and conclusion

This study compared the quality of L2 (English) popular-science texts with that of their L1 (German) versions written by the same authors. In this analysis, special attention was paid to the following text-level error categories:

coherence, sense, implicitness, and FSP. The data used for analysis included not only the written products but also process-oriented data collected using think-aloud and keystroke logging. The specific characteristics of the German products as resulting from the translation task itself were given special focus.

The comparison of the text-level writing competence of the six advanced English students revealed that, while fewer sense and implicitness errors were made when subjects wrote in their L1, there was no significant difference in the total number of text-coherence errors between L2 and L1, and FSP errors occurred even more frequently in the L1 than in the L2. The lattermost result, as well as the overall result that more linguistic errors occurred in German than in English, can be primarily attributed to the translating task, i.e., many errors in German would likely have not occurred without the presence of the English source texts they were based on. It can be assumed that, due to the low level of translation competence among the subjects in this study, they did not resist interference and tended to display fixedness on the source text, phenomena which might not have occurred during a free text-production task. Fixedness and interference thus represent disadvantages of translation tasks that must be taken into account when assessing text-production competence in two languages on a contrastive basis using translation tasks as writing assignments.

During translation, the source text alleviates the cognitive demand of the task at hand because the content of the source text can be taken over into the target text. In line with McCutchen's (1996) capacity theory of writing, this decrease in cognitive demand can be assumed to free up working memory capacity that can then be dedicated to other text production processes. This may also lead to target texts that, in certain aspects, are better than those produced without a source text. Such observations were made, for example, by Uzawa (1996) in her study of 22 university students who had to complete three writing tasks: one writing task in their L1 (Japanese), one in their L2 (English), and one translation of a completed L1 text into their L2. These students were—in both their L1 and L2— inexperienced writers who could not devote sufficient attention to the linguistic quality of their freely written texts. That is, according to Bereiter & Scardamalia (1987; see also Kellogg 2008), they were in the first stage of writing development, called *knowledge telling*. Their translations, in contrast, were higher in linguistic quality than their L2 texts. This may be attributed to the fact that the translation task relieved the subjects of extensive planning processes, resulting in more attention available for linguistic details.

Aside from methodological disadvantages for determining text-production competence, translation tasks also have many advantages, especially when a product-oriented approach is combined with a process-oriented one. In many cases, process-oriented data make it possible to determine whether the subjects are aware of the errors and other shortcomings in their source texts and, if so, whether they are able to improve upon these in their target texts. In this study, this was witnessed for implicitness and sense errors, indicating a greater degree of linguistic flexibility in their L1 and a more restricted competence in their L2. In turn, this limited flexibility in expressing themselves in their L2 may prove to be harmful to the epistemic function of writing, as this limitation could lead to newly-formed knowledge never fully—or only distortedly—expressed in writing, which is harmful to the development and refinement of knowledge.

This study has also shown that translating can be a useful tool in the didactics of writing. Through translation, students can practice writing with a reduction in complexity, particularly on the macro-level, as the source text already provides the contents to be composed in verbalized form, allowing the students to pay greater attention to micro-level subtleties they might have otherwise ignored. Kim (2011) also corroborated this advantage of translation; she found that having her students translate from their L1 into their L2 enabled them to evaluate their L2 texts more critically. On top of gaining a greater awareness of structural differences between their L1 and L2, students are also more sensitized to language-specific requirements from a communicative standpoint, such as those of sentence construction. Specially-tailored translation tasks can furthermore facilitate students' awareness of language-specific coherence-generating means; for example, having them translate using a source text in which connectors are systematically deleted would force them during their translation processes to think about the logical relations between two parts of a sentence or two sentences and how to express them appropriately in each language. In this way, students are prompted to express explicitly certain relationships in written form that are significantly more difficult to establish and monitor in free writing tasks.

Due to its small scope, no generalizations can be made on the basis of this study. The results, however, demonstrate the interesting insights that an analysis of text-level errors can bring to our knowledge about text-composition competence, and lead us to conclude that a study with greater scope concentrating on the creation of text coherence in writing would bring even more promising insights into the development of writing competence. An especially interesting research question to explore would be whether or not

writing competence correlates with the ability to receptively detect certain types of errors, and whether or not the quality of texts on a text-linguistic level, as was determined here by the errors on the text level, can serve as a reliable predictor of the general text-production competence of a particular author.

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SOME THOUGHTS ABOUT THE CONCEPTUAL / PROCEDURAL DISTINCTION IN TRANSLATION: A KEY-LOGGING AND EYE-TRACKING STUDY OF PROCESSING EFFORT[1]

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Abstract

This article builds on the conceptual / procedural distinction postulated by Relevance Theory to investigate processing effort in translation task execution. Drawing on relevance-theoretic assumptions, it assumes that instances related to procedural encodings will require more effortful processing not only in relation to the time spent on the task but also in terms of product indicators such as seconds per word and number of micro translation units per word. Drawing on key-logging and eye-tracking data, the article shows that there are statistically significant differences when conceptual and procedural encodings are analysed in selected areas of interest, with instances related to procedural encoding requiring more processing effort to be translated. The results are relevant for translation process research as they signal to where processing effort

is predominantly located. Additionally, the discussion also contributes to validating experimentally some claims postulated by Relevance Theory.

Resumen

Este artículo se basa en la distinción entre codificaciones conceptuales y procedimentales postulada por la Teoría de la Relevancia para investigar el esfuerzo de procesamiento en tareas de traducción. Con base en esta teoría, se asume que los casos relacionados con codificaciones procedimentales requieren más esfuerzo de procesamiento no sólo en relación al tiempo empleado en la tarea, sino también en términos de indicadores de producto, tales como segundos por palabra y número de micro unidades de traducción por palabra. Utilizando datos de registro de teclado y ratón, así como datos de seguimiento ocular, el artículo muestra que existen diferencias estadísticamente significativas entre las codificaciones conceptuales y las procedimentales cuando se analizan áreas de interés seleccionadas. Los casos relacionados con la codificación procedimental requieren más esfuerzo de procesamiento para traducirlos. Los resultados son relevantes para la investigación del proceso de traducción, ya que indican dónde se concentra predominantemente el esfuerzo de procesamiento al traducir. Además, el debate contribuye a validar experimentalmente algunos principios postulados por la Teoría de la Relevancia.

1. Introduction

The use of eye tracking has gained impetus in translation process research lately. Jakobsen & Jensen (2008), Pavlović & Jensen (2009), Hvelplund (2011), Carl & Kay (2011), Carl & Dragsted (2012) and Alves, Gonçalves & Szpak (2012), among others, have shown that eye fixations differ in areas of interest (AOIs, henceforth) found in source and/or target texts and, thus, suggest interesting implications in terms of reading/writing for translation. These authors assume that the allocation of cognitive resources in translation is essentially an information-processing task that can be assessed in real time. In conjunction, key-logging and eye-tracking data emerge as powerful indicators of processing effort in translation.

Research using key logging builds on the recursive nature of the writing process (Flower & Hayes 1981) and on the notion of cognitive rhythm (Schilperoord 1996), first applied to translation process research by Jakobsen (2002). Research using eye tracking draws on the works of Just & Carpenter (1980) and Rayner (1998), among others, and rests on the overall assumption that eye-tracking data can be interpreted as correlates of on-going cognitive processing and, thus, offers a window into human information processing. Building on Just & Carpenter's (1980) eye-mind assumption, authors in translation process research assume that eye fixations can be used to map instances of processing effort in source and/or target texts and account for cognitive traits inherent to human translation processes.

Jakobsen & Jensen (2008) analyse reading for understanding, for translating, for sight translation, and for written translation to account for different reading modalities in translation. Measured in terms of eye fixation duration, their results suggest that translators allocate more processing effort to target text (TT) processing rather than to correlated instances in source texts (ST). This seems to indicate that TT processing requires more effort than ST processing. Pavlović & Jensen's (2009) use eye-tracking data to analyse directionality in translation and compare gaze patterns of professional and novice translators. Their results are in line with Jakobsen & Jensen (2008) and show that ST comprehension and TT production are two processes which differ in

terms of processing effort. Hvelplund (2011) also points out that processing effort is stronger for novice than for professional translators during ST and TT processing. Hvelplund measures fixation duration and pupil dilation to show that professional translators engage in automatic processing more often and longer than novice translators do. Hvelplund also suggests that switching attention between different processing modes, such as reading and writing, is easier for professionals and demands more effort from novice translators. Carl & Kay (2011) also investigate shifts of attention in relation to the segment being processed and segments that lie ahead. They show that professional translators are capable of typing a translation while already reading ahead in the ST, whereas novice translators often resort to a sequential processing mode and can only carry out one activity at a time. Carl & Dragsted (2012) investigate differences between copying and translation tasks. They point out that TT production problems, and not comprehension, seem to determine sequences of reading and writing patterns. Comparing copying and translation tasks, Carl & Dragsted (2012) show that, whereas there is more sequential reading/writing processes in translation, parallel reading and writing activities are more predominant in copying tasks.

In the aforementioned works, translation has been studied in terms of the allocation of processing effort during task execution. However, as Alves, Pagano & Silva (2009) show, a fine-grained linguistic analysis of translation problems may also shed light onto relevant aspects of cognitive processing in translation. Alves, Gonçalves & Szpak (2012) and Alves & Gonçalves (2013) use Relevance Theory (Sperber & Wilson 1986/1995) to investigate processing effort in translation drawing on the concepts of conceptual (CE) and procedural encodings (PE). Alves & Gonçalves (2013) report of a study of key-logged data of professional translators performing direct and inverse translation tasks, and they show that problems related to procedural encodings demand more processing effort to be translated. Alves, Gonçalves & Szpak (2012) analyse eye-tracking data using a similar methodology to identify instances where processing effort is stronger. Their results are in line with Alves & Gonçalves's (2013), with the number of eye fixations in their data suggesting that processing effort in translation is stronger in problems related to procedural encodings.

This article builds on the works of Alves, Gonçalves & Szpak (2012) and Alves & Gonçalves (2013) to propose an adaptation of the methodology used in those papers in two combined steps. First, we use key-logged data to analyse micro translation units (micro TUs, henceforth) located in selected AOIs, defined according to relevance-theoretic assumptions. Secondly, eye tracking

is used to probe further into the data and analyse fixation counts and fixation duration in selected AOIs. We claim that this methodological approach can offer an alternative to carry out fine-grained linguistic analyses of key-logging and eye-tracking data in translation process research and contribute to corroborate some assumptions postulated by Relevance Theory.

2. Theoretical underpinnings

Relevance Theory (Sperber & Wilson 1986/1995) has been applied to the study of processing effort in translation (Alves & Gonçalves 2003, Alves 2007), mainly by using the relevance-theoretic concepts of conceptual and procedural encodings proposed by Blakemore (2002) in order to identify a relation between processing effort and cognitive effect.

In relevance-theoretic terms, the function of conceptual expressions (i.e., open lexical categories, such as nouns, adjectives and verbs) is to convey conceptual meaning which is propositionally extendable and contributes to expanding the inferential processing of an utterance, whereas the function of procedural expressions is to activate domain-specific cognitive procedures (i.e., morph-syntactic constraints in utterance processing) and contributes to constraining the inferential processing of these same utterances. Relevance Theory assumes that the conceptual-procedural distinction guides inferential processing. And since most content words also carry some procedural meaning (Wilson 2011), therefore, processing effort in translation tends to concentrate more on problems related to procedural than conceptual encodings.

In order to clarify the distinction between CE and PE, we borrow an example from Alves & Gonçalves (2013), namely the title of one of the source texts used in their paper:

> **Coagulation** activation <u>and</u> inflammation <u>in</u> **sickle cell disease**<u>-</u>**associated pulmonary** hypertension

In the example above, normal type fonts refer to items that exclusively convey conceptual encodings; underlined fonts refer to items that exclusively convey procedural encodings; and bold-face fonts refer to hybrid encodings related to items in which conceptual encodings have a procedural function. In the noun phrase "Coagulation activation and inflammation", for instance, it is quite transparent that there are three content words *(coagulation; activation; inflammation)* and a function word *(and)*. However, besides being a content, referential word, in terms of the instructions it encodes, *Coagulation* also works as a modifier for other content words. Therefore, it is analysed as a case of hybrid encoding according to the theoretical framework adopted

by Relevance Theory. It is also relevant to note that words and encodings have different roles in a relevance-theoretic account of inferential processing. Whereas content and function words are lexical items used in text production, encodings concern the type of instructions conveyed by such words, namely conceptual, procedural or hybrid instructions (Blakemore 2002, Wilson 2011).

The studies of Alves (2007) and Alves & Gonçalves (2003) show there is a relation between processing effort and cognitive effect in translation and also that the conceptual-procedural distinction plays a role in such processes. Alves & Gonçalves (2013) build on these previous relevance-theoretic findings and corroborate them by means of statistical analyses. Using key-logged data to map instances of conceptual and procedural encodings onto micro/macro TUs (Alves & Vale 2009, 2011), Alves & Gonçalves (2013) show that problems related to procedural encodings demand more processing effort both in direct and inverse translation tasks.

According to Alves & Vale (2011: 107), a micro TU is defined as "[…] the flow of continuous target text production—which may incorporate the continuous reading of source and target text segments—separated by pauses during the translation process as registered by key-logging and/or eye-tracking software. It can be correlated to a source text segment that attracts the translator's focus of attention at a given moment." The definition of the pause duration threshold between every two micro translation units will depend on the respective theoretical constraints. In this paper, we adopt the values suggested by Jakobsen (2005), i.e., 2.4 seconds as the minimum pause time limit, as explained on section 3.3 below. A macro TU, on the other hand, is "[…] defined as a collection of micro TUs that comprises all the interim text productions that follow the translator's focus on the same ST segment from the first tentative rendering to the final output that appears in the TT." Alves & Vale (2011) classify macro TUs with editing procedures taking place only in the drafting phase as P1. Those macro TUs that are produced once in the drafting phase and changed only in the revision phase are classified as P2. Finally, those macro TUs that undergo editing procedures both during drafting and revision are classified as P3. Alves & Gonçalves (2013) have broadened Alves & Vale's (2011) taxonomy to include a P0 macro TU, corresponding to those micro TUs that do not undergo any editing at all. Such micro TUs are also considered macro TUs for annotation purposes. It is important to highlight here that we distinguish *editing procedures* from *first rendering production*: the former comprises some kind of addition, deletion, or modification performed

on some initial production whereas the latter corresponds to the very first version of a given translation unit.

In their attempt to map problems related to conceptual and procedural encodings onto translation process data, Alves & Gonçalves (2013) have also annotated more detailed editing procedures inside each macro TU to account for the level of linguistic complexity in an editing procedure. The results of Alves & Gonçalves (2013) suggest that the allocation of cognitive resources in translation can be illustrated as P0>P1>P3>P2. Drawing on relevance-theoretic assumptions, the authors argue that subjects concentrate editing procedures within or very close to the respective initial micro TU and systematically attempt to reduce processing effort in order to optimise the resources in their cognitive environments. If they postpone the solution to a problem, or only fully realise this problem later on, the required processing effort needed to re-activate relevant information will be suboptimal in terms of cognitive processing economy. This is consistent with the relevance-theoretic framework, since additional processing effort diminishes the relevance of the cognitive effects, described by Alves & Gonçalves (2013: 109) as effects that,

> correspond to the changes taking place in the cognitive environment as a result of inferential processes (i.e., the pieces of information added, changed or even excluded); effort, in turn, is the amount of cognitive resources spent in those processes. None of them can be measured in terms of precise amounts—they can only be estimated and treated in comparative dimensions. Therefore, for any input to be considered more or less relevant, it will depend on the balance between these two factors (effects and effort).

Alves & Gonçalves (2013) have also found that the total number of problems related to conceptual and procedural encodings is highest in P1, followed by P3. They assume that this can be interpreted in terms of allocation of processing effort to phases in the translation process, indicating where this effort is greater. In P1, subjects interrupt the cognitive flow to deal with more immediate processing problems. In P3, however, part of problem solving is accomplished in the end-revision phase. Their results point to prevalence of processing effort for procedural encodings in absolute terms, particularly in P1 and P3 where processing effort seems to be concentrated.

Along similar lines, Alves, Gonçalves & Szpak (2012) have proposed a methodological approach to map eye movements onto macro TUs. The authors also show that the number of eye fixations is higher in problems related to procedural encodings than in problems related to conceptual encodings. An interesting question that emerges from the studies of Alves, Gonçalves & Szpak (2012), with eye-tracking data, and Alves & Gonçalves (2013), with key-logged data, is whether an analysis combining key logging and eye

tracking would corroborate the results of the two previous studies. Drawing on Alves & Gonçalves (2013) and Alves, Gonçalves & Szpak (2012), in this paper we analyse both key-logged and eye-tracking data in an experiment which aims at investigating the performance of the same subjects who had participated in the two previous studies, now performing a new translation task, to probe once again into the conceptual/procedural distinction in translation. By doing this, we hope to put the results to the empirical-experimental test and also to validate experimentally some theoretical claims of Relevance Theory by applying them to translation process research.

3. Methodology

Eight Brazilian translators with at least five years of professional experience were asked to translate into Portuguese (L1) a source text in English (L2) about the physics of crumpling paper. The English ST has 186 words and was published in *Scientific American,* a science popularization magazine. Translators worked without time pressure, and were allowed to use the online dictionary Babylon as a resource for external support. Before starting to translate, subjects were instructed by a brief of the task with a detailed description at hand.

Data was collected using the triangulation paradigm in translation process research (Alves 2003). Keyboard and mouse actions were registered by means of Translog2006 whereas eye movements were recorded with a Tobii T60 eye tracker. Before data collection, subjects were asked to perform a copy test to serve as a baseline for typing speed and help them to familiarise themselves with the working conditions in the research setting. A QWERTY keyboard, familiar to all subjects, was used in the experiment. Eye calibration was performed according to the instructions provided in the Tobii T60 user's manual.

Building on Alves & Gonçalves (2013) and Alves, Gonçalves & Szpak (2012), we have refined the methodology to investigate the relevance-theoretic conceptual/procedural distinction in translation. We have thus correlated micro TUs registered in key-logged files to macro TUs observed in previously defined AOIs. The next subsections present the methodological steps taken to achieve that end.

3.1. Analysis of source text from a relevance-theoretic perspective

The ST used in the experiment, displayed in figure 1, was divided into 12 AOIs, six in each paragraph. The eight AOIs selected for the study are AOI_1 to AOI_7 and AOI_10. In relevance-theoretic terms, the selected AOIs contain instances of conceptual and procedural encodings, highlighted in italics,

which we considered to be potentially effortful for purposes of translation task execution.

AOI_1   Crumpling a sheet of paper seems simple and doesn't require much effort, *but* explaining the crumpled ball's behavior is another matter entirely.

AOI_2   *Once* a paper ball is scrunched, it is more than 75 percent air.

AOI_3   *Yet* it displays surprising strength and resists further compression,

AOI_4   *a fact that* has confounded physicists.

AOI_5   A report in Physical Review Letters, *though,* describes one aspect of the behavior of crumpled sheets:

AOI_6   changes in their size in relation to the force they withstand.

AOI_7   A crushed thin sheet is essentially a mass of conical points connected by *curved ridges*, which store energy.

AOI_8   In the event of further compression of the sheet these ridges collapse and smaller ones form, increasing the amount of stored energy within the wad.

AOI_9   Scientists at the University of Chicago modeled the relation between compression force and ball size.

AOI_10   The researchers crumpled *a sheet of thin aluminized Mylar*

AOI_11   and then placed it inside a cylinder equipped with a piston to crush the sheet.

AOI_12   Instead of collapsing to a final fixed size, the height of the crushed ball continued to decrease, even three weeks after the researchers had applied the weight.

Figure 1. AOIs in Source Text (selections in italics).

The ST has two paragraphs with somewhat different structures. The first paragraph has 77 words (405 characters) while the second paragraph is longer, containing 109 words (551 characters). The first paragraph is structured in six sentences (AOIs 1 to 6) that create a cohesive chain which attempts to convey the cause/effect relation for the problem described in the article, namely the physics of crumpling paper. The connectives *but, once, yet,* and *though,* together with the phrase *a fact that* and the colon followed by *changes in their size in relation to,* build a sequence of causal relations that guides readers into understanding the physics of crumpling paper. According to relevance-theoretic assumptions, this chain of procedural encodings help translators in their inferential processing in order to generate cognitive effects in their TT output. The second paragraph, in turn, explains what is a crushed thin sheet and

describes the procedures that account for the results obtained by scientists at the University of Chicago. This second paragraph consists of six sentences (AOIs 7 to 12) which are independent from one another in structural terms. However, two noun groups, "curved ridges" and "a sheet of thin aluminized Mylar", stand out as terminological items that may pose problems to translators. These potential translation problems were selected as AOIs containing conceptual encodings. Therefore, for the purposes of the present study, AIOs 1 to 7 and AOI_10 constitute the focus of the analysis whereas AOIs 8, 9, 11 and 12 were grouped together in one block of other areas of interest (O/AOIs) when statistical analyses were carried out.

3.2. Hypotheses

Being 18% longer than the first paragraph, one would expect the second paragraph to require more time to be translated. However, when examining the conceptual and procedural encodings in the ST, one notices that the first paragraph conveys six potential procedural encoding-related problems, while the second paragraph, although longer, relates more specifically to two instances of potentially problematic conceptual encodings, conveyed by the noun phrases "curved ridges" and "a thin sheet of aluminized Mylar." Needless to say that we are aware of the procedural encodings present in the second paragraph. Nevertheless, we decided to focus our analysis on the conceptual encodings to see how their processing differed from those related to encodings found in the first paragraph.

In accordance with relevance-theoretic assumptions and drawing on the results of Alves & Gonçalves (2013), one could hypothesise that the higher number of procedural encodings in the first paragraph requires more processing effort to be translated. We measured this not only in terms of the time allocated to text production as registered by key logging, but also depending on the number of micro TUs in the specified AOIs. Hypothesis one thus reads:

> In comparison to total task time, the first paragraph, although shorter, will take longer to translate. Processing effort will be higher not only in terms of time but also in respect to the number of micro TUs allocated to instances related to procedural encodings.

We also used eye-tracking data to assess relevance-theoretic assumptions related to a second hypothesis. One would assume that instances of conceptual encodings might also take some reasonable amount of time to be translated. Nevertheless, processing effort would be of a different nature. Whereas processing effort in issues related to procedural encodings would be distributed in the first paragraph with a high number of more complex,

recursive movements along the process, the conceptual encodings selected in the second paragraph would show a localised type of processing, with substantial time allocated to sources of external support such as dictionary look-ups. Hypothesis two thus reads:

> Processing effort will be higher in instances related to procedural encodings as shown by a higher number of micro TUs, pointing to a more complex, and distributed type of cognitive processing. The number of micro TUs allocated to instances related to conceptual encodings will be lower and point to a more localised type of processing.

3.3. Data treatment

Based on Alves & Gonçalves (2013), the log files of the eight professional translators were segmented into micro TUs separated by a pause value of 2.4 seconds, a value deemed to be representative of segmentation patterns among more expert translators (Jakobsen 2005). The Translog linear representations show idiosyncratic patterns across the sample. The number of micro TUs ranges from a maximum of 108 to a minimum of 26 for the translation of the same ST. That difference in numbers notwithstanding, it is possible to assess the data in order to show how much processing effort each translator allocated to the eight selected AOIs selected and then compare the data among subjects. This procedure also allows us to indicate how much processing effort is located within, or falls outside the scope of, the selected AOIs.

A second step consists in the analysis of heat maps indicating instances in the translation process where processing effort is higher, through fixation counts and duration. A heat map indicates points where eye movements concentrate in terms of number of eye fixations and their duration. When using colours, there is a gradient that goes from green (indicating a smaller number of eye fixations), through yellow and orange, to red (indicating a higher number of, and longer, eye fixations). In this paper, those areas with higher or lower number of, and shorter, fixations can be recognised in shades of grey. The white areas (yellow, when coloured) point to a number and duration of fixations above average while the dark grey areas (orange or red, when coloured) indicate a high number of, and longer, fixations. The light grey areas (green, when coloured) depict a low number of, and shorter, fixations. Figure 2 displays an example of a heat map for one of the eight professional translators, with eye fixation being determined by gaze lasting 250 ms or longer (Rayner & Sereno 1994).
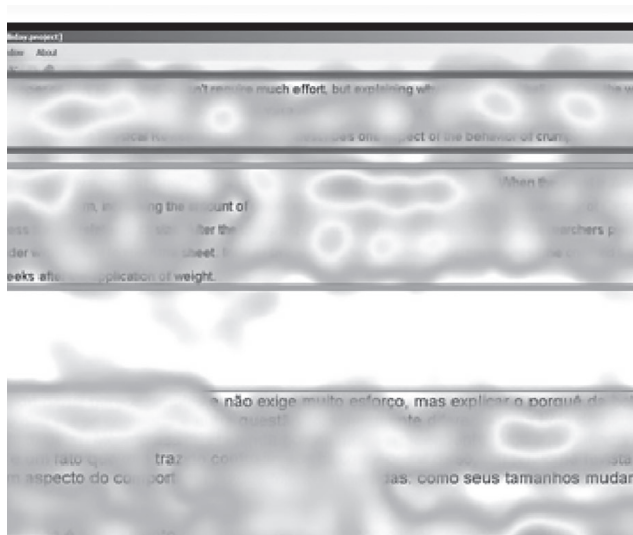
Figure 2. Example of a heat map with its AOIs.

Heat maps provided by Tobii Studio software show both fixation count and fixation duration from a graphic perspective according to visual activity. Such activities are easily identified in both ST and TT areas, respectively the upper and lower areas in each individual heat map. Instances with higher fixation counts/duration probably correspond to translation problems which require more time and effort to be processed. Thus, they are deemed to be cognitively relevant in terms of processing effort. In the heat map displayed in figure 2, the selected AOIs in the first and second paragraphs of the ST indicate points in the process where eye fixations were longer. Empirically speaking, they suggest that a selection made on the basis of relevance-theoretic assumptions is feasible. Individual heat maps for the eight subjects illustrating the distribution of effort in terms of fixation duration, in appendix 1.

4. Analysis and discussion

Our analysis builds on the results of Alves & Gonçalves (2013) for key-logged data and Alves, Gonçalves & Szpak (2012) for eye-tracking data. We compare the number of micro TUs with the number and duration of eye fixations for eight selected AOIs. As these AOIs are spread throughout the ST with procedural encoding-related problems concentrated on the first paragraph and two instances of conceptual encoding-related problems in the second paragraph,

an analysis of the time spent on each paragraph can provide insights into the amount of processing effort in different parts of the ST. Anderson-Darling normality tests confirm that parametric t-tests are adequate for the data set under scrutiny (see appendix 2). Table 1 displays information related to time spent on the task.

Subject	Jane	Cicy	Adam	Jim	Will	Mona	Tess	Rui	Means	Nº of words	Secs/ Word
1st P.	703	421	1059	270	627	224	529	543	547.0	77	7.1
2nd P.	814	545	692	411	1077	385	700	494	639.8	109	5.9
1st+2ndP.	1517	966	1751	681	1704	609	1229	1037	1186.8	186	6.4

1st P - Normality test Anderson-Darling (0.256) p-value (0.616)
2nd P– Normality test anderson-Darling (0.242) p-value (0.557)

Table 1. Time spent on each paragraph [P.] (in seconds) and translation effort rate (secs. per word).

Table 1 shows task duration both in terms of the total time spent by each of the eight translators as compared to the time spent on the translation of each paragraph. The figures in table 1 indicate a mean total task time of 1.187 seconds. On average, 46.2% of the total time was allocated to the first paragraph, while 53.8% of the total time was spent in the translation of the second paragraph, a difference of 7.6% on the mean total time spent on the translation of the second paragraph. However, taking into account that, in number of words, the second paragraph is 18% longer than the first para-graph, there is a negative difference between the relative size of the ST and the relative time spent on the translation of each paragraph. This suggests that the first paragraph requires relatively more processing effort to be translated. Among the eight translators, six of them have individual numbers very close to the means. Only two translators, Adam and Rui, have diverging perfor-mance patterns. They spend relatively more time on the translation of the first paragraph. On average, translators require 547 seconds to translate the 77 words in the first paragraph, i.e. 7.1 seconds per word. On the other hand, they need 640 seconds to translate the 109 words of the second paragraph, working at a rate of 5.9 seconds per word. These results suggest that the first paragraph requires relatively more time to be translated and thus corroborate the initial assumption that procedural encodings demand more processing effort in translation.

As described in section 3, micro TUs were mapped onto eight relevant areas of interest (AOIs) in the ST. First, they were mapped onto key-logged data and, secondly, onto eye-tracking data. Table 2 presents the micro TUs processed by each of the eight translators. It shows the total number of micro TUs as well as the numbers of micro TUs for each area of interest (AOI) and also includes the number of micro TUs that fall outside the selected AOIs (O/AOI), including AOI_8, AOI_9, AOI_11 and AOI_12 (see figure 1).

When contrasting the results for P types of macro TUs with those obtained by Alves & Gonçalves (2013), the total number of problems related to conceptual and procedural encodings is highest in P1. However, instead of being followed by P3, in our data these problems are related to P2 macro TUs. Nevertheless, these results can also be interpreted in terms of allocation of processing effort to phases in the translation process, indicating that in P1 subjects interrupt the cognitive flow to deal with more immediate processing problems, whereas in P2 or P3 problem solving is postponed to or concluded in the end-revision phase.

The differences between procedural encodings (PE) and conceptual encodings (CE) in table 2 is statistically significant, p-value (0.001), pointing

Subject	Jane	Cicy	Adam	Jim	Will	Mona	Tess	Rui	Means	Overall means	Pondered Means*
AOI_1	3 (P1)	4 (P1)	8 (P1)	1 (P1)	4 (P2)	1 (P1)	8 (P2)	7 (P1)	4.50		
AOI_2	7 (P1)	3 (P1)	10 (P1)	5 (P1)	2 (P1)	1 (P1)	2 (P2)	9 (P3)	4.88		
AOI_3	4 (P1)	5 (P2)	17 (P1)	3 (P1)	3 (P2)	2 (P1)	4 (P1)	3 (P1)	5.13	4.42 (PE)	0.06
AOI_4	6 (P1)	2 (P1)	15 (P3)	1 (P0)	2 (P2)	1 (P0)	2 (P1)	2 (P2)	3.88		
AOI_5	6 (P3)	7 (P1)	9 (P2)	3 (P1)	5 (P2)	2 (P1)	3 (P2)	3 (P1)	4.75		
AOI_6	5 (P1)	5 (P1)	4 (P1)	2 (P1)	5 (P2)	2 (P1)	2 (P1)	2 (P2)	3.38		
AOI_7	6 (P1)	3 (P1)	7 (P1)	3 (P2)	3 (P1)	3 (P2)	4 (P1)	3 (P1)	4.00	3.19 (CE)	0.12
AOI_10	4 (P1)	3 (P1)	4 (P1)	1 (P0)	3 (P1)	2 (P3)	1 (P0)	1 (P1)	2.38		
O/AOIs	41	25	34	14	65	12	37	31	32.38		
Total	82	57	108	33	92	26	63	61	65.25		

*micro translation units per word
Normality Test Anderson-Darling for PE (procedural encodings) = AOI_1 to AOI_6 (0.686) p-value (0.045)
Normality Test Anderson-Darling for CE (conceptual encodings) = AOI_7 and AOI_10 (0.706) p-value (0.040)
Difference between PE and CE in micro TUs - Wilcoxon Test (62) p-value (0.001) = significant
Difference between PE and CE in micro TUs per words – Wilcoxon Test (60) p-value (0.003) = significant

Table 2. Number (and type) of micro units (absolute and mean values) in selected AOIs.

to a higher number of micro TUs in PE-related AOIs than in CE-related ones. When we divide the number of micro TUs by the respective number of words in each AOI, the difference between PE and CE is statistically significant: the mean number of micro TUs per word is significantly higher for CE (0.12) than PE (0.06). This means, conversely, that the number of words per micro TU is significantly higher for PE than CE (p-value 0.003). Together with the results in table 1, the data shows a longer mean time for processing words related to PE than CE. On average, in PE-related AOIs words take longer (and require more effort) to be processed than in CE; in PE-related micro TUs, on average, there are more words; in PE-related AOIs, on average, there are more micro TUs – what leads to the conclusion that time/effort for PE-related problem solving is significantly higher than for CE.

Combining the results of tables 1 and 2, table 3 shows the amount of time (seconds) spent in each micro TU (Secs/MTU), and the division of this result by the number of words in each paragraph (Secs/MTU/Word); a rate we may consider another possible measure of processing effort in translation. Anderson-Darling normality tests confirm that parametric t-tests are adequate for the data set under scrutiny.

Subject	Jane	Cicy	Adam	Jim	Will	Mona	Tess	Rui	Means	Nº of words	Secs/MTU/Word
1st P.	22.7	16.2	16.8	18.0	69.6	10.6	25.2	20.8	25.0	77	**0.32**
2nd P.	15.9	17.6	15.4	22.8	63.3	5.4	16.6	14.1	21.4	109	**0.20**
1st+2ndP.	38.6	33.7	32.2	40.8	133.0	16.0	41.8	34.9	46.4	186	**0.25**

1st P – Normality Test Anderson-Darling (0.226) p-value (0.616)
2nd P- Normality Test Anderson-Darling (0.275) p-value (0.557)
Paired T-tests contrasting 1st and 2nd paragraph: seconds per MTU; Pondered Effort rates, p<0.01 (significant)
Pearson's correlation coefficient correlating 1st and 2nd paragraph: seconds per MTU; Weighted Effort rates, r=0.97 (very strong)

Table 3. Time spent on each micro translation unit (secs/MTU) and weighted translation effort rate (secs/MTU/word).

Weighted effort rates contrasting the first and second paragraphs point to a significant difference in the number of words processed in each paragraph in relation to the number of micro TUs and the time spent on the task. The Pearson's correlation coefficient correlating the two paragraphs is also very strong, which reinforces the consistency of the difference between them and confirms that subjects spend more time and make more effort per micro TU in the first

paragraph. Thus, table 3 confirms the tendencies observed in tables 1 and 2, suggesting an interesting relation between the time spent on the task, the number of micro TUs, and the total number of words in each paragraph. With an average value of 0.32 second per micro TU/word in the first paragraph against 0.20 second per micro TU/word in the second paragraph, the results on table 3, as weighted effort rates, confirm that PE requires more processing effort than CE for key-logged data. In short, these results demonstrate that each word and each micro TU in the first paragraph require more time to be processed when compared to each word and the micro TUs in the second paragraph, thus corroborating our first hypothesis. And, since PE-related problems are mainly located in the first paragraph, while CE ones appear in the second paragraph, an analysis of eye-tracking data for each paragraph could provide us with further insights into processing effort in translation related to the relevance-theoretic conceptual/procedural distinction.

In order to assess that, we analysed eye fixations in the selected AOIs. A major methodological problem in the analysis of CE and PE would be the impact of external support searches in the complete data set. During task execution, subjects often deviate their gaze from the computer screen or open other windows to look up dictionary entries and/or perform web searches. These actions are an integral part of the translation process and must be taken into consideration. To be more precise about the impact of external support searches on online processing, scenes were created separately for instances of internal and external support which occur predominantly for AOI_7 and AOI_10. Eye-tracking data related to external support searches, i.e., online dictionary look-ups, was then added to eye-tracking data related to internal support searches, i.e., when subjects lean only on their memory and inferences.

Table 4 shows fixation counts in both ST and TT areas. The average number of eye fixations is higher for AOIs 1 to 6, corresponding to instances of PE, and contrasts them to the fixation counts in AOI_7 and AOI_10. Wilcoxon Test contrasting PE and CE show a p-value of 0.0001, which is statistically highly significant. As far as the conceptual/procedural distinction is concerned, the higher number of eye fixations in instances related to PE confirms the analysis of key-logged data and suggests that AOIs 1 to 6 demand more processing effort to be translated, thus corroborating relevance-theoretic assumptions related to the conceptual / procedural distinction.

Another interesting aspect is the number of fixation counts in ST and TT areas. The data suggests that there are more variations in the first paragraph, with eye movements going back and forth from ST and TT as well as

encompassing longer stretches of text. The lower fixation counts for AOIs 7 and AOI_10, where instances of CE appear, could be due to the fact that eye fixations fell predominantly on the two noun groups and did not extend to other stretches of text. On average, fixation counts are higher on TT areas, a result that corroborates previous translation process studies (Jakobsen & Jensen 2008, Pavlović & Jensen 2009, Hvelplund 2011, Carl & Kay 2011, Carl & Dragsted 2012 and Alves, Gonçalves & Szpak 2012).

Next we analysed fixation duration for the selected AOIs. Table 5 shows fixation duration in both ST and TT areas. Wilcoxon Test contrasting PE and CE show a p-value of 0.003, which is statistically significant. As far as the conceptual/procedural distinction is concerned, an analysis of eye fixation duration in instances of PE-related problems confirms the analysis of key-logged data and suggests that AOIs 1 to 6 demand more processing effort to be translated, thus corroborating relevance-theoretic assumptions related to the conceptual/procedural distinction.

Subject	Jane		Cicy		Adam		Jim		Will		Mona		Tess		Rui		Means		Means	Overall means
	ST	TT	ST	TT	ST	TT	ST	TT	ST	TT	ST	TT	ST	TT	ST	TT	ST	TT	ST+TT	
AOI_1	46	52	95	35	216	121	69	29	106	68	44	27	101	94	32	29	88.63	56.88	72.75	
AOI_2	19	52	37	44	144	227	34	29	20	13	14	15	48	89	25	68	42.63	67.13	54.88	
AOI_3	102	34	99	59	124	203	51	27	65	143	26	24	53	39	20	6	67.50	66.88	67.19	59.90 (PE)
AOI_4	19	36	14	11	60	338	17	17	56	56	10	4	19	16	18	10	26.63	61.00	43.81	
AOI_5	178	109	77	37	81	281	45	32	95	58	28	14	55	48	38	17	74.63	74.50	74.56	
AOI_6	25	29	33	47	28	112	29	13	83	205	22	25	28	26	20	14	33.50	58.88	46.19	
AOI_7	36	50	58	37	49	70	0	65	28	20	41	78	34	14	22	7	33.50	42.63	40.60	31.13 (CE)
AOI_10	43	21	50	34	18	41	20	8	14	17	35	19	8	12	7	9	24.38	20.13	22.25	
O/AOIs	669	594	428	465	631	1005	386	310	619	1780	341	439	708	803	491	425	534.13	727.63	630.88	
Total	1137	977	891	769	1351	2398	651	530	1086	2360	561	645	1054	1141	673	585	925.50	1175.63	1050.56	

Normality Test Anderson-Darling for PE = AOI_1 to AOI_6 (0.690) p-value (0.044)
Normality Test Anderson-Darling for CE = AOI_7 and AOI_10 (0.639) p-value (0.060)
Fixation counts for PE and CE - Wilcoxon Test (64) p-value (0.0001) = highly significant

Table 4. Fixation count in selected AOIs and in complete ST/TT
(absolute and mean values).

Data on table 5 reinforces the argument that instances of conceptual encodings are processed in a localised fashion and do not extend to other stretches of text. Fixation duration is, on average, lower for AOI_7 and AOI_10. They take long to translate, mostly due to the need of external support, whose fixation time is included in the O/AOI measures. Time, however, as argued by Alves & Gonçalves (2013), is not the only and most important feature when analysing processing effort in translation. Recursive movements seem to be equally or even more important. AOIs 1 to 6 seem to confirm this. On average, they show longer fixation durations, probably indicating recursive

eye movements, going back and forth from ST and TT as well as encompassing longer stretches of text. Results suggest that instances of procedural encodings not only demand a higher number of fixations but also that these fixations are longer.

Subject	Jane		Ciey		Adam		Jim		Will		Mona		Tess		Rui		Means		Means ST+TT	Overall Means
	ST	TT	ST	TT	ST	TT	ST	TT	ST	TT	ST	TT	ST	TT	ST	TT	ST	TT		
AOI_1	13.6	17.0	32.2	21.1	82.1	34.5	18.5	28.2	34.5	42.2	11.8	9.7	35.4	49.3	7.5	10.8	29,44	26,59	28,02	
AOI_2	6.1	20.1	11.0	19.7	42.5	91.9	11.4	21.5	7.9	9.4	3.1	4.2	14.4	40.2	6.5	31.4	12,87	29,80	21,33	
AOI_3	34.1	10.1	39.7	32.0	40.6	74.3	18.8	20.0	23.7	74.2	6.1	12.2	18.9	26.2	5.1	2.5	23,36	31,45	27,40	
AOI_4	8.2	12.9	4.6	4.9	18.1	120.7	4.6	12.0	18.5	28.5	1.7	1.3	4.6	8.5	4.4	7.8	8,07	24,58	16,33	22.98 (PE)
AOI_5	53.8	41.7	25.0	19.6	22.3	109.4	22.6	21.8	33.2	27.9	6.1	4.6	15.2	28.6	10.0	4.6	23,51	32,27	27,89	
AOI_6	9.7	10.7	9.5	18.5	7.6	41.4	8.7	10.4	25.5	79.6	5.7	7.4	8.4	15.1	4.8	7.3	9,97	23,80	16,88	
AOI_7	11.4	17.2	31.7	16.8	17.6	22.9	0	28.9	13.5	10.3	11.2	22.7	13.0	6.2	6.7	1.9	13,12	15,85	15,45	12.13 (CE)
AOI_10	14.0	7.5	19.5	18.7	5.7	15.0	6.4	5.5	5.2	11.3	10.4	8.2	2.2	6.6	2.9	5.1	8,30	9,76	9,03	
O/AOIs	230.3	184.5	150.1	209.2	168.4	354.8	147.0	154.3	208.0	715.0	83.8	131.2	220.0	335.1	154.4	129.1	170,24	276,63	223,44	
Total	381.0	321.9	323.4	360.5	404.9	864.8	238.1	302.5	370.0	998.3	139.8	201.6	332.0	515.7	202.2	200.5	298,90	470,71	384,81	

Normality Test Anderson-Darling for PE = AOI_1 to AOI_6 (1.15) p-value (0.004)
Normality Test Anderson-Darling for CE = AOI_7 and AOI_10 (0.213) p-value (0.825)
Wilcoxon Test contrasting PE and CE (60) p-value (0.003) = significant

Table 5. Fixation duration in selected AOIs and in complete ST/TT
(absolute and mean values).

The results show that both hypotheses were confirmed in our study. The number of words processed in each paragraph in relation to the number of micro TUs and the time spent on the task reveals that subjects spent more time and made more effort per micro TU in the first paragraph. Thus, relatively to its length, the first paragraph took longer to translate. The number and types of micro TUs also indicate that processing effort was stronger in the first paragraph. Hypothesis one was, therefore, confirmed. As far as the conceptual/procedural distinction is concerned, the results indicate that AOIs 1 to 6 demanded more processing effort to be translated than AOIs 7 and 10. There was a higher number of eye fixations in instances of PE-related problems. Fixation duration was also longer for PE. Processing effort also showed lower levels of complexity for micro TUs located in AOIs 7 and 10, pointing to a more localised type of cognitive processing. Therefore, hypothesis two was also confirmed.

5. Concluding remarks

The results of our study point to interesting observations concerning translation both as a process and as a product. Combining time spent on the task, seconds per word, and the number of micro TUs per word in each paragraph, we could show that there is a statistically significant difference in the way

instances related to CE and PE are processed by professional translators. The joint use of key-logged and eye-tracking data to analyse processing effort yields insights into what type of processes are favoured when translators deal with either CE and PE. Whereas CE tends to favour a more localised type of processing effort, PE requires more complex and distributed operations which encompass longer stretches of text.

Overall, the results point to the validity of the proposed methodology for the selection of translation problems. The selected AOIs proved to be a valid choice to test some relevance-theoretic claims concerning the conceptual/procedural distinction in translation. The results point, almost always, to the allocation of longer stretches of time, and eventually more processing effort, in the processing of PE-related problems, as shown by the statistic tests: PE-related AOIs, on average, include more words and more micro TUs than the CE-related ones; PE-related words, on average, take longer to be processed; and PE-related micro TUs, on average, have more words.

Although the data set is relatively small to allow for robust generalizations, on the whole, the combined analysis of key logging and eye tracking highlights the explanatory power of a relevance-theoretic account of translation and provides a better understanding of the role of processing effort in translation. Other studies replicating our methodology and contrasting it in disparate language pairs would help us assess further the validity of our claims. We intend to do that by expanding the analysis presented herewith in similar studies to probe further into the consistency of a relevance-theoretic account of processing effort in translation.

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Appendix 1

Heat maps for the eight subjects illustrating the distribution of effort in terms of fixation duration.
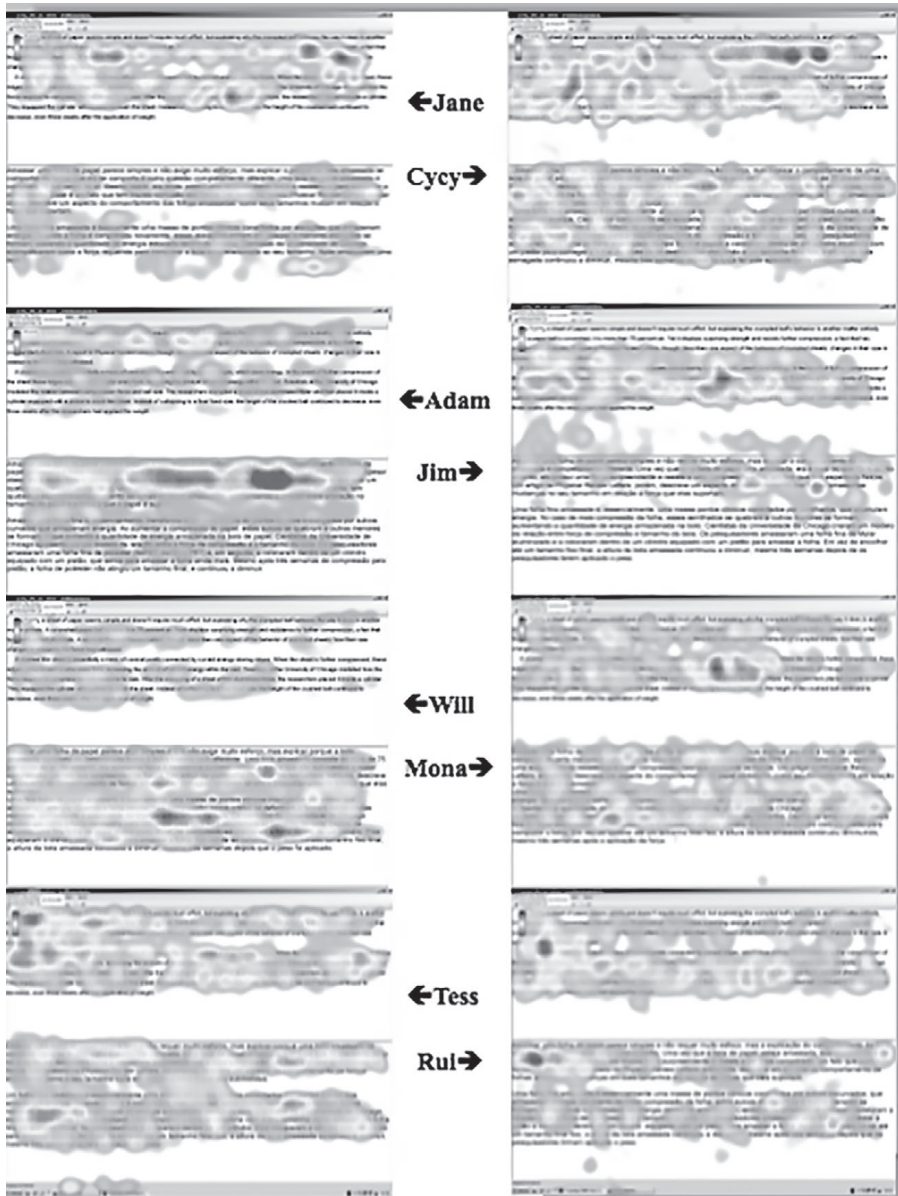
Appendix 2

Normality tests for Paragraphs 1 and 2 and for AOIs 1–6 and AOIs 7–10.

NORMALITY TESTS
Paragraph 1
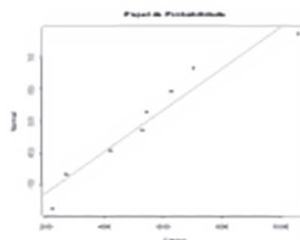
PROCESS DATA
Statistics: Anderson-Darling   0,255917558
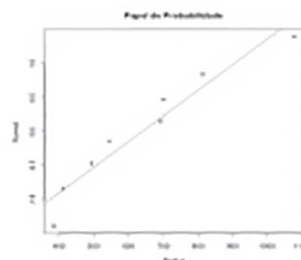P-value   0,615878704

NORMALITY TESTS
Paragraph 2

PROCESS DATA
Statistics: Anderson-Darling   0,274150996
P-value   0,556991601

NORMALITY TESTS
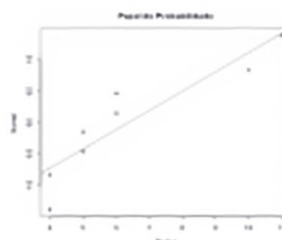AOI_1 to AOI_6

PROCESS DATA
Statistics: Anderson-Darling   0,685971132
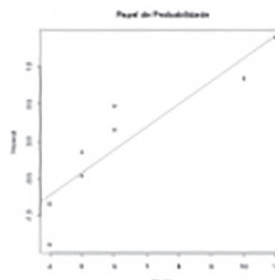P-value   0,044326225

NORMALITY TESTS
AOI_7 and AOI_10

PROCESS DATA
Statistics: Anderson-Darling   0,705808942
P-value   0,039031841

BIONOTES / NOTAS BIOGRÁFICAS

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RETROSPECTION
IN INTERPRETING AND TRANSLATION:
EXPLAINING THE PROCESS?

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Abstract

Retrospection is one of the few research methods equally suitable for studying the processes involved in both translation and interpreting. At the first workshop on research methods in process-oriented research (Graz 2009), we presented the results of a pilot study of retrospection as a research method, published as Englund Dimitrova & Tiselius (2009). The study involved data from two groups (15 years of professional experience vs. no professional experience), each with 3+3 subjects (interpreter subjects vs. translator subjects, all with Swedish as their L1). The source text was a 10-minute plenary speech in English from the European Parliament, interpreted simultaneously into Swedish. For the translation data, the translator subjects translated the original European Parliament transcript of the speech, 1,093 words, using Translog. After the task, subjects did immediate retrospection. The first analysis of the data indicated that a challenge when using retrospection is that subjects tend to report having forgotten about some of their processes.

In this paper we report an analysis of the process data in relation to the retrospective protocols. Our focus is on reported problems and the occurrences of problem indicators in the process. It was found that most reported problems are confirmed by the presence of problem indicators in the process. However, the majority of problem indicators found in the process do not correspond to any reported problem. Hence, the subjects' problem reports can only explain a limited number of the potential problems

in the process. The need for further research into retrospection as a research method in Translation Studies is pointed out.

Resumen

La retrospección es uno de los pocos métodos de investigación igualmente adecuados para estudiar los procesos de traducción y de interpretación. En el primer taller sobre métodos de investigación de procesos (Graz 2009), se presentaron los resultados de un estudio piloto sobre la retrospección como método de investigación, publicado como Englund Dimitrova & Tiselius (2009) . El estudio incluía datos de dos grupos (15 años de experiencia profesional frente a inexperiencia profesional), cada uno con 3+3 sujetos (intérpretes y traductores, todos con sueco como L1). El texto original era un discurso de 10 minutos en inglés del Parlamento Europeo, interpretado simultáneamente al sueco. Para la traducción, los sujetos traductores usaron la transcripción original del discurso, de 1.093 palabras, usando Translog. Tras la tarea, los sujetos efectuaron retrospección inmediata. El primer análisis de los datos indicó que un reto al usar la retrospección es que los sujetos tienden a informar que han olvidado algunos de sus procesos.

Este trabajo presenta un análisis de los datos del proceso en relación con los protocolos retrospectivos. Nuestra atención se ha centrado en contrastar los problemas declarados con las ocurrencias de indicadores de problemas en el proceso. Encontramos que la mayoría de los problemas declarados se confirman por la presencia de indicadores de problemas en el proceso. No obstante, la mayoría de los indicadores de problemas que se encontraron en el proceso no se corresponden con ningún problema declarado. Por lo tanto, los informes de problemas de los sujetos sólo pueden explicar un número limitado de los problemas potenciales del proceso. Ello apunta a la necesidad de seguir investigando la retrospección como método de investigación en los estudios de traducción.

1. Introduction

Retrospection is a popular method for analyzing translation and interpreting processes through the participants' own reports. In retrospection, an introspective method from cognitive psychology, subjects give verbal reports of their own cognitive processes after having performed a given task. Retrospection is facilitated if the probed task was recent and short. A disadvantage of retrospection is that it generally does not allow complete recall of the information, especially in longer tasks, for instance, translation. For interpreting it is one of the few methods available for investigating the process from participants' reports. Retrospection has gained popularity as translation and interpreting research has become more interested in process studies (cf. Göpferich 2008, Hansen 2006 and Vik-Tuovinen 2002). Analyzing retrospective data may, however, not be as straightforward as it perhaps seems at first. The data is based on the participants' recall, and reports may be distorted for many different reasons.

The purpose of this study is to explore the validity of retrospective data by relating it to the process data. It is a relatively small study and the approach is explorative. It is based on an in-depth analysis of part of the translation/interpreting, where retrospective data is related to process data. The data from interpreting subjects and translation subjects are compared, both in terms of retrospection and process.

2. Retrospection

Memory is crucial in interpreting and translation. Memory research commonly agrees on a division of memory into three parts: long-term memory, short-term memory and working memory (Cowan 2008). As Cowan (2008: 325) points out, however, there has been some confusion as to the difference between short-term memory and working memory, and some researchers have used the two concepts interchangeably. Although the difference is still not crystal clear, there seems to be consensus that short-term memory involves immediate response to and storage of different types of input, while working memory is involved when any type of activation of mental processes occurs

(Jonsson & Eklund 2012: 586). Applied to processing in interpreting and translating, it could be assumed that short-term memory is used to identify and retain an utterance or piece of text, while working memory is activated to identify meaning and processing it into a new utterance of piece of text. Both these memories work in an automatized mode, unless the process is stalled by a difficulty or a problem.

The memory of how that situation was solved, and of the situation as such, may enter into long-term memory, but not necessarily. Functional forgetting (Karlsen 2008:71) is important in this context, as the brain retains what is necessary for solving the task at hand. Since everything that surfaces cannot be retained in the long-term memory, what is no longer needed can be quickly forgotten. Some memories remain, though, for different reasons. Various introspective methods allow researchers to tap into subjects' memory. Concurrent introspection, or think-aloud protocols (TAPs), taps into subjects' working memory (Ericsson & Simon 1993: xlix), and has been widely used in translation process research.[1] Retrospection, on the other hand, is assumed to tap into subjects' long-term memory (Ericsson & Simon 1993: 21); the retrospection is also cued in order to trigger the memory. Using a cue is not without disadvantages, however, since by triggering the memory we also risk installing false memories (Meade & Roediger 2002). Despite certain challenges, retrospection is a popular method in interpreting process research, as concurrent introspection is impossible during the interpreting task (see, e.g., Bartłomiejczyk 2006 and Chang & Schallert 2007). Vik-Tuovinen (2002), using a recording of the interpretings as cue, has described in detail how retrospection can be used when studying interpreting. Ivanova (1999) also used retrospection for studying the interpreting process, using transcripts of the original speech as cue.

Before describing the analysis further, it seems important to define what we mean by *retrospection* or *retrospective interview* in this context. In Englund Dimitrova & Tiselius (2009), we described more in detail how retrospection is used in translation and interpreting. Within the context of this study, retrospection refers to an interview that takes place immediately after the task and where the only cue is a transcript of the original speech/text. From this cue, the participant reports about everything s/he remembers from the process. It is thus not cued by any questions from the interview leader or by the participant's own production. The immediacy is an important condition; Ericsson & Simon (1993: xvi) remind us that a cognitive task can only be

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1. See an overview in Göpferich (2008) and also Jääskeläinen (2010) for further references.

accurately recalled if the task is no longer than 0.5 to 10 s and the retrospection is immediate. Compared to those figures, the task in this study is very long: nine minutes for the interpreters and about an hour for the translators. The immediacy condition was partly observed, however, by doing the retrospection immediately after task. It should also be pointed out that this type of retrospective interview only deals with the task at hand and not with other tasks, the participants' background or opinions, or suchlike.

Since the process data in this study was not made available to the participants in their retrospection, their recall is assumed to be taken from their long-term memory of the process, without being distorted by any new cognitive processes involved in viewing their writing process (for translators) or listening to their own interpretation (for interpreters). This also means that the retrospective reports can be related to the process data in an analysis aiming to answer two questions:

1. Are retrospective problem reports confirmed by indicators of problems in the process?
2. Are there problems in the process that are not reported retrospectively?

3. Materials and methods

The overall design of this study and its rationale is described in Englund Dimitrova & Tiselius (2009).

3.1. Participants

The participants in this study are 12 in total, three students of translation and three students of interpreting, together with three professional translators and three professional interpreters. Table 1 shows the background of the participants.

Subjects	Male	Female	Years at university	Years of experience	Age
Translation students	1	2	3–4	0	20–30 (n = 2) 40–50 (n = 1)
Interpreting students	0	3	4–5	0	20–30
Translation professionals	2	1	4–5	15+	40–60
Interpreting professionals	1	2	4–5	25+	50–60

Table 1. Subjects.

The students were recruited at the Institute for Interpreting and Translation Studies, Stockholm University. They all had Swedish as L1 and were taking the introductory course to translation and interpreting. They did not have any previous experience of translation or interpreting. The professionals were recruited at the institutions of the European Union. They all belonged to the Swedish unit (i.e., interpreting or translating into Swedish) and were seasoned professionals who all had Swedish as L1.

3.2. Materials

3.2.1. Elicitation material and method

For the interpreting and translation task, an English speech (09:35 m) from the European Parliament was chosen. The speech was authentic but slightly manipulated to add difficulties in terms of numbers and terminology. It was re-recorded with an English speaker with Received Pronunciation. For the translation task, a transcription of the speech, with normalized orthography and punctuation, was used. The number of words was 1,093.

All the subjects interpreted or translated the speech into Swedish. The students performed their interpretation or translation tasks at the Institute for Interpreting and Translation Studies. The professional interpreters and translators performed their tasks at their work place, whether in an empty interpreting booth (interpreters) or at their office (translators). The interpreting subjects were first asked to interpret the speech simultaneously from an audio recording and then perform retrospection with a transcription of the speech as cue. The translation subjects were asked to imagine that they were working under time pressure and therefore perform the translation as swiftly, yet carefully, as possible. Translation subjects translated on a laptop computer with Translog installed on it. The text was presented one sentence at a time so as to prevent the subjects from going back and forth in the target text and thereby possibly blurring retrospection. When the subjects considered the target text corresponding to one source sentence finished, they hit the enter key and the next source-text sentence appeared on the screen. After finishing the translation, they were asked to do retrospection with a copy of the original text as cue. Both interpreting and translating subjects were given a short list of some names and English terms from the speech. This was the only aid permitted.

3.2.2. Analyzed material

For the analysis in this study, two paragraphs from the source text were chosen, comprising a total of 11 sentences with 219 words, that is, about 20% of the text's total 1,093 words. This part of the speech is approximately two minutes long for interpreters, the first minute consisting of 105 words or 170 syllables, the second minute consisting of 114 words or 195 syllables. This text segment was chosen because it was part of the manipulation; some names and figures had been introduced to the speech and were assumed to constitute potential problems in the process, especially for the interpreters. Furthermore, it was clear from the coding of the full protocols (cf. Englund Dimitrova & Tiselius 2009) that these two paragraphs elicited a number of comments from all participants. So we assumed it was a suitable excerpt to analyze in depth. A transcription of the excerpt can be found in the Appendix.

3.3. Method

The method used in this study can be characterized as qualitative, although some quantitative results will also be provided.

3.3.1. Coding the retrospection protocols

The retrospection was done in Swedish, the subjects' L1. In table 2, the examples are from the data of the present study and are given in English translation. The processing problems in the retrospective protocols were coded according to the model in Ivanova (1999; see also Englund Dimitrova & Tiselius 2009). Table 2 summarizes the kinds of processing problems identified in this model.

The coding scheme of Ivanova (1999; see also Englund Dimitrova & Tiselius 2009) distinguishes three further categories: monitoring, with six sub-categories; strategies, with eight sub-categories; and macrostrategies, with five sub-categories. These are not part of the analysis reported in this paper and will therefore not be presented here.

Processing problems (PP)			*Examples from interpreters*	*Examples from translators*
Comprehension (*C*)	Perception (P)	Problems with hearing	*I didn't have time to catch that it was tobacco-related deaths. (8/Amadeus)*	*In our midst – now that I read it, I did not recognize it, so I don't know. (9/Therese)*
	Lexical access in SL (L)	Failure to access meaning of an SL chunk, which has been identified as familiar	*I said TB but I'm not sure what it means. (8/Amadeus)*	*I don't know what TB is, so then … (9/Therese)*
	Syntactic processing (Syn)	Failure to recognize syntax patterns	*This is difficult, when they start with that they say "which", which, like you start having those subordinate phrases and so on, that is difficult. (15/Amadeus)*	*Or maybe the whole sentence was a little bit complicated, that you had to – change around a little bit. (2/Therese)*
	Text integration (TC/integ/)	Difficulties in constructing a coherent representation for SL chunks	*It's like you understand what it's all about, but you miss certain details. (21–22/Amadeus)*	*I didn't know that "unsafe" – what they were referring to, if it is the cigarettes that are dangerous or that, well … (26/Therese)*
	Text comprehension (TC/bgkn)	Comprehension difficulties due to lack of background knowledge	*Yes, "community", again I became, like, confused over what is com– which community … (47/Amadeus)*	*And I thought, as I read "framework convention", I thought that it was some kind of meeting or almost conference. But then I started thinking, convention, that is more like – it's about something else and then maybe "ongoing" isn't the right word. (47/Therese)*
Translation (Tr/)	TL retrieval (TLr)	Problems in rendering an SL chunk in TL	*I got stuck in this, that is "I must here compliment", you know, I thought, "Oh, how should you put that?" (10/Amadeus)*	*"Public health" I don't know – I didn't write* folkhälsan *[public health] I think – well, anyway, I'm a bit uncertain of how it should be translated. (3/Therese)*
	Equivalent (eqv)	Problems in selecting an appropriate equivalent when there is a choice	*I was thinking about whatever that is called in Swedish, I considered "guidelines" or "descriptions". (37/Amadeus)*	*And a couple of times I hesitated – "tobacco products", if it was better to write "tobacco products" or "tobacco goods". (35/Therese)*

Simultaneity of tasks (Sim/)	(SL, TL)	Problems due to high SL input rate in relation to interpreter's own output rate	*Then there were too many words, sort of, like terms, "tobacco advertising", "spon- sorship", so I don't know what I said. (45/ Amadeus)*	*Since I didn't want to take too much time, I think that I did it fairly simply. (31/Therese)*
	TL delays (TL delays)	Delays in TL product due to translation	*You know, I heard this, but I didn't get it out, everything that is written here. It was really difficult to, you know, use these two processes at the same time, to listen and understand and then speak, it was like a catch or an obstacle. (10/Amadeus)*	*And that is such a thing where you could have come up with something better, if you had reflected some more on it. (9/Therese)*

Table 2. Processing problems. Classification according to Ivanova (1999); the examples, drawn from the data in the present study, are given in English translation; the numbers refer to the sentence; names have been changed.

3.3.2. Identification of problem indicators in the process data

In order to identify possible problem indicators in the process data, we departed from the model of primary and secondary problem indicators in Krings (1986: 121ff.). However, this model was developed to account for another type of data, TAPs, and with the subjects handwriting their target text on paper. Furthermore, the indicators are of three different types: content of participants' verbalizations (nos. 1, 7 and 8), speech characteristics of participants' verbalizations (nos. 9–10), and observable behavior related to the translation process (nos. 2–6). Indicator 11 is of a mixed type, compris- ing both content characteristics (Krings 1986: 305–307) and pauses, that is, speech characteristics (Krings 1986: 308). Not all indicators were relevant for our data: content was instead coded in the categories from Ivanova (1999), and some behavior was not found due to differences in the research design. Indicators 1, 2 and 7 are potentially identifiable in the recorded interpreting data through various slips of the tongue, but are not found in our data. Table 3 shows the indicators presumed relevant for our different types of data.

In Krings' model, the first three indicators are considered primary, and the rest are secondary. A problem is identified through the existence of at least one primary or at least two secondary indicators. For the interpreting data, we assume that other indicators may also be relevant, such as speech

disfluencies. Change in breathing patterns is also a possible problem indicator but was excluded from the analysis because of the categorization difficulties. For interpreting data, relevant process indicators are as follows:

1. A pause within a sentence, immediately preceding or following after a word/expression mentioned in a problem report. Not included are sentence-initial pauses, which we assume to be due to source sentence reading and planning, or sentence-final pauses, which we assume to be due to monitoring of the written target text (for pause length chosen, see section 4.1).
2. Revisions (not including the correction of typos).
3. A combination of 1 and 2.

For interpreting data relevant process indicators are as follows:

1. Unfilled pauses (for pause length chosen, see section 4.1).
2. Paralinguistic indicators: change of lag or speech rate; intonation; sighs.
3. Speech disfluencies: repairs, false starts, fillers.
4. Unfilled pauses in speech production (not including pauses related to waiting for the speaker to begin an utterance) combined with indicators 2 and 3.

Indicator/mode	Computer logging of writing process	Recording of interpretation
1. Explicit or implicit problem identification by participant	–	(yes)
2. Use of aids	–	(yes)
3. Leaving a gap in the translated text/ interpreted utterance	yes	yes
4. Competing tentative translation equivalents	yes	yes
5. Changes in the TT	yes	yes
6. Underlinings in the ST	–	–
7. Negative evaluation of the TT	–	(yes)
8. Metaproblematization	–	–
9. Unfilled pauses longer than 3 seconds (0.5 s for interpreting)	yes	yes
10. Paralinguistic indicators	–	yes
11. Lack of primary equivalent association	yes	yes

Table 3. The relevance of Krings' problem indicators to the present study.

4. Analysis of translation and interpreting data

4.1. Analysis of process data in relation to problem reports

In the first analysis we departed from the retrospection data, identifying all instances of reported problems, and checked the interpretings or the logging files for process indicators related to the problem reports. The purpose of this analysis is to check the reliability of the problem reports. We expect that all or most problem reports will be confirmed by the presence of one or more problem indicators in the process data; an exception could be if a participant reports a problem in connection with a word or expression that is found also at some other place in the text, and errs in where the problem actually occurred.

The data were analyzed according to the following procedure:

1. Coding of processing-problem categories, according to the Ivanova (1999) model.
2. Identification of problem indicators in the process data:
    a. Translation: Revisions involving words/expressions mentioned in the retrospection as problematic;
    b. Translation: Pause(s) immediately preceding or following the writing of words/ expressions mentioned in the retrospection as problematic;
    c. Translation: Combination of points a and b.
    d. Interpreting: Disfluencies related to the problem report.
    e. Interpreting: Paralinguistic indicators related to the problem report.
    f. Interpreting: Isolated unfilled pauses related to the problem report.
    g. Interpreting: Combination of two or three of the indicators mentioned in points d, e or f.

Tables 4 and 5 present the figures for verbalized problems and problem indicators in the process in sentences 34–45 for students and professional translators. Where deemed relevant, percentages are given in the tables in 4.1 and 4.2, for ease of comparison.

	Reported problems	Indicator: Revision	Indicator: Pause ≥ 5 s	Revision(s) + pause(s)	No process indicator
Josephine/S	4	0	1 (25%)	2 (50%)	1 (25%)
Felix/S	14	1 (7.1%)	8 (57.1%)	2 (14.3%)	3 (21.4%)
Therese/S	11	3 (27.3%)	6 (54.5%)	1 (9.1%)	1 (9.1%)
Total	*29*	*4 (13.8%)*	*15 (51.8%)*	*5 (17.2%)*	*5 (17.2%)*

Table 4. Reported problems and problem indicators in the process, translation students.

	Reported problems	Indicator: Revision	Indicator: Pause ≥ 5 s	Revision(s) + pause(s)	No process indicator
Oskar/P	6	1 (25%)	4 (50%)	0	1 (25%)
Tintin/P	4	2 (50%)	0	2 (50%)	0
Isak/P	4	1 (25%)	1 (25%)	1 (25%)	1 (25%)
Total	*14*	*4 (28.6%)*	*5 (35.7%)*	*3 (21.4%)*	*2 (14.3%)*

Table 5. Reported problems and problem indicators in the process, professional translators.

The shortest pause length found in the Translog data that correlated with problem report (according to the operational definition in section 3.3) was five seconds, and this pause length was therefore chosen for further analysis.

Tables 6 and 7 show the figures for verbalized problems and problem indicators in the process in sentences 34–45 for students and professional interpreters.

	Reported problems	Indicator: Speech disfluency	Indicator: Silent pause ≥ 0.5 s	Indicator: Paralinguistic	Combination of two or more indicators	No process indicator
Amadeus/S	5	–	1 (20%)	–	4 (80%)	–
Kajsa/S	11	1 (9.1%)	–	2 (18.2%)	8 (72.7%)	–
Lisa/S	4	–	2 (50%)	–	2 (50%)	–
Total	*20*	*1 (5%)*	*3 (15%)*	*2 (10%)*	*14 (70%)*	–

Table 6. Reported problems and problem indicators in the process, interpreting students.

	Reported problems	Indicator: Speech disfluency	Indicator: Silent pause ≥ 0.5 s	Indicator: Paralinguistic	Combination of two or more indicators	No process indicator
Bettina/P	7	–	–	–	7 (100%)	–
Folke/P	3	–	–	–	3 (100%)	–
Malin/P	3	–	–	–	1 (33.3%)	2 (66.7%)
Total	*13*	*–*	*–*	*–*	*11 (85%)*	*2 (15%)*

Table 7. Reported problems and problem indicators in the process, professional interpreters.

In the analysis, the classification of pauses is shorter for interpreters than for translators. Naturally, this is linked to the differences in speech process and writing process. The shortest pause length for interpreters in the transcript correlating with problem reports was 0.5 seconds for isolated pauses, and 0.2 seconds for pauses in combination with other indicators; these pause lengths were therefore chosen for further analysis... However, the pause length for interpreters was also divided into two categories. The reason behind this goes back to the definition of pauses as evidence of cognitive effort in simultaneous interpreting that was first approached by Goldman-Eisler (1961); more recent work on pauses in simultaneous interpreting has been done by for example Cecot (2001) and Tóth (2011). Pauses are interruptions of the speech flow and can be filled or unfilled. Silent pauses and disfluencies have been studied in order to gain insight in the interpreter's cognitive processes as well as the disfluencies in relation to the source language speech (Tissi 2000). Bakti (2009) provides a thorough overview on studies of disfluencies. In our study, isolated pauses of 0.5 s and over were found in relation to reported problems. Pauses as short as 0.2 s combined with other disfluencies were also found in relation to problem reports. These values tally nicely with Tissi's typology from 2000.

As can be seen in tables 4 and 5, our expectations regarding the relation of problem indicators in the process to problem reports were not confirmed by the keystroke logging data, in the sense that the number of reported problems without the presence of problem indicators in the process was unexpectedly high, 5 out of 29 (17.2%) for students and 2 out of 14 (14.3 %) for professionals.

For interpreting data (tables 6 and 7), the figures were more in accordance with our expectations, with only one interpreter reporting problems that had no problem indicators in the process. On the other hand, the tables also show that in both students' and professional interpreters' process data, the

majority of the problem indicators occur in combination with one or more other indicators, and the number of isolated problem indicators is quite low.

4.2. Analysis of process data not related to problem reports

In the second analysis, we depart from process data. The purpose here is to check the completeness of the reports. The more problem indicators found that involve words/expressions *not* mentioned as problems in the retrospection, the less complete the retrospection is. We certainly expected that there would be some indicators of problems without any retrospection report.

Identification of problem indicators in the process data:

a. Translation: Revisions involving words/expressions not related to problem reports.
b. Translation: Pause(s) within the sentence, not immediately preceding or following after the writing of words/expressions related to problem reports.
c. Interpreting: Disfluencies not related to problem reports.
d. Interpreting: Paralinguistic indicators not related to problem reports.
e. Interpreting: Isolated unfilled pauses not related to problem reports.
f. Interpreting: Combination of two or three of the preceding points.

The pause length for the second analysis was determined by the first analysis (see section 4.1). It was established at 5 seconds for translation data and 0.5/0.2 for interpreting data, thus the same for all participants, instead of establishing a value individually determined. Tables 8 and 9 display the figures for problem indicators not related to problem reports in sentences 34–45 for translation students and professional translators.

	Revision	Pause $\geq$ 5s
Josephine/S	12	9
Felix/S	5	9
Therese/S	9	6
Total	*26*	*24*

Table 8. Problem indicators not related to problem reports, translation students.

	Revision	Pause ≥ 5 s
Oskar/P	4	2
Tintin/P	12	0
Isak/P	10	5
Total	*26*	*7*

Table 9. Problem indicators not related to problem reports, professional translators.

Tables 8 and 9 show that the translation data include quite a large number of problem indicators in the process that do not correspond to any problem report. The figures are higher for students than for professionals, but for both groups they are more than twice as high as the figures for problem indicators in the process related to reported problems (see tables 4 and 5).

Tables 10 and 11 give the figures for problem indicators not related to problem reports in sentences 34–45 for interpreting students and professional interpreters.

	Speech disfluencies	ParaL	Silent Pauses ≥ 0.2 s with other indicators	Silent Pauses ≥ 0.5 s
Amadeus/S	18	7	3	15
Kajsa/S	12	–	–	4
Lisa/S	9	3	2	12
Total	*39*	*10*	*5*	*31*

Table 10. Problem indicators not related to problem reports, interpreting students.

	Speech disfluencies	ParaL	Silent Pauses ≥ 0.2 s with other indicators	Silent Pauses ≥ 0.5 s
Bettina/P	12	1	2	3
Folke/P	15	1	3	6
Malin/P	9	1	3	6
Total	*36*	*3*	*8*	*15*

Table 11. Problem indicators not related to problem reports, professional interpreters.

Tables 10 and 11 show that in the interpreting data the number of problem indicators in the process not related to a problem report is about four times

higher for both students and professionals compared to the problem indicators related to a problem report. Just as for translators, the figures are higher for students than for professionals (see tables 6 and 7).

4.3. *Verbal reports vs. problem indicators in the process*

The data from tables 4, 5, 8 and 9 for translators are brought together in table 12 to give an aggregated picture of the quantitative relation between verbal reports and problem indicators in the process. The same is done for interpreters by bringing together tables 6, 7, 10 and 11 in table 13.

Translators	Verbal problem report and related process indicator	Process indicator only	Verbal problem report only	Total
Students	24 (30.4%)	50 (63.3%)	5 (6.3%)	79
Professionals	12 (25.5%)	33 (70.2%)	2 (4.3%)	47
Total	*36 (28.6%)*	*83 (65.9%)*	*7 (5.6%)*	*126*

Table 12. Quantitative relation between verbal reports and problem indicators in the process, translation subjects.

Interpreters	Verbal problem report and related process indicator	Process indicator only	Verbal problem report only	Total
Students	19 (18%)	85 (82%)	–	104
Professionals	11 (14.7%)	62 (82.7%)	2 (2.6%)	75
Total	*30 (16.8%)*	*147 (82.1%)*	*2 (1.1%)*	*179*

Table 13. Quantitative relation between verbal reports and problem indicators in the process, interpreting subjects.

These figures show quite clearly that, quantitatively, the predominant category is problem indicators in the process that are not related with any problem reports, and that this is particularly true for interpreters. For interpreters, there could of course be a carry-over effect, that is, that a problem occurred earlier in the performance, and was reported on and that the effects of this problem were carried over to the next segment. However, these process indicators occurred in segments that were not preceded by problem reports. The cases where the problem report and the problem indicator(s) coincide are around 29% in the translation data and less than 20% in the interpreting data.

We did not expect the retrospective protocols to account for *all* the problem indicators in the process, but we were not expecting to find such a relatively low degree of correspondence between the two types of data.

4.4. *Verbal problem report without problem indicator in the process*

Of special interest are the cases where subjects report a problem, but there is no problem indicator in the process data. Tables 4 and 5 show that this is not uncommon in the translation data, the share being 17.2% of the students' verbal reports and 14.3% of the professional translators' verbal reports. It is less frequent in the interpreting data: it was not found at all in the students' data, and in 15% of the professional interpreters' data. A closer inspection of the cases from the data shows that one reason for these results may lie in the operational definitions applied. Two examples will clarify this.

Professional translator Isak reports a problem in finding the Swedish equivalent of *descriptors* in the NP *misleading product descriptors*. He was concerned that *descriptors* might be a term, and if so, that the correct Swedish term should be found. However, as he was not allowed to search in termbanks (cf. section 3.2.2), he was unable to ascertain this and wrote the Swedish word *beskrivningar* ('descriptions'). In his logging, there is a pause of 5 seconds before starting to write the translation of the whole NP, but not immediately preceding the problematic item. This does not meet the operational definition of pauses in the analysis (cf. section 3.3) and has therefore not been included. A reasonable assumption is that the reported problem was indeed present and processed as part of the processing of the whole NP. In this case, thus, our operational definition of a process indicator is too restrictive. A similar case is student Therese, who reports a problem with finding the exact Swedish equivalent to the expression *break even,* seemingly without a confirming process indicator. There is, however, a 5-second pause in her logging, that occurs sentence-initially (before she starts to write the target text of the full phrase *So to break even*), so it has not been counted (see operational definitions in section 3.3).

The following examples are to some extent similar. In some cases, the reported problems concern words or expressions found towards the end of a long source text sentence. In such cases, the problems may very well have been processed together with earlier parts of that sentence, thus leaving no specific trace of a process indicator in direct connection with the problematic word. An example is student Josephine, who reports a problem regarding target language retrieval for the English cigarette terms *light, low tar* and *ultras,* that is, whether to keep them in their English form or not. No process

indicator is found. Another example is student Felix, who reports a problem with how to express the adverbial *extra* in Swedish in "a smooth way", as he puts it. No process indicator according to operational definition in 3.3 was found, but the word occurs towards the end of a rather long sentence. Characteristic of all these cases is that they concern words or expressions that are not difficult to understand for the subjects—the difficulty lies in choosing the Swedish equivalent.

For interpreting (tables 6 and 7), students do not have any reports that are not confirmed by indicators in their process. Among the interpreting professionals only one, Malin, reports a problem that is not confirmed by her process data. She reports not hearing *double filtered,* but also evaluates herself immediately and says that it can be accepted in a long list when the pace is fast. In the protocol there are no problem indicators in the process. The delivery is smooth, without longer pauses, false starts or repetitions. The only thing that could possibly indicate an increased processing effort is a slightly faster breathing. However, the breathing can be due to other factors than the perception issue, such as pace. This is what Malin actually says in her retrospection:

> Just det, just det. Ja, det där hörde inte jag – 'double filtered' hörde jag inte. Men det är en sån grej som, som kan accepteras tycker jag i en snabb – om han säger någonting snabbt, så får du inte med allt. Det måste man acc– det får – det måste man acceptera själv. Att man inte kan få med allting.

> [Right, right, yes, I did not hear that – I did not hear 'double filtered'. But that's the type of thing that can be accepted, I think, in a fast – if he says something fast, then you don't get everything. You have to acc– it has – you have to accept that yourself. That you cannot get everything.]

The fact that there is no process evidence, combined with the way she expresses herself, can be seen as an indication that there was no actual problem during the task, but rather something she realized retrospectively. At first it seems obvious that she reports on not hearing 'double filtered', but when analyzing it in light of the process, it becomes clear that she does not for example report "I realized there was something I didn't hear, but it was too fast so I had to leave it out" or something similar. The way she expresses herself rather indicates that, when reading the transcript, she understands that she left something out. It is, however, very difficult to identify that only from the retrospective protocol. A similar example from the translation data is when professional translator Oskar correctly reports having reproduced in his Swedish text the English phrase *break even,* saying that "it went too quickly". This utterance we classified as PP/Sim/SL.TL, that is, "problems due

to high SL input rate in relation to interpreter's/translator's own output rate" (cf. Ivanova 1999), thus interpreting it as reflecting Oskar's problems with the (self-imposed) time pressure of the translation task. Oskar's utterance is ambiguous, however, and could also be understood as an implicit evaluation of his own work in retrospect, that is, that he (now) considers that he acted too quickly and should have thought more before writing.

5. Discussion

This analysis of a segment of our data showed that retrospective verbal problem reports relate only to a minor part of the potential problem indicators in the process, namely, less than one-fifth of the interpreting data and just above one-fourth of the translation data. This was an unexpectedly low figure. The low degree of reports may in part be due to the subjects, either because they had forgotten quite a few of the problems they actually had or because they chose not to report some of the problems they actually had and remembered, for example, due to fatigue. This is as expected from other studies on retrospection, as mentioned above in section 2.

However, the results can also be due to aspects of the analysis of data. The coding system of the retrospective protocols does not allow for the coding of *every* utterance in the protocols; thus, it may fail to capture certain utterances that are actually indicative of problems. That is, the coding system may be too restrictive. On the other hand, in the analysis of the process data, we may have been too inclusive: what we have tentatively coded as problem indicators in the process should perhaps better be labeled more cautiously *potential problem indicators*. For instance, a pause within an utterance or (the writing of) a sentence can be due to other cognitive activities than problem solving. Thus, some pauses in the translation data are probably related to reading further on in the ST or evaluating the part of the TT sentence already written down, or in the case of interpreters, causes connected with natural speech production.

Although infrequent, verbal reports not corroborated by the process data (mainly found in the translation data) are of special interest and they were therefore analyzed separately. The analysis showed that the operational definition of process indicator in this study is so strict that it most probably does not allow for identification of all indicators of problem-solving processes, when seen in relation to problem reports connected with a specific word or expression. It could be argued that the operational definition applied here is incompatible with a view of translation that assumes that translators comprehend and translate not words in isolation, but rather larger chunks within a context. Still, as shown in the data analysis, problem reports tend in the

majority of cases to have corresponding problem indicators in the immediate vicinity of the problematic word/expression, according to this operational definition. There were also two examples, one from the translation data and one from the interpreting data, where the possible ambiguities lying in the interpretation of the retrospective protocol were clearly highlighted, something that could distort the results.

Problem indicators related to the process are different between interpreters and translators, and the amount of problem indicators in the process in interpreted data is larger than in the translation data. This is not surprising as it reflects differences in the speech process versus the writing process.

6. Conclusions

It must be assumed that not all problems are verbalized in retrospective protocols and it is clear that, in particular for translators, not all verbalizations have a coinciding problem indicator in the process. Clearly, retrospective reports must be used with caution in research and it must be emphasized that they give only a part of the picture. An important question then concerns the representativeness of the reports in relation to the whole set of data: given the incompleteness of retrospective reports, can we still draw conclusions regarding for example the quantitative relations between different categories of verbalizations in different categories of subjects?

Ericsson & Simon (1980: 247) say that verbal reports are a reliable source for investigating cognitive processes when they are carefully elicited and "interpreted with full understanding of the circumstances under which they were obtained". In the case of retrospection it should also be added that the researcher has to take precautions as to what instances the subject actually remembers, and what instances may be blurred by other confounding processes. Considering the data in our material, it may also be prudent to take possible lacunae in the verbal reports into consideration. With that in mind, it is possible to draw appropriate conclusions from the material.

It is thus important to continue investigating what conclusions can actually be drawn from retrospective data, in order to be as appropriate as possible in the analysis of such data. It is equally important that research is precise and exhaustive in reporting the use of retrospective data to allow the reader to fully understand how the collection, analysis and interpretation of the data were carried out.

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Appendix

Analyzed part of the speech

34. As a result of an amendment from this Parliament on 24th July 1999, the
    introduction of colour photos on product warnings is to be introduced for
    the first time.

35. This will greatly increase their impact.

36. In recent years, research has shown the importance of avoiding mislead-
    ing product descriptors on tobacco products, because such descriptors
    may mislead the consumer into believing that one product is safer than
    another.

37. This directive introduces a requirement not to use such misleading terms
    on tobacco products.

38. As such it aims to protect smokers and non-smokers alike from misleading
    and dangerous descriptors such as light, low tar, double filtered, ultras,
    etc.

39. In a previous declaration to the Parliament, I undertook to consult tobacco experts.

40. Richard Peto, who is statistician and epidemiologist at Magdalena College of the University of Loughborough, reported that BAT, British American Tobacco, recently gave more than £3 million to sponsor Nottingham University.

41. Now, every cigarette sold makes a profit for the company of about 3 p.

42. To get its donation money back, which we have to assume BAT wants to do, it has to sell 100 million extra cigarettes.

43. Every million cigarettes causes about one death.

44. So to break even, they've got to sell enough cigarettes to cause about 100 deaths.

45. The money, incidentally, was given to fund a professorship in corporate responsibility.

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EYE TRACKING AND THE TRANSLATION PROCESS: REFLECTIONS ON THE ANALYSIS AND INTERPRETATION OF EYE-TRACKING DATA[1]

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Abstract

Eye tracking has become increasingly popular as a quantitative research method in translation research. This paper discusses some of the major methodological issues involved in the use of eye tracking in translation research. It focuses specifically on challenges in the analysis and interpretation of eye-tracking data as reflections of cognitive processes during translation. Four types of methodological issues are discussed in the paper. The first part discusses the preparatory steps that precede the actual recording of eye-tracking data. The second part examines critically the general assumptions linking eye movements to cognitive processing in the context of translation research. The third part of the paper discusses two popular eye-tracking measures often used in translation research, fixations and pupil size, while the fourth part proposes a method to evaluate the quality of eye-tracking data.

Resumen

El seguimiento ocular es un método de investigación cuantitativa de creciente popularidad en la investigación de la traducción. Este artículo aborda algunos de los aspectos metodológicos más importantes relativos el uso del seguimiento ocular en la investigación de la traducción. Se centra específicamente en el análisis y la interpretación de los datos de seguimiento ocular como reflejo de los procesos cognitivos durante la traducción. El artículo aborda cuatro tipos de aspectos metodológicos. La

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primera parte considera los pasos preparatorios previos a la grabación de datos. La segunda parte examina críticamente las hipótesis que vinculan los movimientos oculares al procesamiento cognitivo en el contexto de la investigación de la traducción. En la tercera parte se analizan dos parámetros de seguimiento ocular de uso frecuente en la investigación de la traducción (fijaciones y el tamaño pupilar), mientras que la cuarta parte propone un método para evaluar la calidad de los datos de seguimiento de los ojos.

1. Introduction

Eye tracking has become a well established and increasingly popular quantitative research method in translation research to collect data about the cognitive processes involved in translation. A wide range of research questions have been explored using eye tracking, such as translation memory tools and cognitive load (O'Brien 2006), reading for translation as a particular type of reading (Jakobsen & Jensen 2008), coordination of comprehension and production processes in translation (Dragsted & Hansen 2008), directionality in translation (Pavlović & Jensen 2009; Chang 2009), reading modalities in translation (Alves *et al.* 2011), distribution of cognitive effort during translation (Hvelplund 2011), translator competence (Ehrensberger-Dow & Massey 2013), metaphor translation (Sjørup 2013), classification of translator styles (Dragsted & Carl 2013), parallel processing in translation (Balling *et al.* 2014), to name just a few.[2] The use of eye tracking as a research method raises methodological questions, and O'Brien (2009) and Alves *et al.* (2009) have dealt specifically with the methodological issues involved in the use of eye tracking in translation research. O'Brien (2009) focuses on the challenges researchers encounter when collecting eye-tracking data, and she discusses important issues such as research environment, participant selection and ethics. Alves *et al.* (2009) address the challenges involved in the use of eye tracking in combination with key logging and retrospective analysis, and raise questions on issues related to the reliability and comparability of eye-tracking data across studies.

This paper focuses specifically on the challenges involved in the analysis and interpretation of eye-tracking data as reflections of some sort of cognitive activity, and it also comments on relevant methodological aspects to consider when capturing the translation process using eye tracking. Ideally, eye-tracking data reflect the translator's object of attention with perfect spatial accuracy and perfect temporal precision. In reality, however, several issues

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2. See Alves *et al.* (2012) for an overview of some of recent studies exploring the translation process using eye tracking.

complicate a straightforward interpretation of eye-tracking data as evidence of concurrent cognitive processing. For instance, since our thoughts can shift independently of eye movements, how can we rely on Just & Carpenter's (1980: 331) eye-mind and immediacy assumptions to infer something about the translator's cognitive focus during translation? With respect to process measures, can we, for instance, be certain that longer fixations actually reflect more processing intensity? Might it not be that a task attracts longer fixations because the eyes are monitoring the mechanical operation of typing? These and other questions are considered here in the context of translation research. The paper is divided into four parts. The first part discusses the suitability, advantages and disadvantages of different types of eye trackers for translation research as well as issues related to participant selection and research setting. The second part evaluates basic assumptions of eye movements as indicators of cognitive processing in the light of translation research, while the third part focuses on eye tracking measures, including fixations and pupil size, as well as their advantages and disadvantages. Finally, the fourth part proposes three methods to evaluate the quality of eye-tracking data.

2. Eye trackers, participants and research setting

Several issues can have an impact on the reliability of eye-tracking data as reflections of the cognitive processes involved during translating. O'Brien (2009: 252) points to several methodological challenges when using eye tracking to examine cognitive processes. The choice of eye tracker, the research environment and the participant's familiarity with working with an eye tracker (or lack thereof) are some of the factors which may contribute negatively to the generalisability of the recorded data. Eye-tracking data can be affected by a variety of factors not related specifically to cognitive events. For instance, eye-tracker accuracy, reflexive responses, such as pupillary responses to changes in light intensity, and a possible white-coat effect from having a translation process monitored in an unfamiliar environment are some of those factors. In order not to base findings on data which cannot easily be said to be generally representative of translation processing, careful consideration must be given to these issues that could otherwise cause problems for the interpretation of eye-tracking data as indication of cognitive processing during translation.

2.1. Types of eye trackers

An eye tracker is a device that registers and records where the eyes are looking. Most modern eye trackers use video-based technology to measure the

position of the eye, where a camera captures and records the reflection of infrared light on the eye's cornea or retina (Duchowski 2007: 54). Eye trackers are often compared on how accurately they reflect where the user is looking, and accuracy is typically measured in degrees of visual angle. The inaccuracy reported by eye-tracker manufacturers is typically between 0.5 and 1 degrees, which corresponds to roughly 0.5 to 1 centimetre, although some head-supported systems reportedly have even higher accuracy. In deciding which eye tracker is best for a given research objective, accuracy is one important factor, but the degree of invasiveness and the eye tracker's recording speed, i.e., its sampling rate, measured by the frequency of gaze sample registrations per second (Hz), are also factors to consider.

Remote eye trackers, also referred to as desktop eye trackers, are generally the preferred type in translation research (see also O'Brien 2009: 263). In remote eye trackers, cameras are integrated into a separate box which is placed in front of, or attached to, a computer monitor (e.g., SMI's RED series, Tobii's X60/120, TX300 and SR Research's EyeLink 1000) or the cameras are integrated into a dedicated monitor (e.g., Tobii's T60/120), making this type of tracker less invasive than head-mounted eye trackers and systems which require head support.[3] Accuracy is typically between 0.5 and 1 degree, and remote eye trackers have the overall advantage that the participant can freely move around and move the head without compromising the quality of the recording. In naturalistic research settings—such as most translation setups, which are intended to imitate an authentic setting—movement restriction may potentially cause the participant to become very aware of the research setting, and stress and a possible white-coat effect may arise resulting in a recording that cannot straightforwardly be assumed to contain generalizable reflections of typical translator behaviour. Since there is usually no movement restriction with remote eye trackers, this is not a serious issue, so this type constitutes a good choice for translation research.

Head-mounted systems, such as SMI's iView X HED and SR Research's EyeLink II, and eye-tracking glasses, such as the SMI Eye Tracking Glasses and the Tobii Glasses, also allow free head movement and inaccuracy is typically about 0.5 degrees. This type of eye-tracking device is more invasive than remote devices, since the participant has to wear the equipment on his/her head. Having an eye tracker strapped to the head will most likely make

3. Tobii Technology <http://www.tobii.com/> Accessed 9 March 2013.
   SR Research <http://www.sr-research.com> Accessed 9 March 2013.
   SensoMotoric Instruments (SMI) <http://www.smivision.com/> Accessed 9 March 2013.

the participant even more aware that s/he is being observed, and this could also influence the reliability of the eye-tracking data as reflection of cognitive processing. The head-mounted systems work at between 200–500 Hz, which is comparable to the recording frequency of most remote systems, while the glasses work at only 30 Hz. Such low frequency is not ideal for studies where high temporal resolution is needed to make detailed observations on changes in fixation duration and pupil sizes, and by this measure eye-tracking glasses are not well-suited for translation research. One advantage that head-mounted eye trackers and glasses have over remote eye trackers is that the recording area of the device is not restricted to the screen area of a computer monitor. While remote eye trackers will only capture eye movements inside the computer monitor area, head-mounted eye trackers and glasses capture eye movements outside of this area as well. For translation research, specifically, this is particularly important if the researcher is interested in the participant's use of external resources, such as printed dictionaries or other texts, or if the researcher wishes to examine how frequently the participant monitors his/her typing activities.

Eye trackers which require that the participant's head is kept still, such as SMI's iView X Hi-speed system, Arrington Research's HeadLock system and SR Research's EyeLink 1000 Head Supported, work at between 400 and 2000Hz, and inaccuracy can reportedly be as low as 0.25 degrees, corresponding to a spatial offset of around 0.25 centimetres between object and actual visual focus.[4] With this type of eye tracker, the head is stabilised using a chin rest or a bite bar, so this setup makes it the most invasive alternative of the three types discussed here. In terms of ecological validity, there is the general problem of possible stress and white-coat effects from having the head fixed to the eye tracker. Secondly, since the participant's head is fixed in a locked position, the participant will have poor if no visual contact with a keyboard, if such is used. For translation research specifically, this means that the translator will not be able to monitor his/her typing activities, which severely complicates the writing process. The translator's eye movements may thus well be related to stress from not being able to look at what key is being pressed in addition to actual problem-solving activities arising from the translation itself. Although some translators are good touch typists and do not need to frequently monitor the keyboard, a situation in which the translator is restricted by the experimental setup to look only at the monitor will result in an undesirable research

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4. Arrington Research Eye Trackers <http://www.arringtonresearch.com/> Accessed 20 March 2013.

setting, which further compromises the ecological validity of the research. Overall, remote eye trackers are less intrusive than the other two types, and for that reason it constitutes a better option. However, head-mounted trackers have the advantage that they record activities which are not confined to what occurs on the computer monitor.

2.2. *Participant profile*

Other factors that have an impact on how well the eye tracker registers the position of the participant's eyes on the monitor have to do with the participant's eyes and the possible use of eyeglasses. Problems related to eyes and eyeglasses can to some extent be anticipated and taken into account before the eye-tracking data is collected, thus increasing the chances of a successful high quality recording. Glasses and contact lenses are normally not a problem for the quality of the recorded eye-tracking data, although the shape of the eyeglasses worn by the participant can have a negative impact. Eye trackers rely on unobstructed view between the eye tracker and the participant's eyes, and if the frame of the eyeglasses is very narrow, then the infrared signal may be obstructed by the frame and data are not captured by the tracker. Similarly, bifocal lenses can cause problems since the quality of the signal from the eye to the eye tracker can become affected by sudden variation in lens dioptre. For the same reason of obstruction of view between eye and eye tracker, even very long eyelashes and heavy mascara can make recording of good eye-tracking data problematic. To obviate these problems, it can be necessary to instruct participants not to wear heavy mascara and, if possible, to use eyeglasses that do not have a very narrow frame or bifocal lenses. The eye tracker should in any case be thoroughly calibrated, so that the researcher can identify potential problems before the recording session begins.

The problems outlined above are inherent to any research with eye tracking, but in relation specifically to translation, there is the additional problem of the participant's ability to touch type, which was discussed in relation to eye tracker type above. The participant's ability to touch type will affect how frequently s/he looks at the keyboard to monitor typing activities. The most popular type of eye-tracker system, i.e., remote eye trackers, record only the position of the eyes when the eyes are looking at the computer monitor, so if the participant is visually monitoring his/her typing activities by looking at the keyboard, then the eye tracker will not be able to record any eye movement activity and the level of *completeness* of the recording is not as high as it might have been. It might therefore be tempting to prefer only participants that are able to touch type, and ideally the selected participants would share

the same high level of touch typing ability; however, this selection criterion places severe limitations on the potential pool of candidate participants in a translation study using eye tracking, and restriction such as this is not favourable. Instead, the impact of the participant's touch-typing ability should be controlled for statistically, rather than experimentally, using inferential methods (e.g., Balling 2008, Balling & Hvelplund, in preparation).

2.3. Data collection

To compensate for the inaccuracies of the eye-tracking equipment discussed above in 2.1, large font sizes are generally preferred in translation research using eye tracking. O'Brien (2009: 261ff) suggests a font size 16 or 18, and studies typically opt for font sizes 16–20. Using a large font size is relevant only to the extent that the researcher is interested in making observations on differences at the *word* or *sentence* levels. If the researcher is interested in differences between larger items, for instance at the *text* level between source text (ST) and target text (TT), then smaller fonts could be used. For the sake of recycling, however, it might still be a good idea to use a large font size, since data could then be reused for other research objectives that rely, for instance, on mapping of eye movements to words.

Another factor that can be controlled easily is the participant's distance from the monitor. Eye-tracker manufacturers typically recommend that participants are seated at a distance of around 60-80 centimetres from the monitor (e.g., SMI's RED systems specifications and Tobii's T60 & T120 Eye Tracker User Manual).[5] Some eye tracking software (e.g., Tobii Studio and SMI's iView X software) will indicate in real-time whether the participant is sitting at a suitable distance, but not all software provides this information. In those cases, it is absolutely necessary to manually check the distance to the eye tracker before the session starts. Jensen *et al.* (2009: 325) suggested that the high discard percentage reported in this study could be related to a high distance between participant and monitor and, based on these observations, it seems that there is a close causal relationship between distance to the computer monitor and discard percentage.

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5. Tobii T60 / T120 Eye Tracker User Manual < http://www.tobii.com/Global/Analysis/ Downloads/User_Manuals_and_ Guides/ Tobii_T60_T120_EyeTracker_UserManual. pdf> Accessed 20 March 2013.
SMI RED Systems specifications <http://www.smivision.com/en/gaze-and-eye-tracking-systems/products/red-red250-red-500.html> Accessed 25 October 2013.

Since eye movements and pupil size are sensitive to variation in light intensity, it is generally recommended to collect eye-tracking data in a room with a stable source of light. O'Brien (2009: 253) suggests that a consistent source of light is used and that the blinds are closed in the room where the eye-tracking data are collected, while Holmqvist *et al.* (2011: 17) suggest an entirely windowless room. The matter of pupil size and relevant precautionary measures are considered in more detail in section 4.2 below.

3. Eye movements, assumptions and translation processes

The reliability of eye-tracking data as indication of cognitive processing has not yet received much critical attention in the context of translation research. From an intuitive perspective, it makes good sense to assume that we direct our focus of attention to whatever object we are looking at. For instance, when reading a book, it is hard, if not impossible, to intentionally detach our focus of attention from that word or string of words that we are looking at. Visual exposure to letters automatically activates a processing stream that cannot be interrupted intentionally, unless looking away from those letters (Valdés *et al.* 2005: 279). For translation, it also makes good sense to suppose that the translator focuses on the words that s/he is looking at. For instance, when fixations are observed on ST words, it makes sense that the translator is engaged in ST reading and when fixations are observed on TT words, it makes sense that the translator is engaged in tasks related to the processing of the TT. In translation research using eye tracking, Just & Carpenter's (1980: 331) eye-mind and immediacy assumptions are often used as an operational basis for assuming a link between visual focus and cognitive focus. Just & Carpenter point out that "there is no appreciable lag between what is being fixated and what is being processed" and "... the interpretations at all levels of processing are not deferred; they occur as soon as possible" (1980: 331). Just & Carpenter's assumptions hold that recordings of eye movements will unveil information about the contents of conscious processing during a task, as visual focus on objects, be it letters or images, will always lead to attention being focused instantaneously to those letters or images. This is not necessarily the case, though. For instance, our thoughts may drift unintentionally during reading, and we may think of something completely unrelated to clouds when staring at the sky. Such mind wandering, or mind drifting, is a frequent and common phenomenon (Smallwood & Schooler 2006: 946), and it suggests that the eye-mind assumption perhaps only provides an approximation of the relationship between visual focus and cognitive focus. The matter of covert attention in particular has been emphasised as a possible argument against

the eye-mind assumption: "[…] it is important to distinguish between overt changes in orienting that can be observed in head and eye movements, and the purely covert orienting that may be achieved by the central mechanism alone […]" (Posner 1980: 5.)

Posner distinguishes here between behavioural changes, which can be observed, and cognitive changes, which cannot, and highlights an important limitation of the eye-mind assumption, namely that cognitive focus can shift independently of eye movement. While the eye tracker can fairly accurately identify where the eyes are looking, it cannot identify the object of thought. For translation, specifically, this means that although the translator is looking at the ST, he may well be considering possible target language (TL) equivalents of that specific ST word, and when looking at the TT, the translator may well be constructing meaning hypotheses based on ST content. In translation research, and other research disciplines as well, this problem of possible disagreement between visual focus and cognitive focus merits caution, and observations ought to be interpreted in the light of this potential weakness.

With respect to a potential weakness of the immediacy assumption, research suggests that the mind is up to 250 milliseconds ahead of the eye (cf. Holmqvist *et al.* 2011: 379). In other words, the mind focuses attentional resources to an object before it enters into visual focus. In a translation context, this could mean that the researcher cannot be certain if the translator is processing the word on which a fixation has been registered or if the translator is in fact preparing to process a successive word not yet in visual focus. With respect to this potentially asynchronous temporal relationship, Holmqvist *et al.* (2011: 379) offer a word of caution: "most eye-tracking research is conducted and interpreted as though attention and fixation were synchronous events […] they probably are not."

In terms of more technical challenges to the eye-mind assumption, there is also the issue of *drift*, which may further compromise the validity of the eye-tracking data as reflections of cognitive processing (Tobii Eye Tracking White Paper).[6] Drift is when the recorded eye position and the true eye position become gradually asynchronous as a data-collection session progresses. Drift is measured by calculating the gradual dislocation of the participant's gaze relative to screen content in degrees of visual angle. Eye tracker manufacturers typically report up to 0.3 degrees drift over time, which corresponds

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6. <http://www.tobii.com/en/eye-tracking-research/global/library/white-papers/tobii-eye-tracking-white-paper/> Accessed 9 January 2013.

to roughly 0.3 centimetres. This is not likely to be a serious issue for short translation sessions but for lengthy sessions, which are not uncommon, it may well have an impact on the reliability of the eye-tracking data. For lengthy translation sessions, it may be necessary to consider dividing the session into shorter sessions with additional eye-tracking calibrations between sessions.

Despite the issues discussed above, eye tracking constitutes a very useful and powerful methodology to make observations on the cognitive processes during the translation process. While the eye-mind and immediacy assumptions have their weaknesses, they do offer a reasonable basis for assuming some sort of relationship between eye movements and translation processing. For example, while covert attention is a factor to consider, we cannot ignore the many instances during the translation process where ST words have been read for the purpose of translating them into the TL. During those instances, visual focus will have been overt manifestation of cognitive focus. Findings from reading research provide further support for assuming a link between visual and cognitive focus. Fixation duration tends to increase as an indication of increase in perceived difficulty with less frequent and less predictable words (Inhoff & Rayner 1986, Ehrlich & Rayner 1981) and with more complex and difficult genres (Rayner & Pollatsek 1989). Furthermore, since the task of translating is a cognitively demanding one, there is arguably little room for much mind wandering, and we may cautiously assume that the *majority* of eye movements during translation relate to on-going, conscious, synchronous processing of the translation task. This argument is supported by psychology research, which has found that mind wandering is more likely to occur in tasks that are simple or automatic than in attention-demanding tasks (Smallwood & Schooler 2006: 947, 956). In summary, the eye-mind and immediacy assumptions are reasonable assumptions that are not only necessary in order to be able to interpret eye movements as correlates of cognitive processing in translation but that have been successfully validated in neighbouring research disciplines.

It should be noted that in order to increase the likelihood that eye movement data reflect actual cognitive activities, other precautions can and should be taken. Having a high number of participants and filtering recordings according to eye-tracking data quality (e.g., Hvelplund 2011, Sjørup 2013) and statistical control of possibly confounding factors (e.g., Balling 2008, Balling & Hvelplund, in preparation) are some of the steps that could be taken to further secure large amounts of high quality data.

4. Eye movement measures and translation

In eye-tracking research in general, a wide range of measures have been used to make observations on eye movements during different types of tasks. These measures include fixation-based measures, pupil-based measures, saccade-based measures and transition-based measures, and they can be further classified into movement measures, position measures, numerosity measures and distance measures.[7] In most eye-tracking software, popular measures such as fixation duration, fixation count, time to first fixation, first fixation duration, etc. are readily available at the click of a button. Most eye-tracking software also offers visualisation of a recording, such as heat maps and gaze plots. Some measures, however, are not calculated automatically by the software. In those situations, manual identification is needed of the desired figures in the so-called *raw data* (see Hvelplund 2011: 112-116 for a practical example of data extraction from raw data output). For instance, access to information about pupil sizes most often requires manual identification in the raw data, and this manual work can potentially be quite time consuming.

In translation research, two indicators in particular have been popular to make observations on the cognitive processing during the translation process, namely measures of fixations and measures of pupil size. These two types of measures are considered below in some detail in relation to some of the issues involved in applying them to make inferences on the cognitive processes in translation. In addition, other quantitative measures of cognitive processing are discussed briefly and a note of caution is raised about the use of visualisation tools.

4.1. Fixations

A fixation is a type of eye movement often defined as a period of time during which the eye is relatively stable; the purpose of fixations is to bring an object of interest into visual focus (Duchowski 2007: 46). In translation process research using eye-tracking data, fixation duration and fixation count are popular measures, and they are often taken to index cognitive effort. Longer fixations and more fixations indicate more effortful processing and shorter fixations and fewer fixations indicate less effortful processing, and this more effortful processing is often linked to an increase in difficulty. While these interpretations make good sense, in particular in light of the eye-mind and

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7. See Holmqvist *et al*. (2011) for a comprehensive overview of various eye movement measures.

immediacy assumptions discussed above, there are situations in which it does not seem so straightforward. As a case in point, the TT area of the monitor generally attracts longer fixations than the ST area of the monitor (e.g., Sharmin *et al.* 2008: 39, Jakobsen & Jensen 2008: 114, Pavlović & Jensen 2009: 101). But does this mean that TT reformulation, in general, is more difficult than ST reading and comprehension? Or could it be that these more and longer fixations over the TT area have to do with the eye moving more slowly across the TT in sync with the emerging TT being typed? For this specific case, it is necessary to distinguish between ST reading and TT reading as two different types of reading activity. A likely interpretation of the more and longer TT fixations is that TT fixation duration and count are functions of the mechanical time-consuming operations related to typing the TT *as well as* of the difficulty involved in TT reformulation. In other words, TT reading speed during typing is essentially defined by the typing speed with which the TT emerges on the computer screen, and TT reading is thus not necessarily more cognitively demanding than ST reading. This relationship between fixation duration and the nature of the task is supported by research in reading. Summarising previous work, Rayner (1998: 373) points out that mean fixation duration is 225 ms during silent reading and 275 ms during reading out loud. During typing, i.e., when reading and typing simultaneously, mean fixation duration is 400 ms, which is considerably longer than for 'regular' reading. Non-reading tasks such as visual search and scene perception also yield different durations, namely mean fixation durations of 275 ms and 330 ms, respectively. Since the nature of the task codetermines the duration of the fixation, it is important to interpret the fixation data in light of the *kind* of reading that the translator is performing. In the example above, the fixation durations need to be interpreted as two different reading tasks, i.e., as ST reading and as TT reading while typing, since the underlying tasks carried out during the two types of reading are fundamentally different.

In terms of comparing and replicating the findings from translation research using eye tracking, Alves *et al.* (2009: 274) and Alves *et al.* (2011: 191) point to the different filter settings used in different studies as a potentially complicating factor. A filter setting essentially defines which gaze samples should be included in a fixation, and most eye-tracking software allows the researcher to manipulate these settings. Two filter settings can typically be manipulated: a setting related to the maximum *distance* between two gaze samples (measured in millimetres or pixels) and a setting related to the minimum *duration* of the fixation (measured in milliseconds). Based on the filter setting, gaze samples will be grouped together if they are in spatial and temporal proximity

to each other according to predefined thresholds. Comparing different filter settings, Alves *et al.* (2009: 274) observe that "the data are […] inconclusive when different fixation filters are used, since […] the AOI (area of interest) having the longest fixation differs according to the filter." Alves *et al.* (ibid.) suggest that researchers should strive towards a standardisation of settings, i.e., that the duration and distance thresholds are kept the same irrespective of the study. This recommendation of standardisation is indeed very recommendable, although a uniform setting might be problematic in cases where two studies have recorded eye-tracking data at different eye-tracker speeds (i.e., *sample rates*). More specifically, the distance the eye travels between two samples is a function of the recording speed of the eye tracker. For instance, the eye travels fewer pixels, or millimetres, between two samples if the eye tracker recording has been sampled at 50 Hz (i.e., across a time span of 20 milliseconds) than if the recording has been sampled at 30 Hz (i.e., across a time span of 33 milliseconds). If a comparison is intended, sample rates and distance would have to be normalised to account for this difference. That said, standardisation of filter settings is a very recommendable proposal, and it would make comparison and replication of studies more straightforward.

4.2. Pupil size

Measures of pupil size or dilation are often taken as indicator of the working load placed on the cognitive system (e.g., Hess & Polt 1964, Holmqvist *et al.* 2011: 393). Overall, pupils that are more dilated indicate higher cognitive load, i.e., they indicate that a task is relatively more difficult, while pupils that are less dilated indicate lower cognitive load, i.e., that a task is relatively easier. In translation and interpreting research, some studies have used measures of pupil size as indicators of changes in cognitive load (including Hyönä *et al.* 1995, O'Brien 2006, Caffrey 2008, Chang 2009, Jensen *et al.* 2009, Pavlović & Jensen 2009, Hvelplund 2011).

In general, caution should be exercised when collecting and analysing pupil size data, since this type of eye movement is sensitive to not only changes in cognitive load but to many other factors. More specifically, pupils dilate and constrict as a reflexive response to changes in light intensity; in response to emotional events, such as stress, pain and fear; in response to the intake of medicine and stimulants, such as drugs and alcohol; or if the participant is ill (Holmqvist *et al.* 2011: 393ff). While it is hard to control the participant's emotional state of mind while the recording of eye-tracking data is in progress, it is less problematic to control for other factors. Obviously, prospective participants in a translation study who have consumed stimulants

or are ill should not be allowed to contribute. Maintaining the same light intensity in the room where the eye-tracking data is recorded is crucial, in particular for studies that are interested in changes in pupil sizes.

In terms of analysis of pupil size data, further caution should be exercised. Pupillary response to a stimulus occurs with some delay. Several estimates have been presented of this delay, or *pupillary latency*. For instance, during multiplication tasks, pupils react within 300 milliseconds (Ahern & Beatty 1979), and the pupillary response to light occurs after 150 to 400 milliseconds (Holmqvist *et al*. 2011: 435). For translation and interpreting, specifically, Hyönä *et al.* (1995: 605) found that pupils responded with a delay of between 300 and 500 millisecond in a study on interpreting, while Hvelplund (2011: 71, 117) estimates a pupillary delay of 120 milliseconds for ST and TT reading during translating, based on a heuristic design in which different latency values were tested. In order to reduce the risk that changes in pupil size are erroneously linked to the wrong word or object, a pupillary delay needs to be taken into consideration. This could be done either by applying a fixed pupillary delay to all recordings across all participants or by applying individual pupillary delays for each participant, assuming that not all participants' pupils respond with the same delay. The latter approach requires individual baseline measurements to be recorded for each participant before collecting the actual process data. In any situation, if this psychophysiological delay is not somehow taken into account, the researcher risks performing analyses on pupil measurements that do not reflect the actual pupil size related to a specific word or item.

4.3. *Other measures*

In addition to the popular position and numerosity measures discussed above, total gaze times (the sum of all fixation durations) on a word or a larger region is also a popular measure. Other measures have also been used in translation research to make observations on translation as a cognitive activity, including blink rate as an indicator of cognitive load (e.g., Chang 2009), attention shifts as indicators of cognitive management (Hvelplund 2011) and eye-key span as indicator of the translator's coordination efforts (Dragsted & Hansen 2008). While fixation data, and to some extent also pupil data, are often more easily accessible than, for instance, data from saccades, transitions, and blinks, it is very likely that translation research could benefit from exploring the possibilities of measures rarely used in translation process studies but often used in neighbouring research disciplines such as reading research. Also, measures such as first fixation duration (the duration of the fixation on a word the

first time the gaze lands on a word), second fixation duration, regression behaviour (how frequently a word is reread), have not yet been used much in translation research, and there is most probably more to be discovered about the translation process using these indicators of cognitive processing.

Visualisation of eye movement behaviour through heat maps and gaze plots is popular in translation research. Visualisation often gives a very good first impression of which part(s) of a text received most fixations during a translation. It is, for the most part, used as a supplement to the more quantifiable measures discussed above, and to generate hypotheses. However, the use of visualisation as the main source of input for hypothesis testing and exploration of research questions is not very recommendable. Visualisations cannot be subjected to statistical tests such as the data from the quantifiable measures discussed above, and hypotheses therefore cannot be verified with comparable certainty.

5. Eye-tracking data quality

As discussed above, the quality of eye-tracking data is sensitive to a variety of factors. Although precautions have been taken, eye-tracking data may still be of such poor quality that they are not realistic reflections of the translator's eye movements and pupil size. Thorough assessment of eye-tracking data quality is therefore a crucial step in the analysis process; it is, however, a step which is often neglected in process studies. Below, three methods to evaluate the quality of eye-tracking data are presented and discussed in the context of translation research.

5.1. Fixation measure

While translation process studies often do not report how eye-tracking data quality was assessed, but only that a number of recordings were discarded due to poor data quality, one relatively popular measure of eye-tracking data quality is calculations of mean fixation duration. In a study on translation directionality, Pavlović & Jensen (2009: 99) discarded recordings in which fixations were "abnormally short", namely < 200 milliseconds, noting that the mean fixation duration during silent reading is around 225 milliseconds (Rayner 1998: 373). Hvelplund (2011: 106) similarly used a mean fixation duration threshold of 200 milliseconds to discriminate acceptable data from non-acceptable data, while Sjørup (2013: 105) applied a threshold of 180 milliseconds.

Relying on the fixation duration alone as a quality measure is not entirely unproblematic. Mean fixation duration is a relatively crude measure, which ignores the potential difference in *completeness* of eye-tracking recordings. More specifically, completeness, seen as how much eye movement has been successfully recorded by the eye tracker compared to how much has not been recorded, varies between recordings as a function of various factors. For instance, as discussed above, the quality of a recording can be affected by the participant's use of optical aids, which means that the recorded eye-tracking data may only be partial reflections of the participant's eye movements. It might be that a participant's recording has a mean fixation duration of >200 milliseconds, but if this mean is calculated on the basis of just a few seconds of partial recording with just a few fixations, then it does not represent the overall quality of the eye-tracking data during a recording. In Hvelplund (2011: 260), one discarded participant had mean fixation durations of 201, 235 and 314 milliseconds in three separate recordings, which is comfortably close to Rayner's (1998: 373) 225 milliseconds mean in silent reading. However, these means were calculated from very few fixations, which represented only 1.7 per cent, 0.9 per cent and 1.4 per cent of the total recording time, respectively. During 98.3 per cent, 99.1 per cent and 98.6 per cent of the respective recordings, no fixations were detected by the equipment. Relying on mean fixation duration alone, these three recordings would have been included in the analyses and could have distorted the analyses.

5.2. *Gaze time on screen*

In response to the issue of completeness, Gaze Time on Screen (GTS) has been used as a measure to further gauge the quality of eye-tracking data (Hvelplund 2011: 104; Sjørup 2013: 105ff). GTS is a simple calculation of total fixation duration as a percentage of total task time [(total fixation duration / total task time) * 100]. The score provides an indication of either how much time the participant spent looking at the screen, or the quality of the eye-tracking data. A high GTS score may indicate that the participant looked at the monitor for a considerable amount of time *or* that the eye tracker captured well the eye movements of the participant. A low GTS score may indicate that the participant only looked at the monitor for a limited amount of time *or* that the eye tracker did not capture well the eye movements of the participant. In a translation setting, we can expect that the translation task requires the participant to look at the monitor for a fair amount of time in order to read the ST (and most likely also the TT or parts of it), but there will obviously be instances during which the translator looks away from the monitor, for

instance, to monitor typing activities and to consult offline dictionaries, and the GTS score will very rarely be 100 per cent. In the example above with the very low percentages, the translator did in fact manage to translate three texts consisting of a total of 419 words. The three low percentages presented above constituted only around 11 seconds of total fixation time for all three texts. It is fairly reasonable to assume that there are problems with the quality of the eye-tracking data in this translator's recordings – and not so much that the participant managed to read 38 ST words per second. Despite this measure's advantage over the fixation duration measure, it has the overall disadvantage that the percentage reflects recording quality as well as the amount of time that the participant looked at the monitor. In other words, if the translator spends a considerable amount of time looking up words in dictionaries then the percentage will be correspondingly low – irrespective of the otherwise high quality of the eye-tracking data. To sum up, the researcher cannot be certain if a GTS percentage is the product of overall poor eye-tracking data quality or if the translator looked away from the monitor for substantial periods of time.

5.3. *Gaze sample to fixation percentage*

In response to the drawback of the GTS measure, a third measure has been used to gauge eye-tracking data quality. The gaze sample to fixation percentage (GSF) is based on the circumstance that saccades constitute between 5 and 15 per cent of all eye movements in reading. Ideally, a recording would reflect this ratio, in which roughly 85-95 per cent of a recording's gaze samples could be categorised as belonging to fixations and roughly 5-15 per cent would belong to saccades. The GSF percentage is calculated by comparing the total number of gaze samples with the total number of gaze samples that formed part of a fixation ([number of gaze samples / number of fixation gaze samples] * 100). For instance, in a recording containing 11,000 gaze samples, of which 10,000 belong to fixations, the GSF percentage is 90.9. In Hvelplund (2011: 259), around half of the GSF percentages of the study's 81 recordings were lower than 85 per cent and a lower threshold at 75 per cent was adopted for practical reasons: "[...] the quality of eye-tracking data is prone to be affected by external factors [...] irrespective of the efforts made to minimise them [...]" (Hvelplund 2011: 105). With a 75 per cent threshold, 11 recordings (13.8 per cent) were considered to be of low quality while 70 recordings were above threshold. Unlike the GTS measure, this measure does not presuppose that the participants spend the same relative amount of time looking at the monitor, and it therefore constitutes a better alternative to measuring eye-tracking

data quality. Its main drawback, however, is that the figures are not straight-forwardly accessible, and calculations have to be done on the recording's raw data, which may be potentially cumbersome and time-consuming.

Most eye tracking software provides mean fixation duration of a given recording at the press of a button. While obtaining the GSF percentage is a potentially labour-intensive process, some analysis software can be useful in determining a GTS percentage. Tobii Studio, for instance, automatically calculates how many gaze samples were correctly identified as belonging to fixations or saccades as a percentage of the total number of identification attempts made by the software. Combined, these three methods offer a robust tool to identify which recordings should be included in a study's analyses and which should not, due to data quality issues. Other methods to screen poor data from good data, for instance, one based on pupil size registrations, could be equally useful; the key point here is, however, that neglecting proper data screening may have a serious impact on the data analysis of a given study, and it could potentially distort a study's findings.

6. Summary and conclusion

The aim of this paper has been to highlight some of the relevant methodological issues when interpreting and analysing eye-tracking data from recordings of the translation process. It has also commented on relevant issues related to preparing data collection in the context of translation research.

Eye-tracking data can potentially be misrepresentative of actual cognitive processing if caution is not exercised when collecting it. In terms of the choice of eye tracker, remote eye trackers are generally better suited for translation research because they are less invasive than head-mounted and head-supported systems. With respect to interpreting eye-tracking data as manifestations of cognitive processing, the link from eye movement to cognitive processing is intuitively sound; however, there are issues that make the link less straightforward. Issues such as covert attention and mind wandering can potentially complicate interpretation, and the researcher should consider how these issues may affect the findings of a study and how the effect of these issues can be minimised. When collecting and analysing eye movement data, there is a host of confounding factors that are not necessarily linked to the translator's problem-solving activities during translation, and they could potentially distort the analyses of the recorded translations. Pupils, for instance, are sensitive to many factors, including changes in light intensity and the emotional state of the participant, and the researcher should aim at controlling for these potentially error-inducing factors when collecting the

data and also when analysing it. In addition, while measures of fixation and pupils are popular indicators of cognitive processing in translation research, other measures that are popular in other research disciplines might be useful to the study of translation processes.

Even if precautions have been taken during data collection, the quality of the eye-tracking data might still be poor and overall not reflect the translator's process. An important step in the analysis phase is, therefore, to discard low-quality data. While mean fixation duration is a reasonable indicator, other more powerful measures, such as gaze time on screen and fixation samples as a percentage of gaze samples, are recommended since they reflect the quality of the data in more detail. Careful attention to the complex interplay of factors that are inherent to translation research using eye tracking before, during and after the data collection will help increase the reliability and generalisability of the findings of an analysis.

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BIONOTE / NOTA BIOGRÁFICA

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EFFICACY OF SCREEN RECORDING IN THE OTHER-REVISION OF TRANSLATIONS: EPISODIC MEMORY AND EVENT MODELS

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Abstract

In a 2011 study, Angelone compared the self-revision results of graduate German translation students. Participants documented their original translations using Integrated Problem and Decision Reporting (IPDR) logs (Gile 2004), think-aloud protocols and screen recordings. They then used this documentation to assist self-revision of their translations. Angelone found a significant improvement in error detection overall and in each of six discrete error categories when participants used screen recordings to assist their self-revision. We sought to partially replicate Angelone's findings concerning the efficacy of screen recording in translation revision. Instead of focusing on self-revision, we studied other-revision and broadened our scope to examine the behavior of graduate students in both Spanish and German translation. We hypothesized that error analysis overall would show that screen recording would again prove to be a more efficacious process protocol in support of revision than IPDR logs, as was the case in Angelone's study. We also hypothesized that we would replicate his findings for each of the six error categories. The results partially confirmed Angelone's results: screen recordings were significantly more efficacious than IPDR logs in overall error mitigation.

Resumen

En un estudio de 2011, Angelone comparó los resultados de auto-revisión de estu-
diantes graduados de traducción alemán-inglés. Los participantes documentaron sus
traducciones originales mediante registros integrados de problemas y decisiones (IP-
DR, por sus siglas en inglés; Gile 2004), protocolos de pensamiento en voz alta, y
grabaciones de pantalla. Después utilizaron esta documentación para facilitar la auto-
revisión de sus traducciones. Angelone encontró una mejora significativa general en
la detección de errores y, en particular, en seis categorías específicas de errores cuando
los participantes utilizaron las grabaciones de pantalla para sustentar su auto-revisión.
En este estudio intentamos replicar parcialmente los resultados de Angelone con res-
pecto a la eficacia de las grabaciones de pantalla para revisar traducciones. En lugar de
centrarnos en la auto-revisión, estudiamos la revisión de traducciones ajenas. Según
nuestra hipótesis de partida, el análisis de errores en general mostraría que las gra-
baciones de pantalla resultarían ser de nuevo un protocolo de proceso más eficaz en
apoyo de la revisión que los registros IPDR, como en el estudio de Angelone. Otra hi-
pótesis consistía en que replicaríamos sus resultados en cada una de las seis categorías
de errores. Los resultados confirmaron parcialmente los obtenidos por Angelone: las
grabaciones de pantalla fueron significativamente más eficaces que los registros IPDR
en la mitigación general de errores.

Keywords: Translation revision. Integrated Problem and Decision Reporting. Screen
recording. Episodic memory. Event segmentation theory.

Palabras clave: Revisión en traducción. Registros integrados de problemas y decisio-
nes. Grabación de pantalla. Memoria episódica. Teoría de la segmentación de eventos.

1. Introduction: Efficacy of screen recording in self-revision

Revision processes in translation are, according to Künzli (2007: 115), a "distinct and hitherto often neglected component of the overall process of producing translations." Increasingly, scholars are turning their attention to the nature of translation revision, focusing on where and how it occurs and the role it plays in the overall translation process. For instance, a recent study by Massey, Ehrensberger-Dow & Hunziker Heeb (2013) seems to show significant differences in revision behavior between professionals and students and questions some assumptions about where revision primarily occurs, in the drafting phase or the post-drafting phase. The authors' results suggest that "revisions are actually a more prominent feature of what has been termed the drafting phase than of the post-drafting phase." Carl, Dragsted & Jakobsen (2010: 8) similarly found a "clear preference among the translators for allocating more time to the drafting phase than to the end revision phase." While it is not our intent here to review the literature on revision, it is clear that the discipline has increasingly turned its attention to translation revision processes.

There are pedagogical implications to translation revision research. Clearly, if revision processes play a critical role in producing accurate and acceptable target texts, then we should expose students to revision as a discrete topic during their training, the same way we expose them to translation strategies, for instance. As Erik Angelone (2013: 1) argues, recent advances in translation research technology and method (eye tracking, keystroke logging, screen recording) can be harnessed to foster the student translator's "cognizance of how one translates," including helping them understand the nature of revision. Modern translation pedagogy is increasingly "process aware;" this means that pedagogical methods, activities and objectives should reflect clear, empirically-based understandings of the cognitive bases of translation. Kiraly (1995: 11) was one of the first advocates of a translation curriculum "based on a theoretically adequate description of translation behavior."

Thus, research studies such as the one described here and Angelone's 2011 study, aim directly at serving process-oriented translation pedagogy.

The studies use process research to explicate self- and other-revision but, in the form of learning activities, they also foster reflection and self-awareness in students of the problems they encounter and the quality of the solutions they generate. Revision research is quite useful pedagogically because it sheds light on issues central to the development of expertise: improved problem recognition and resolution, error recognition and correction processes, and monitoring / control processes (see Shreve 2006).

In his 2011 study, Angelone compared the self-revision results of graduate German translation students employing three different translation "process protocols," defined here as student-generated documentation of readily observable problems and problem-solving behaviors. In conjunction with a total of nine translation tasks, participants created one of the following three protocol types: (1) an Integrated Problem and Decision Report log (IPDR; see Gile 2004); (2) a think-aloud protocol (TAP); or (3) a screen recording (SR). Three protocols were created for each type. Students were given the opportunity to utilize these process protocols as a point of departure in making any desired revisions before submitting their translations for error encoding. In other words, the protocols were utilized as revision tools for recognizing and addressing problems. Angelone evaluated the resulting translations for errors in six categories (punctuation, spelling, lexis, syntax, style, mistranslation) and tabulated the overall number of errors in the translation as well as the number of errors in each error category in relation to process protocol type used for purposes of revision.

Angelone (2013: 267) found a significant improvement in error mitigation during the revision phase when participants used screen recording to assist self-revision. By *error mitigation* we mean that participants, through application of the respective process protocol, recognized and corrected errors they had overlooked during initial translation task completion. Screen recording proved to be the most effective support for mitigation across all error categories, from smaller, more granular errors (punctuation, spelling) to larger, more textual ones (style).

Angelone's finding about the efficacy of screen recording raised some interesting questions. First, would screen recording also be more efficacious if it were employed to assist other-revision? Second, if that were to be the case, what is a possible cognitive explanation for these results: how and why does screen recording improve error mitigation in both other- and self-revision?

2. Efficacy of screen recording in other-revision: Study and method

To answer the first question, we conducted a small study in October 2012 to see if we could (at least partially) replicate Angelone's results. In our study, graduate Spanish and German translation students translated a set of two experimental texts under two process protocol conditions: IPDR documentation, and SR documentation. In other words, they created an IPDR log in conjunction with one translation task and a screen recording in conjunction with the other. Think-aloud protocols were not used in this study. The decision to compare only two protocol types was reached in order to simplify the study and can be justified by the fact that the TAP and IPDR results in Angelone's original study were similar insofar as error frequency ranges were concerned. While there were some differences, both methods performed at about the same level relative to SR recordings.[1] Thus, if, in our study, SR outperformed IPDR, then it would also most likely have outperformed TAP.

Our study transpired over the course of two sessions. After an initial translation session, participants took part in a second session where they revised the translations of fellow translators using the IPDR and SR protocol documentation captured during the original translation. Our first hypothesis was that screen recording would be more efficacious in support of other-revision than IPDR documentation, in line with the result in Angelone's study of self-revision. Our second hypothesis was that screen recording would be more efficacious in support of revision than IPDR documentation in each error category, as was the result in Angelone's preceding study.

2.1. Participants

A total of twelve participants took part in the study. Six were students in the Spanish track of our Master's program, four were students in the German track of the program, and two were recent graduates of the Spanish track with less than three years of professional translation experience. Among the eight participants in or from the Spanish track, four were English L1. Among the four participants in the German track, two were English L1.

Of the twelve participants, five had received formal training in editing their own translations, and six had received formal training in the editing of translations produced by others. Four of the participants had professional

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1. For example, when using TAPs as a framework protocol for revisions, mistranslation errors tended to go unnoticed more frequently than when IPDR logs were used, but this frequency of occurrence differentiation was minimal, particularly in relation to the significantly lower frequencies when screen recordings were used.

experience in editing. Although six of the participants in this study had some level of professional translation and/or editing experience, we primarily wanted to explore the relative efficacy of the respective diagnostic tools when used by students of translation and therefore did not look for an expertise effect in the study.

None of the participants had prior experience in other-revision of translations using IPDR logs or screen recordings as process protocols. Both approaches were briefly explained and modeled for the participants at the outset of the follow-up revision task.

2.2. *Materials and procedures*

Data were collected over the course of two related sessions. Four texts were selected in German and four in Spanish from short travel brochures (approx. 80 words each). During the first session, all twelve participants translated two of the texts from either Spanish or German into English. They were instructed that the translations should target English-speaking tourists visiting the various destinations depicted in the brochures, and that the purpose of the translations would be to present the destinations in an attractive light. The tasks were carried out on a laptop computer, and students had access to online resources during task completion. Although the translation tasks were not timed, participants spent approximately forty-five minutes on each of their two translations.

During the first of the two translations, participants were asked to create an IPDR log, documenting the following information in a columned format: (1) problems, as encountered in the ST; (2) a brief description of the nature of the problems; (3) a brief discussion of the decision-making and strategies utilized in addressing the problems; and (4) solutions, as they appeared in the TT. As in Angelone's study, participants needed to temporarily break away from the task at hand to enter this content since log documentation and translation proceeded concurrently. Minimum or maximum IPDR entries were not stipulated, and participants created the log using an MS Word document template provided by the researchers.

For the second of the two translations, a screen recording documenting all on-screen activity that took place during task completion was captured using the Blueberry Flashback Express software application. The default "full screen" setting was used for recording purposes. No audio data were collected. Participants were informed that the application would be running in the background as they worked. Researchers started recording at the onset of the translation task and stopped recording upon task completion. Other than

that, researchers were not present while participants completed the tasks. After the students finished the translations, all files (two translations, one log, and one screen recording for each participant) were saved.

The second phase of this study took place one week after the first (translation) session ended. During the second session, participants were asked to revise two translations created by another participant in the study. As was the case with the translations, the two revision sessions were not timed. However, participants spent approximately thirty minutes in each session. Revisions were made directly in the MS Word files containing the translations. Participants were instructed to use the process protocol created during the translation (either a log or a screen recording) as a tool for recognizing and fixing any errors in the translation. They were instructed to correct any errors they found in the translation, including any that were not explicitly documented or indicated in the accompanying process protocol. Before revision commenced, the researchers gave the participants an idea of what to look for in the screen recordings as potential indicators of problems that might warrant double-checking in the corresponding translations (extended pauses in screen activity, look-ups/information retrieval, and concurrent revision activity).

The texts to be translated and revised as well as the documentation method used (SR vs. IPDR log) were counterbalanced across subjects according to the rotation specified in table 1. This rotation was used once for the four German participants and twice for the eight Spanish participants.

	Session I - Translate		Session II - Revise	
	Task 1	Task 2	Task 1	Task 2
Participant 1	Text A - SR	Text B - IPDR	Text C - IDPR	Text D - SR
Participant 2	Text C - IPDR	Text D - SR	Text A - SR	Text B - IPDR
Participant 3	Text C - SR	Text A - IPDR	Text D - IDPR	Text B - SR
Participant 4	Text D - IPDR	Text B - SR	Text C - SR	Text A - IPDR

Table 1. Rotation of texts and documentation methods.

During the revision sessions using the process protocols, participants were not bound to take a set approach. In other words, they were informed that they could first review the process protocol in its entirety and then go to the translation and make revisions; they could analyze the process protocol and make revisions synchronously; or they could make revisions and then review the process protocol for verification purposes afterwards.

Part.	Errors		%	PU error		SP error		LEX error		SYN error		STY error		MIS error	
Text	TT	RTT	Fixed	TT	RTT	TT	RTT	TT	RTT	TT	RTT	TT	RTT	TT	RTT
DE-IPDR															
1 (B)	10	6	40.0	1	1	1	1	2	1	0	0	1	1	5	2
2 (C)	10	7	30.0	1	1	0	0	1	0	0	0	1	0	7	6
3 (A)	2	1	50.0	0	0	0	0	2	1	0	0	0	0	0	0
4 (D)	3	3	00.0	0	0	0	0	0	0	0	0	0	0	3	3
DE-SR															
1 (A)	6	1	83.3	3	1	0	0	1	0	0	0	1	0	1	0
2 (D)	10	2	80.0	1	0	0	0	1	0	1	0	1	1	6	1
3 (C)	5	4	20.0	1	1	0	0	0	0	1	0	1	1	2	2
4 (B)	10	3	70.0	2	0	0	0	0	0	1	0	2	1	5	2
ES-IPDR															
1 (B)	4	4	00.0	0	0	0	0	1	1	0	0	1	1	2	2
2 (C)	12	8	33.3	0	0	0	0	6	3	0	0	0	0	6	5
3 (A)	10	8	20.0	1	1	1	0	2	2	0	0	1	1	5	4
4 (D)	8	5	37.5	0	0	1	0	2	1	0	0	2	1	3	3
5 (B)	15	8	46.7	1	0	0	0	4	3	2	0	3	2	5	3
6 (C)	12	7	41.7	0	0	0	0	3	2	1	0	0	0	8	5
7 (A)	9	7	22.2	0	0	0	0	3	3	1	1	3	1	2	2
8 (D)	12	8	33.3	1	0	0	0	1	1	0	0	3	1	7	6
ES-SR															
1 (A)	11	7	36.4	1	1	0	0	2	2	0	0	1	1	7	3
2 (D)	11	4	63.6	0	0	0	0	1	1	0	0	3	0	7	3
3 (C)	8	5	37.5	1	0	0	0	5	5	0	0	0	0	2	0
4 (B)	8	5	37.5	0	0	0	0	1	0	1	1	2	2	4	2
5 (A)	13	5	61.5	1	1	1	0	3	0	3	0	2	1	3	3
6 (D)	8	5	37.5	0	0	0	0	3	1	1	1	1	1	3	2
7 (C)	12	9	25.0	2	1	0	0	7	7	2	0	0	0	1	1
8 (B)	10	5	50.0	0	0	0	0	1	1	1	0	1	0	6	4

Table 2. Efficacy of IPDR logs and screen recordings in error mitigation (PU=Punctuation SP=Spell LEX=Lexical Error SYN = Syntax STY= Style MIS=Mistranslation).

Once the second phase was complete, all translations (TT) and their revised versions (RTT) were evaluated for errors. We used the same error categories employed in Angelone's original study: punctuation, spelling, lexis, syntax, style, and mistranslation. Overall error frequencies and error frequencies by type were calculated for the translated texts before other-revision and after other-revision. Lexis errors included such things as using the wrong term or word, collocation errors, and word form errors. Syntax errors included word order errors or errors in subject/verb agreement. Stylistic errors involved, for

example, problems in register and problems at the level of genre conventions. Finally, mistranslation errors comprised erroneous additions or omissions as well as apparent miscomprehension errors.

3. Results

The percentage of errors mitigated in the revised texts was calculated. Overall, the mean percentage of errors mitigated was 50.4% when the reviser had access to the translators' screen recordings and 29.6% when the reviser had access to the translators' logs. The raw data for each participant in each of the languages for each process protocol mode is given in table 2.

A 2×2 mixed analysis of variance (ANOVA) was performed with *process protocol* as a within-subjects independent variable with two levels (screen recording and IPDR log), and *language* as a between-subjects independent variable with two levels (German and Spanish). For the means, see table 3 and figure 1.
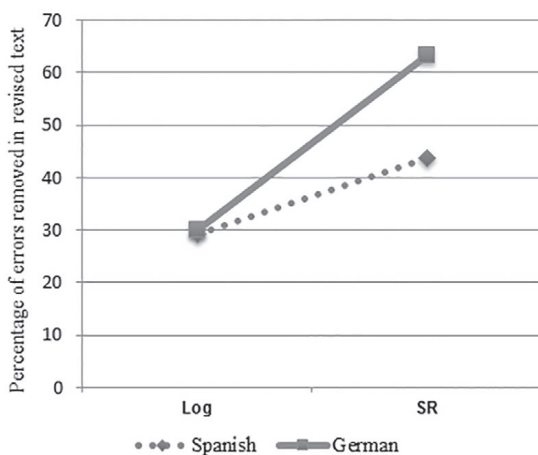
Figure 1. Analysis of variance results.

	Screen recording	IPDR log	Process protocol effect
Spanish	43.6	29.3	+14.3*
German	63.3	30.0	+33.3*
Combined	50.4	29.6	+20.8*

Table 3. Mean percentage of errors removed in the revised texts (statistically significant differences indicated by *).

The main effect of *process protocol* was significant, $F(1,10) = 8.506$, $p < .05$. Thus, the overall (German and Spanish together) percentage of errors remaining in the revised texts was significantly lower when the revisers had access to the translators' screen recordings than when they had access to the translators' IPDR logs.

The overall mean percentage of errors removed was 36.6% for the Spanish edited texts and 46.7% for the German revised texts. The main effect of *language* was not significant, $p > 0.05$. Thus, the overall (screen recording and IPDR log together) percentage of errors removed in the revised Spanish texts was not significantly different from the overall percentage of errors removed in the revised German texts. The interaction between *process protocol* and *language* was not significant, $p > 0.05$. This means that the main effect of *process protocol* was significant for both languages.

An analysis of the number of errors mitigated by the two process protocols shows that, overall, SR was most effective in reducing the frequency of errors. Out of a total of 107 TT errors, IPDR-supported revision only mitigated 35 errors, leaving 72 (32.7% mitigation). Screen recording, on the other hand, mitigated 56 out of 111 TT errors, leaving 55 (50.4% mitigation). Figure 2 graphically illustrates the overall efficacy of both process protocols. These findings confirm our first hypothesis, namely that SR would be more efficacious than IPDR protocols in overall error mitigation in other-revision.
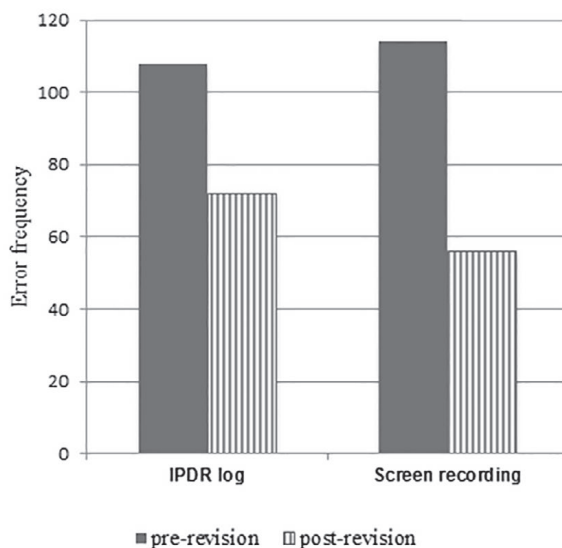
Figure 2. Overall error mitigation pre- and post-revision by process protocol.

However, our second hypothesis was only partially confirmed. If we examine the effect of the process protocol mode used during revision on the errors for each error category, our study demonstrated improved mitigation in only four of the six error categories. We see that screen recording is more effective in the mitigation of punctuation, spelling, syntax, and mistranslation errors, while it is nearly or just as effective as IPDR in the mitigation of errors in lexis and style (see figure 3).

To put these results in perspective (see table 4), one of the error categories did not have very many instances; the spelling error category only had 4 instances over the entire set of texts and only one of those instances (mitigated) was in the SR condition. Lexical, stylistic, and mistranslation errors were both present in high frequencies and reasonably balanced between the two conditions. This was purely fortuitous, because we could not control for the errors made in the TTs. The punctuation and syntactic categories were not balanced between the two conditions, although in both conditions SR mitigated a larger absolute number of errors. Thus, we hesitate to draw any strong conclusions about punctuation, spelling and syntax. The error counts for lexis, style, and mistranslation are robust and balanced. Of these, only mistranslation shows a large effect for the SR process protocol. Here, IPDR only mitigated 12 of 53 errors (23%), while SR mitigated 24 of 47 errors (51)%. This was by far the most dramatic result from our study and matches with a similar result for mistranslation in Angelone's study, where mistranslation also seemed to produce the most dramatic result.
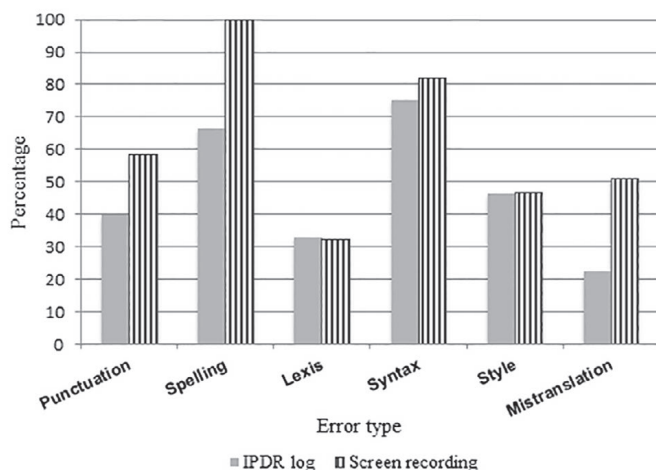
Figure 3. Error mitigation by error type and process protocol.

ERR	PU		SP		LEX		SYN		STY		MIS	
	TT	ETT	TT	ETT	TT	ETT	TT	ETT	TT	ETT	TT	ETT
IPDR	5	3	3	1	27	18	4	1	15	8	53	41
SR	12	5	1	0	25	17	11	2	15	8	47	23
TOT	17	8	4	1	52	35	15	3	30	16	100	64

Table 4. Error counts by error category.

4. Discussion

The results of our experiment indicated that, as in Angelone's 2011 study, screen recording is significantly more efficacious overall than IPDR logs in mitigating translation errors. We did not entirely duplicate Angelone's results for the individual error categories, and this may very well have to do with the nature of the sample, sample size, and lack of control over the total number of errors and errors within each process protocol set. A more robust data set may produce different results. The failure to duplicate the error category results may also have to do with the possible cognitive differences between other-revision and self-revision. Nevertheless, we did find some congruences: SR is still efficacious in mitigating very small, granular errors (punctuation) and certain more global ones (mistranslation).

How do we explain SR's apparent overall advantage in both self-revision, as in Angelone's study, and in other-revision? In his 2011 study, Angelone argued that the "guided" eye movements that occur when a self-editor views a screen recording make the locations of "areas of difficulty" originally encountered in the text more salient during the revision phase. Any problem indicators (pausing, revision activity, look-up activity) are brought to the reviser's attention and can be re-considered during the revision phase. Angelone remarked that the students' "visual attention is inherently drawn to problems as they unfold in real-time." We agree that, when compared to IPDRs (and TAPs, as in the original study), SRs simply provide more detail to use in bringing the reviser's attention to areas of difficulty. Not only that, they provide that detail in a temporal sequence and in their full "event context." We will return to the notions of event and event context again.

In self-revision, one obvious additional explanation for SR's advantage has to do with the nature of episodic memory. Episodic memory is a type of long-term memory that involves the recollection of specific events, situations, and experiences; it is the *capacity* to consciously remember personally experienced events and situations. Recall of past experience can be enhanced when

information available during encoding is also present at retrieval. Tulving & Thomson (1973: 359) called this the "encoding specificity principle."

One could make the case that the use of any sufficiently detailed process protocol mode makes such information available. TAPs, IPDR logs, and SRs all have the possibility of providing important cues that trigger recall and enhance retrieval from episodic memory. Screen recordings, arguably, simply provide a much richer set of detailed cuing information than either TAPs or IPDR logs. Indeed, in Angelone's original results, where screen recording was more effective in mitigating smaller granular errors than IPDR, he remarked that "it almost seems as if students preferred documenting 'bigger issues'" when using IPDRs. There were fewer entries regarding punctuation, spelling, and lexis overall. Participants in his studies used their IPDR logs primarily to document syntactic and stylistic issues. That pattern seems to have been repeated in our study.

Indeed, the issue that arises here is one of filtering. IPDR logs (and, indeed, even TAPs) are "active" logging protocols; that is to say they require the translator to, as Angelone says, "break away from the task at hand." This breaking away probably not only pulls the participant's attention away from the ongoing activity of the translation, but also engages a selection mechanism. The participant has to decide which events to document. Smaller, more frequent events will not be selected for logging in favor of more striking or unusual problem events. Screen recordings, on the other hand, are "passive" logging protocols; by their very nature they capture all activity without having to break away from the task or engage a selection mechanism. One might argue that passive logging produces too much detail, e.g., produces as much cuing noise as it does relevant cuing data. With a more active logging protocol the participant benefits, one could argue, from a mechanism that "selects" what is important to pay attention to, that is, directs the focus of attention. We argue that screen recording, although it is a passive logging procedure, does, in fact produce little noise and is quite effective in providing the participant (other-reviser, self-reviser) with a rich set of relevant cues. It does this by effectively cuing the structured recognition of events.

The richness of the cues generated by screen recordings raises two questions. First, in what important way is a screen recording richer than a TAP or an IPDR log? We know that screen recordings contain more visual information than either TAPs or IPDR and they are not subject to the filtering effects of the other two protocols. They are, in some ways, more natural, more like re-living the event. Maybe re-experiencing the event helps participants retrieve important information about what problems they were solving, what

difficulties they were having in generating solutions, and, indeed what they were attempting to accomplish in their translations. The second issue proceeds from the first. If an SR is more like "re-living the event," how can we explain its efficacy in other-revision? We can't find an explanation for the efficacy of screen recording in the greater richness and naturalness of cuing information in the SR log, because we are not cuing the episodic memory and improving the recall of the original translator.

Event segmentation theory (EST) can help provide an answer to that question (Zacks et al. 2007: 273). According to this theory, human beings naturally and spontaneously segment the ongoing continuous activities that occur around them. These segments or events are demarcated along "event boundaries" constructed from "breaks" (perceptions of changes in motion, frequency, or the composition of objects and their backgrounds). As part of normal perceptual processing, the brain chunks reality into meaningful segments; the chunking plays an essential role in attention, control, and episodic memory encoding (Zacks & Sargent 2010: 8).

Event segmentation is always active in working memory, creating representations of "what is happening now" (Zacks 2010). The basic assumption of EST is that these representations of events exist in working memory because they improve our perception of what is happening and our ability to predict what comes next. One can think of an event representation as a transient model that represents the activity currently being perceived. The model is stable and remains in effect, accommodating minor fluctuations in the perceptual input. However if unexpected or unpredicted change occurs, then so-called "prediction error" increases. The locus where change occurs and the predictive ability of the event model decreases is the so-called event boundary (Zacks 2010). A new event model arises to account for the new stream of experience.

Event segmentation affects how information about experience is encoded into episodic long-term memory. According to Newston (1976), event boundaries are anchors in long-term memory and any experiential information encoded at event boundaries is remembered better. In a variety of empirical studies, event boundaries have been shown to be associated with increased recall of events (Newston & Engquist 1976; Schwan & Garsoffky 2004; Ginsburg & Smith 1993). So episodic memory is indeed not just about remembering everything that we have experienced, it is a memory of events whose structure is related to the event models and event boundaries used to encode it.

The notion of event models as a mechanism may explain why screen recording is efficacious in both self- and other-revision. In self-revision, the screen recording helps the user "recreate" the events of the past and retrieve from memory the details of the event boundaries (translation activity pauses, periods of text production activity, reference-related internet lookups, text revision activity, and so on). Unlike TAPs and IPDR logs, it allows unprecedented access to the discrete "event structure" of the activity that occurs in an application such as MS Word and also provides that same information about searching activity on the Internet, and activity involving translation memories and terminology managers. These applications are used concurrently with the main translation activity in the word processor and provide important contextual information about the cognitive processing of the translator. Not only does screen recording provide us with an "event stream" within each application, it allows us to see how the discrete application-oriented activities intersect with one another in real-time; at each intersection, arguably, there is a context change, an "event boundary" that can be perceived by a viewer and become a focus of attention in the attempt to reconstruct the translation problem-solving activity of the original translator. Screen recording provides, as we have argued, very granular detail; every action is recorded. It not only allows a reconstruction of the stream of events and makes explicit both intra- and inter-application event boundaries (e.g., the transition between comprehension, initial text production, and revision), but also provides the original temporal data (e.g., the specific sequence of activities and real-time preservation of durations and pauses). Screen recording provides an almost "cinematic" narrative flow to the activity that occurs within and between applications.

There has been some empirical work on the role of "logging methods" in improving recall. Sellen et al. (2007: 82) argued that logging methods that provided rich detail (they used a wearable SenseCam that passively stored images) enhance "the *recollection of specific details of recent past events* (remembering what one perceived or felt at the time of an event)." Based on Cangiano's notion of "reinstating context", we claim that the same rich detail and re-enactment of past events provided by detailed logging or process protocol methods also produces a benefit when such logs are viewed by others:

> From the theoretical perspective of EST […] we can think of *reinstating context* really as an act of "re-perceiving." In other words, perceiving again the same structural and temporal relations used to guide attention and memory during the original performance of the activity. (Cangiano 2011: 22).

In other-revision, the screen recording allows the other-reviser to *perceive the same events* that the original translator perceived. In their study of everyday activities in a law office, Cangiano & Hollan (2009: 946) argue that "if we are to move towards understanding and supporting real activities, what is needed is access to episodic views of activity within and across applications and resources." If we provide that access to another, instead of the person who lived the activity, what occurs? We suggest that by reinstating a past context (e.g., the entire event stream of another's previous activity) we allow the *other* (translator, reviser, etc.) to use that event stream to create a context for interpreting the results they are revising. As Zacks & Sargent (2010) remark, "[e]vent models combine current perceptual information with information acquired very recently in the present context, and with patterns of information learned over a lifetime of experience" (Zacks & Sargent 2010: 4). These long-term patterns of information are the accretions of "commonly activated event models," what Zacks & Sargent (2010: 14) call "event schemata" in long-term memory.

Let us assume that the activity performed by people who share a task domain will, at least in its gross aspects, resemble the activities of others who have performed this same activity in similar contexts. The apparent advantage of screen recording in other-translation is still based on episodic memory, but what we are recalling or remembering are our own *similar* or *analogous* activities, filtered through our own event schemata, triggered by the observation of the recorded event stream produced by a colleague who practices in the same task domain as we do.

This advantage would most likely disappear if the screen recordings were shown to individuals, for instance in this case, who were not translators. Their past activities do not include translation; they therefore have not accreted event schemata about translation. They cannot use the events they see in a screen recording to trigger recognition of the nature and importance of the events. Mind you, such non-practitioners may still parse the event stream and recognize events (e.g., someone is doing word processing; someone is doing a Google search) because they *do have* schemata for these more general events. But their observation of a screen recording will not trigger any information about the translation-relevance of the events they perceive. If this is the case, we should see a strong expertise effect in the efficacy of screen recordings in both self- and other-revising.

5. Conclusion

Clearly, the research that Angelone began, and that we have pursued, is in its infancy, and there are many open questions. For instance, keystroke logs and eye-tracking methods are finely detailed and also passive recording systems. They have some of the same characteristics as SRs. However, will they, can they, allow editors to reinstate context and interpret the event structure of a past translation activity as effectively as screen recording? Or is screen recording's exact and natural presentation of the past the key?

Also, our results in specific error categories showed some differences in the efficacy of SR when used for self-revision and other-revision. Future studies might use a larger, more balanced data set to determine whether there are cognitive differences between self- and other-revision (for instance, the specificity that derives from recalling one's *own* memories) that could explain this variation in results. It might also be useful to compare self- and other-revision directly within the same experiment, manipulating experimental factors to give a better idea about where these two forms of editing converge and where they diverge. Is screen recording in self-revision more efficacious than in other-revision, and is the result time sensitive? If we conduct a self-revision session immediately post-translation, a week after, a month after, will we then see a decline in efficacy, reflecting an increasing dependence on the event schemata for recognition rather than recall and remembering?

Finally, an important future line of investigation would be to explore the interaction of expertise and using process protocols for support during self- and other-revision. For instance, does the efficacy of screen recording (or indeed of any process-protocol) remain "stable" during the development of expertise, or does it increase or decline? In other words, are such protocols of greatest "effect" for self-revision earlier in one's professional career, with benefits tapering off as expertise increases? If there is greater benefit in early career, then this argues primarily for the pedagogical value of using process protocols. In novices and early career translators such as our participants, it may be that the efficacy of screen recording in self-revision is partially correlated with the fact that the absolute number of errors in all categories after the initial translation is completed is relatively large. There are many more errors (of all six categories) to be mitigated. Fewer errors are revised concurrently, either before or soon after the translated segment is exited, or before the initial translation session ends (for example, when a translator returns to an earlier segment after translating subsequent segments). Awareness of error *during* the task is less developed because that aspect of translation metacognition is less developed. If experts, as one would expect, commit fewer errors in the

first place, and those errors they do make are corrected before the translation session ends, then the efficacy of screen recording in self-revision will be less dramatic in absolute terms. We will see a drop-off in the utility of the protocol as a method to assist self-revision.

On the other hand, the efficacy of screen recording for other-revision should show a dramatic expertise effect since it depends, we would argue, on the strength of event schemata for translation. We contend that the formation and application of such schemata are a part of task awareness, and an important aspect of metacognition. Thus, the more expert the translator, the more he or she would "recognize" the import of the screen activity being viewed. The more developed the translation expertise, the more the reviser could extract from the recording. However, it would remain an open question, perhaps one for experimental investigation, as to whether an expert using a screen protocol to other-revise would significantly out-perform another expert simply reading and other-revising the translation without support. In other words, is the expertise itself the primary key to success in other-revising?

Angelone's original study was undertaken in the context of translation pedagogy. He wanted to explore ways to assist students in understanding "how one translates" (Angelone 2013: 1). By using process protocols as a support during self-revision, particularly screen recordings, he argued one could effectively engage and direct students' self-reflection on their own translation processes. The process protocols become a device to spur the development of metacognitive awareness of the translation task. Our study indicates that screen recording is equally beneficial in helping students understand the processes of others. So, from a pedagogical perspective the technique has merit for both self- and other-revision. It is not clear if the findings of these studies have practical application in the workplace, e.g., as part of editing practice. The effort and time involved in obtaining recordings and then using them during editing would probably not be outweighed by the expected benefits from error reduction.

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BIONOTES / NOTAS BIOGRÁFICAS

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THE IMPACT OF TRANSLATORS' IDEOLOGY ON THE TRANSLATION PROCESS: A REACTION TIME EXPERIMENT

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Abstract

This paper presents an experiment designed to measure the influence that a translator's political stance may exert on the time needed to find a translation solution when working with ideologically loaded concepts. To this purpose, a reaction time experiment (with positive and negative prompting conditions) was designed to evaluate whether words and expressions that are contrary to the translator's ideology may slow down the translation process, making translators take longer to find an adequate translation. Our hypothesis predicted that the reaction time of translators would be bigger when the English word was presented with a negative "prompt", that is, with a word they would feel contrary to their political views. Differences in reaction times between two groups of translators with different ideological viewpoints would provide empirical support for the claim that translators may be influenced by their ideological views. The results will contribute to increase translators' awareness of the impact that issues such as ideology and power may have on their work.

Resumen

Este trabajo presenta un experimento diseñado para medir la influencia que puede ejercer la postura política de un traductor sobre el tiempo que necesita para encontrar una solución de traducción cuando trabaja con conceptos con carga ideológica. Para ello, se diseñó un experimento de tiempo de reacción para determinar si palabras y

expresiones contrarias a la ideología del traductor pueden decelerar el proceso de traducción, originando que el traductor tarde más en encontrar una solución adecuada. Nuestra hipótesis predecía que el tiempo de reacción de los traductores sería mayor cuando la palabra inglesa se presentara con un estímulo negativo, esto es, con una palabra contraria a sus convicciones políticas. Las diferencias en los tiempos de reaccción de dos grupos de traductores con perspectivas políticas dispares sustentaría empíricamente que los traductores pueden dejarse influir por su ideología. Los resultados pueden contribuir a profundizar la conciencia de los traductores del impacto de factores como la ideología y el poder en su trabajo.

1. Defining the object of study: What do we understand by *ideology?*

Ideology is indeed a most elusive concept. As in the case of the term *equivalence,* it is an everyday concept familiar to most laypeople, one of those terms that pervades our daily discussions but escapes an easy definition. Every ordinary citizen will probably recognize the term and be happy to use it without a hint of hesitation. But when asked what they really understand by *ideology,* they will most likely provide very different answers. Some may relate it to their political stance; others may use it to define their value-systems and worldviews; a few others may find it fervently tied up with their religious beliefs. The term is associated to sets of beliefs, assumptions, and values and this makes it, indeed, highly controversial.

At the time the term was first used by Count Destutt de Tracy, during the French Revolution, it adhered to the positive view of a new rationalist "science of ideas" which aimed to improve the living conditions of the population. However, from the 19th century onwards, social change did not quite evolve as planned and the term *ideology* started to acquire a sense of illusion and false consciousness, often associated with theoreticians who were out of touch with reality and fixed in their own dogmatic views. The term has ever since remained controversial despite the existence of contemporary uses that convey more neutral and scientific senses conveniently codified in intangible labels such as *culture, worldview* or *mentalité* (cf. Fawcett & Munday 2011: 137). Unfortunately, once a negative image of a concept is formed, it is extremely hard to get rid of and a tone of disapproval has prevailed even in the most neutral senses of the term. On most occasions, the voice of the person using the term is accompanied by a ring of accusation that depends on the angle we look at things.

Apart from these controversial undertones associated with *ideology,* scholars from any discipline still have to solve the problem of defining the scope of the term. In translation, this problem becomes even more intricate due to the complexity of the task and the variety of factors and participants involved. The range of translation decisions that can be explained in terms of some sort of ideological intervention is not limited to the strategies adopted by the

translator. The decisions of other participants, such as editors or commission-ers, may also be ideologically biased, exerting a positive or negative influence on the image and impact of a translation in its target culture. One way to solve the problem is to provide a working definition specifically coined for the aims of each research project. By positing their own terminology and model, scholars can frame the notion of ideology in a more precise way, selecting the phenomena involved and discarding unwanted connotations.

In this article, we report on our attempt to measure the influence of the translator's ideology upon the time they need to find a translation. To this purpose, we provide a working definition of ideology to meet the specific requirements of our experimental design. We identified the translator's ideol-ogy by their position on a two-dimensional spectrum based on the correlation between their political views (towards the economic right or towards the left) and their social attitude (more or less authoritarian vs more or less libertar-ian). In very broad terms, translators are thus placed on the most right-wing and conservative part of the spectrum or on the most left-wing and liberal part. For the purposes of our research, each part is defined by a certain set of ideals and principles that explain how society should work in terms of a number of leading topics on most political agendas. Thus, right-wingers and conservatives are taken to support social order and traditional family and religious values; in general, they are often also seen as opposing abortion, sexual promiscuity, euthanasia, homosexuality, and illegal immigration. A large majority of right-wingers are also assumed to favor the death penalty for heinous crimes. On the contrary, left-wingers and liberals are often believed to support social change to create a more egalitarian society and also to favor, e.g., racial equality and open immigration, the right of women to choose abor-tion, the legal recognition of same-sex marriage, the abolition of the death penalty and the free distribution of contraceptives.

This ideological characterization is beyond any doubt an oversimplifica-tion of most people's social principles and moral beliefs. Our daily experience provides us with countless examples of individuals who adhere to some of these principles but not to others. There may be, for instance, right-wingers who support equal rights for homosexuals and left-wingers who oppose abor-tion for religious reasons; there may be conservatives who oppose the death penalty and open-minded people who may be against open immigration. Most people's ideological stance is far more complex than simple dichoto-mous thinking and it does not usually fit in political stereotypes and social typecasting. It is, therefore, important to bear in mind that, in our experiment, the above characterizations were used only as operational sets of parameters

applied to select a range of issues that might contribute to establish a difference between the ideological stance of the informants.

2. Ideology in translation studies: Filling the empirical gap

Providing a precise picture of the role ideology has played in translation studies is also a thorny enterprise. Most of the studies on ideology have focused on exploring the essence and expression of ideological intervention in translation. The interest of translation studies in ideology has been shaped by the evolution of the discipline. The growing relevance and awareness of ideological aspects has been linked to the shift of the focus of research from the micro level of isolated linguistic units to the macro level of the socio-cultural context in which the translation act takes place. The "cultural turn" which translation studies experienced in the 1990s enforced the definite move from translation as text to translation as culture and politics (see Snell-Hornby 2006), placing ideological issues in the centre of the research agenda. Ideology has been since one of the key concerns of modern translation studies for the last two decades (Tymoczko 2003, 2007).

The interest of translation studies in ideology has been closely related to the relative power of the languages involved in translation acts. Since the first decade of the 21st century, much of the work carried out on ideology and power has focused on areas such as translation as rewriting, gender and translation, or translation and post-colonialism (see Baker 2010, Venuti 2000). The notion of "rewriting" (Lefevere 1992) relates the study of ideology to the way the source text and culture are manipulated or distorted when translating. From this perspective, the choices made during the translation process are assumed to be biased and the resulting translations are often seen as unavoidably partial representations of their source texts, thereby exerting a repressive or subversive impact on the target culture (see Fawcett & Munday 2011: 138). Gender-focus work in translation interprets ideological aspects in terms of the sociopolitical connections between gender and language. Gender has been used as a powerful analytical tool at two different levels: at a macro-level, translations are revised with the aim of showing the role women and gender minorities (gays, bisexuals, lesbians, transexuals) have played in a given literary tradition. At a micro-level, translations have been examined to illustrate their sensitivity to manifestations of gender and to reveal the endeavor of writers, translators and researchers for the power to interpret meaning (see von Flotow 2011: 123-5). Postcolonial approaches to translation link the study of ideology to the question of how differences in the power of languages influence translation practices. With a special focus on European colonialism, they often are particularly interested in

showing how translation might contribute to exposing and challenging coloni-
alism in a postcolonial era (see Hui 2011: 200).

All these cultural and ideological issues have occupied a prominent
position in translation studies in recent years, binding together a wide range
of case studies mostly centered on literary translation. Nevertheless, and
regardless of the specific research focus and the chosen approach, there has
been a general concern for an increasing "interventionism" on the part of
translators, a claim that requires greater awareness of the ideological values
that may influence their job. As a consequence, questions often associated to
ideology such as the translators' ethics, their relative position in the source
or target culture and the inherent subjectivity and bias of their own ideolog-
ical stance have also been placed in the centre of the research agenda. The
scholars' interest in these questions and the way power differentials convey
and frame ideology have resulted in an extensive number of publications on
ideology and translation (e.g., von Flotow 2000; Tymozcko & Gentzler 2002;
Calzada 2003; Cunico & Munday 2007).

Despite this abundance of studies and the claim for greater awareness of
ideological aspects, to date there exists no empirical attempt to measure the
influence of ideology on the translation process. The interesting question here
is how the translator's ideology may be reflected in the translation process,
even if expressed subconsciously (Munday 2007) and the fact that no study
has been designed yet to test this empirically. In this sense, the present study
aims to fill in such empirical gap by designing an experiment to measure the
impact that the translators' ideological agenda may have on their translation
processes in terms of the time needed to find an adequate translation.

3. The impact of ideology on the translation process: A reaction time experiment based on "priming"

As mentioned above, most of the work on ideology and translation has been
carried out in critical essays which may adopt a more literary or linguistic
point of view, but which tend to be far from the experimental field. Although
the empirical aim of the work reported here may break new ground, the
methods and instruments employed to measure the experimental variables
have been used before in translation research. This study took as its starting
point the work by Stamenov, Gerganov & Popivanov (2010) on the benefits
that the prompting technique may have on translating true and false cognates
and non-cognates. The work by Stamenov and his colleagues combined the
analysis of the participants' reaction times with their eye movements and
percentage of correct answers in two different conditions—with and without

prompting. The use of individual words as experimental stimuli facilitated the measurement of the participants' reaction times. By means of the moving window technique, a series of English words were projected on the screen of the eye tracker Tobii 1750 and participants were told to translate them into Bulgarian as quickly as possible. They first read the English word in the middle of the screen and 250 ms. later, the Bulgarian word appeared in the condition with prompt at about six degrees of visual angle above the English word. When the subjects thought they "knew" the translation, they pressed the *Enter* key and the screen went black so that they could type it. Once they had finished, they pressed *Enter* again to confirm it and signal the start of the next trial. Their results revealed no significant difference between the reaction times in the conditions with and without prompting, although prompting was shown to improve the translation in terms of percentage of correct answers.

The present study basically adheres to the methodology implemented by Stamenov, Gerganov & Popivanov (2010) as a suitable benchmark to design an experiment to measure reaction times when researching the impact that a given ideological stance may have on the translation process. However, our experiment differs from that by Stamenov and colleagues in a few methodological issues. One of the main differences is that we used priming, instead of prompting, as an experimental technique. As explained by Stamenov et al. (2010), prompting differs from priming mainly in terms of their purpose: while priming is mostly used in psycholinguistic tasks to study the mental lexicon and sentence processing, prompting is developed as a tool to optimize the work of the translator. In the authors' own words, prompting is "a procedure that exploits priming effects for the benefit of accelerated translation recognition" (p. 329). A more detailed description of our experimental design follows.

3.1. Aim and hypothesis

There is evidence that compatible distractors typically facilitate responses to targets whereas incompatible distractors interfere with them (Botella et al. 2002). On the basis of these reported results, we hypothesized that words with a valence contrary to the translator's ideology would hinder their decisions, making them take longer to find an adequate translation. On the contrary, words consistent with the translator's ideology were expected to facilitate their decisions, making them take less time to find an adequate translation.

3.2. Participants

Sixteen people initially volunteered to participate in the experiment (8 males and 8 females). Although the number of participants is low for statistical

analysis, the selection requirements of the experiment made it extremely hard to find suitable subjects. The translation task required at least high proficiency in English and Spanish, and the aim to explore ideological aspects demanded an ideological profile that the subjects were not always ready to reveal. For these reasons, we used a convenience sampling technique in which subjects were initially selected on the basis of their language proficiency as university teachers and/or their political affiliation and social attitudes. Selected participants were native speakers of Spanish with a high command of English. Fourteen of them had a degree in English or Translation and two had an advanced proficiency level of English accredited. At least five of them were affiliated to a political party. The rest of the participants were allocated into two different groups depending on their political views and social attitudes. To do so, the participants were asked to complete a political test available on the Web that allowed us to locate their position on a two-dimensional spectrum reporting on the correlation between the subjects' political views (economic right or left) and their social attitude (authoritarian or libertarian). Their position in relation to these two axes was defined in terms of some numerical coordinates, as in the example from one of our subjects shown in figure 1.

Economic Left / Right: -5.25
Social Authoritarianism / Anarchism: -5.44
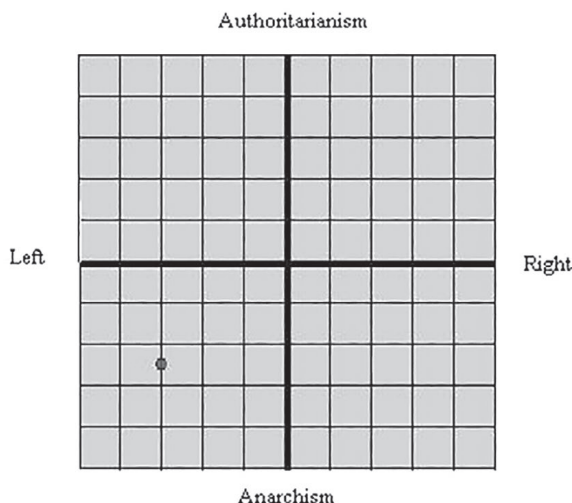
Figure 1. Example of the spectrum to report on the correlation between political views and social attitudes.

Quite surprisingly, all our subjects were located in the economic left and libertarian part of the spectrum (in the bottom left square of the diagram). For this reason, we selected the participants with the most extreme scores, i.e., those closest to either the top right or the bottom left corner of the bottom left square. The scoring scale ranged from 0 to ±10, and only participants scoring less than ±4 o more than ±6 were selected. Two participants were rejected because they scored between these thresholds. Of the remaining twelve, six were classified as left-wingers and more libertarian and seven were categorized as right-wingeers and more authoritarian. It is important to note that this classification coincided with each subject's own categorization as a right-winger or a left-winger, and as a more conservative and traditional citizen or more liberal and open-minded. One of the subjects in the conservative group was excluded later on, because she could not finish the experiment. We mention this case because the reasons for her to abandon the experiment support the hypothesis postulated in our work. As she explained to us, she had problems to translate most of the experimental stimuli because they were causing her an ideological conflict she did not know how to solve. She reported, for instance, that when translating the term "abortion", she felt "crime" would be the best description even if she knew it was not an adequate translation. At the end of this process, we were left with 6 participants in the "conservative" group and 6 in the "liberal" one. The age mean was 38.2 year-old (range 24 to 60 years).

3.3. Design and instrument

The program *E-Prime* was used to design a translation task based on a priming experiment with positive and negative priming conditions:

- The positive condition consisted in expressions primed by words that were potentially consistent with the subject's ideology
- The negative condition consisted in expressions primed by words that were potentially contrary to the subject's ideology

Inter-subject and an intra-subject comparisons were carried out to check not only whether there was a significant difference in the RTs obtained for each condition between both groups of subjects, but also whether each subject took longer to find a translation when the sentence was preceded by a prime contrary to their ideology.

3.4. Materials

Fourteen English expressions were selected as the experimental stimuli the participants had to translate into Spanish. All the expressions were related to issues for which right- and left-wingers are considered to hold opposite views. Seven topics were selected, namely abortion, contraception, sex, euthanasia, death penalty, gay marriage, and immigration. Two expressions were crafted for each of these topics: for example, *medical abortion* and *to end a pregnancy* were chosen for the topic of abortion. Compound expressions were favored in order to increase the translation challenge. Two Spanish primes were also selected to introduce the expressions in each topic. For each topic there was a prime that was thought to convey a positive valence for right-wingers and a negative one for left-wingers; and another prime with opposing valences, that is, a negative one for right-wingers and a positive one for left-wingers. For instance, the expressions tested for the topic of abortion were introduced by *crimen* ('crime') as a term with a positive valence for right-wingers and *libertad* ('freedom') as a term with a positive valence for left-wingers. Table 1 displays the list of topics, experimental stimuli and primes.

32 other different expressions (16 for each condition) were also designed to act as distracting stimuli and mask the aim of the experiment. These expressions related to topics that were assumed not to be controversial from an ideological point of view (see appendix).

3.5. Task and procedure

Participants were asked to translate a series of English expressions into Spanish. They were provided the following instructions regarding the procedure of the experiment:[1]

A series of English sentences will be displayed on the computer screen. Each sentence contains an expression you must translate into Spanish. Read each sentence carefully and press "Enter" on the keyboard when you have understood it. Then, a Spanish term will appear in the middle of the screen and immediately after, you will be shown the English expression that must be translated into Spanish. Press "Enter" again when you think you know its translation into Spanish and then type the solution. When you finish, press "Enter" once more to start the following trial. You have first a practice session to get used to the procedure before the real experiment starts.

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1. The participants received these instructions in Spanish.

Each trial session consisted of 32 stimuli: 16 distractors + 28 experimental—14 with a positive prime for right-wingers and 14 with a positive prime for left-wingers (see appendix). They were presented in random order. The trial started with a short practice, to allow subjects to get used to the mechanics of the experiment.

topic	stimuli	prime_r	prime_l
	end a pregnancy	crimen	libertad
abortion	*medical abortion*	*crimen*	*libertad*
contraception	morning-after pill	asesinato	emancipación
	emergency contraception	*asesinato*	*emancipación*
sex	male masturbation	pecado	natural
	sexual arousal	*pecado*	*natural*
euthanasia	assisted suicide	homicidio	elección
	physician aid-in dying	*homicidio*	*elección*
capital punishment	death sentence	justicia	asesinato
	long-drop	*justicia*	*asesinato*
gay marriage	same-sex marriage	anti-natural	derecho
	gay adoption	*anti-natural*	*derecho*
immigration	Arabic headscarf	invasión	derecho
	immigrant Muslims	*invasión*	*derecho*

Table 1. Topics, experimental stimuli and positive primes for rightists and leftists.

To allow an intra-subject comparison, subjects had to translate the same expression twice: once with a positive prime (that is, consistent with their ideology) and once with a negative prime (that is, inconsistent with their ideology). Although the experimental stimuli (the phrases) were the same for the two conditions, the sentences where they were embedded were slightly different in each condition to prevent the subjects from not reading the sentence carefully the second time they were presented with the same expression. In order to minimize order effects, half of the stimuli were presented first with a positive prime and then with a negative one whereas the other half was

shown in the opposite order (i.e., first with a negative prime and then with a positive one).

As in the work by Stamenov and his colleagues, the primes were presented in the participants' mother tongue. It was assumed that giving the primes to the participants in their native tongue (which was also the language they were translating into) increased the facilitating or impeding effect that the primes might have on the participants' ability to find a translation. However, the procedure we used to introduce the primes differed. While in Stamenov, Gerganov & Popivanov (2010) the prompt remained on the screen at about six degrees of visual angle above the word to be translated, in our experiment primes were introduced after the subject pressed the *Enter* key and appeared in the middle of the screen for about 1250 ms. Then they disappeared and were replaced by the expression to be translated. The reason for this change was the feedback from several subjects during a pilot trial. This pilot trial used the prompting technique designed by Stamenov and his colleagues, keeping the prompt on the screen above the expression to be translated, but the subjects declared that after a couple of examples, they completely ignored the prompt, and sometimes they even made a conscious effort not to look at it. We then decided to use an alternative method that would force them to read the prime, by displaying it on the screen before the experimental stimulus.

Figures 2 and 3 below exemplify step by step the experimental procedure for the two different contexts designed to translate the expression *medical abortion* with the two different primes (one with a conservative valence, and one with a liberal one). First, participants read a sentence in English that contained the expression they would have to translate later on in Spanish
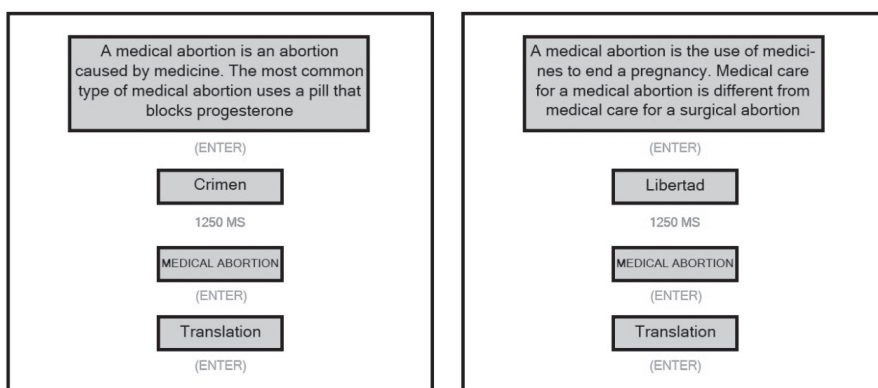
Figures 2 and 3. Examples of the experimental procedure with the two different contexts and primes designed for the same expression.

(*medical abortion,* in figures 2 and 3). Once they had understood the sentence, they had to press *Enter* and the Spanish prime would appear in the middle of the screen for about 1250 ms. Once the prime had disappeared automatically, the English expression to be translated appeared in capital letters on the screen. When they considered they knew the translation, they had to press *Enter* again and type the translation. Then, they would press *Enter* again to proceed to the next round.

3.6. Results

To calculate the participants' reaction times, we used the computer's timestamp of the moment the participants pressed *Enter* when they thought they knew the translation for the English expression they had to render into Spanish. In this way, we avoided individual differences in the typing speed of the participants as well as other problems related to the typing of the translation on the keyboard, such as deletions and rewritings that the program could not record, but which could have increased the final time the participant took to provide a translation.

One of the major problems we faced to analyze our data was related to the differences between the experimental stimuli. After all, we were dealing with the translation of expressions that, despite our efforts to homogenize them as much as possible, were still likely to differ as to the level of difficulty that they posed for the subjects (both in terms of understanding and reformulating). For this reason, instead of using raw reaction times to perform the statistical analysis, our results were standardized to make them more comparable. The mean reaction time was, therefore, calculated for each stimulus in order to compute the difference between this mean and the times of each participant (a positive number was obtained when they were slower than the mean, and a negative one when they were faster). Once we had established how much each participant deviated from the mean in every stimulus, we eliminated outliers that were more than two standard deviations from the mean. In this way, the differences between the stimuli were minimized, increasing the potential of the data for statistical comparison.

The descriptive statistical tests showed that our results followed, for the most part, a normal distribution. Table 2 shows that the tests of normality yielded acceptable results for both primes and ideological groups, with the only exception of the value obtained for the negative prime in the right-wing group ($< .05$).

Tests of Normality[b]

	Ideology	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Positive Prime	left-wing	,251	6	,200*	,906	6	,413
	right-wing	,260	6	,200*	,881	6	,273
Negative Prime	left-wing	,160	6	,200*	,934	6	,609
	right-wing	,290	6	,124	,744	6	,018

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

b. Version Exp = B

Table 2. Values for normality tests.

Nevertheless, the tests to check both the asymmetry and the kurtosis of the distribution yielded acceptable results for asymmetry, the anomalous values being only referred to kurtosis parameters. The test of homogeneity of variance displayed in table 3 also offered acceptable results for both positive and negative primes.

Test of Homogeneity of Variance[a]

		Levene Statistic	df1	df2	Sig.
Positive Prime	Based on Mean	2,160	1	10	,172
	Based on Median	1,849	1	10	,204
	Based on Median and with adjusted df	1,849	1	9,600	,205
	Based on trimmed mean	2,150	1	10	,173
Negative Prime	Based on Mean	3,876	1	10	,077
	Based on Median	3,391	1	10	,095
	Based on Median and with adjusted df	3,391	1	5,373	,121
	Based on trimmed mean	3,861	1	10	,078

a. Version Exp = B

Table 3. Values for homogeneity of variance.

The general asymmetry of the distribution is also illustrated in figure 4, which shows an acceptable symmetrical parting of the figures for both primes and ideological viewpoints.

As can be seen in table 4 below, a repeated measures ANOVA test showed a significant effect for type of prime ($F (1, 10) = 5.57$; $p < 0.05$). This result supports that reading a prime with a valence that agreed or disagreed with the ideological values of the participants had an impact on the time they took to find an adequate translation, regardless of the particular ideology they
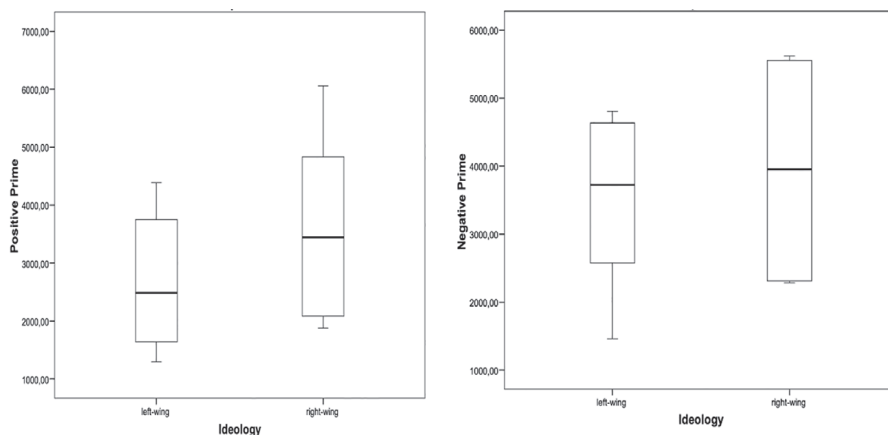
Figure 4. Results of tests of normality and homogeneity of variance.

subscribed to. The effect for the interaction between prime and ideology was not statistically significant (F (1, 11) = 3.99; p = 0.074), although a value of p = 0.07 shows a tendency towards statistical significance. This result suggests that, although we cannot definitely state that the effect of meeting a positive or a negative prime is different for each ideological group, there is certainly a tendency that points to the existence of differences. Let us here remember that both groups were actually the extreme right and extreme left subgroups within the +left, +anarchism area. We will return to this point below.

Tests of Within-Subjects Contrasts[b]

Measure: MEASURE_1

Source	prime	Type III Sum of Squares	df	Mean Square	F	Sig.	Noncent. Parameter	Observed Power[a]
prime	Linear	,059	1	,059	5,578	,040	5,578	,568
prime * Ideology	Linear	,042	1	,042	3,992	,074	3,992	,439
Error(prime)	Linear	,106	10	,011				

a. Computed using alpha = ,05

Table 4. Results for type of prime and for the intersection between prime and ideology.

This tendency becomes more obvious in figure 5, which clearly illustrates the different behavior of both groups (left-wingers represented by a dotted line and right-wingers by a continuous line) for each of the primes (positive =1, negative =2). The figure shows a patent difference in the way the most liberal group responded to a prime consistent with their ideology in comparison to
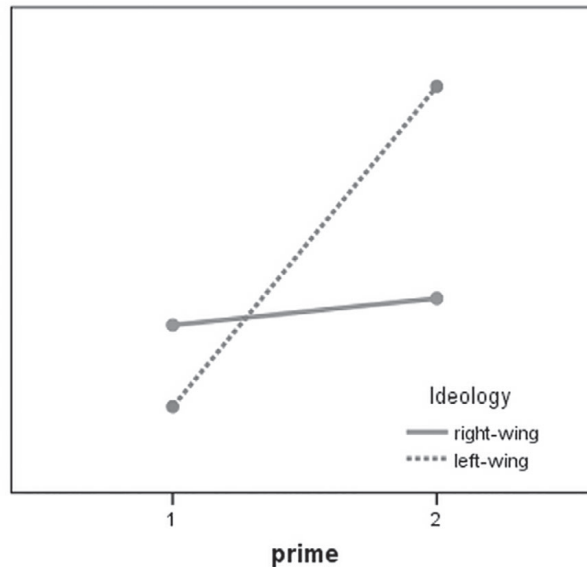
Figure 5. Effects for type of prime and ideological group.

their response when they read a prime opposing their ideological values. On the contrary, the most conservative group showed overall a more homogeneous behavior with both types of primes.[2] Although figure 5 seems to point to a general difference in time between the two groups, the results displayed in table 5 below reveal that ideology on its own was not found to have a significant effect on the subjects' reaction times (F $(1, 10)$ = 0.35; p = 0.85).

Tests of Between-Subjects Effects[b]

Measure: MEASURE_1
Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Noncent. Parameter	Observed Power[a]
Intercept	2,041	1	2,041	8,660	,015	8,660	,756
Ideology	,008	1	,008	,035	,855	,035	,053
Error	2,357	10	,236				

a. Computed using alpha = ,05

Table 5. Results for ideology.

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2. Reaction times are not displayed on the vertical axis of the diagram because results were based on standardized measures.

In fact, if the response of right-wingers and left-wingers to positive primes was quite similar, their reaction to negative primes was much more differentiated, which somehow neutralized the overall difference between the groups. This result is rather encouraging from the point of view of the translation profession since it indicates that the participants' ideological stance was not affecting the time they needed to provide a translation.

4. General discussion and conclusions

The results from our experiment corroborate the postulated hypothesis, and provide evidence that the type of prime exerts a significant influence on the time participants take to find a suitable translation. Words with a valence contrary to the participants' ideological viewpoint elicited longer reaction times than words that were consistent with their beliefs. This effect was found for all participants, independently of their ideological stance.

When we compared the effect that the type of prime had on each group of participants, we did not find a significant effect of the intersection between prime and ideology. However, the fact that our results were closer to statistical significance points to the existence of differences between the effect that different primes may have on each ideological group. Our data revealed that those participants with a more libertarian ideology were much faster when they read a word that was consistent with their beliefs than when they read one which was contrary to their ideological values. On the contrary, the participants with a more conservative ideology were also slightly slower when the word was contrary to their beliefs, but the difference with the positive prime condition was much smaller and did not reach statistical significance, showing a more homogeneous behavior with both types of primes.

A possible explanation for the different behavior of both groups may be found in the moderate attitude of our conservative subjects. As the results of the political test indicated, none of our participants could be classified as really authoritarian and conventional; in fact, most of them could not even be classified as radical right-wingers either. These results were more surprising if we take into account that some of our participants hold strong religious values and were affiliated to right-wing political parties. One could argue that the results of the political test were not reliable enough, but our inteaction with the subjects gave us further indication of the complexity of factors involved. Even those subjects who classified themselves as right-wingers showed a more tolerant attitude towards some of the topics involved in the design of the experiment. Some right-wingers, for instance, declared themselves in

favor of same-sex marriage and some had a permissive attitude towards sex and the use of contraceptives.

The global tendency of modern society towards a more libertarian and tolerant attitude could very well be one of the factors that interferes in our results. It is possible that our participants' reaction is affected by the political system and social practices of the country they live in. In Spain, nowadays, it is probably more shocking for a left-winger to hear that same-sex marriage is "anti-natural" than for a right-winger to hear it is a "right". There are besides a wide range of cultural factors that could also be playing a part in our results. For instance, even if Spain is a country currently governed by a right-wing party, our recent political history has been marked by shades of left. Living in a country where abortion and gay marriage are legal and where open immigration has become a constant in our daily life could be moderating our right-wingers' attitudes towards some of the topics included in the experiment. Unfortunately, this assumption is at this stage a mere speculation that would certainly need further thought and study.

In any case, and whether the effect reported in our experiment has or not a cultural basis, the fact is that the difference in the reaction times of subjects when confronted with words that agree or disagree with their ideological beliefs indicates that the translator's ideology may exert an influence on their job. Fortunately, this influence is not a compelling "a priori" force that drives the translator's job in a certain direction. Rather, our data suggest that the subjects' ideology does not exert per se a significant influence on the time they take to find a suitable translation. In other words, the fact that subjects have a certain ideological profile does not make them translate slower or faster. Only when subjects meet a word or expression that may challenge their ideological expectations do these expectations become a force that may exert an influence on their translations.

The results of our experiment suggest that this influence exists at least in terms of the time needed to provide an adequate translation. They also open interesting venues for future research on the topic. Further experiments could be designed to investigate the impact of ideology on production, exploring the translator's preferences for certain terms and stylistic choices. Additionally, the role translation expertise plays in controlling subjectivity would also be an appealing area for future experimental research. If expert translators are shown to control their subjectivity better than novices, this type of research could have pedagogical implications of practical use in translation training. Translation courses could be designed to teach students to control their

subjectivity, making them aware of the consequences that unrestrained ideological bias may have for their work.

If anything, the experiment suggested here could contribute to widening the spectrum of works on ideology and translation. Opening new ground for experimental research on ideological factors could certainly provide additional information on the impact these factors may have on cognitive translation processes. This type of experimental work would no doubt play a role in the diversification of research methods, adding to traditional empirical and theoretical work in the field.

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Appendix

EXPERIMENTAL STIMULI

SENTENCE	PRIME	*EXPRESSIONS*
One of the most important public policy debates today surrounds the issues of euthanasia and assisted suicide.	**homicidio**	*assisted suicide*
Not many people sit on the fence on the issue of euthanasia or assisted suicide—most have fairly strong beliefs that they're either morally right or morally wrong.	**elección**	
Iran Imposes Death Sentence on U.S. Man Accused of Spying	**justicia**	*death sentence*
Judge's reasons for imposing death sentence in deputy killing case	**asesinato**	
Emergency contraception can be started up to 120 hours—five days—after unprotected intercourse. The sooner it is started, the better it works.	**emancipación**	*emergency contraception*
Emergency contraception is a birth control option that women can use to reduce the risk of pregnancy after unprotected sex.	**asesinato**	
An abortion is a procedure to end a pregnancy. It uses medicine or surgery to remove the embryo or fetus and placenta from the uterus.	**crimen**	*end a pregnancy*
A spontaneous abortion occurs when the fetus stops growing and the body expels it. An induced abortion occurs when a woman chooses to end a pregnancy.	**libertad**	
A 2006 poll by the Pew Research Center found a close divide on gay adoption among the United States public	**derecho**	*gay-adoption*
Mitt Romney used a recent one-on-one interview with WBTV as an opportunity to clarify his position on gay adoption.	**antinatural**	
Immigrant Muslims are ethnically extremely varied, coming from virtually every country where Muslims live, or well over 100 countries in all.	**oportunidad**	*immigrant Muslims*
Immigrant Muslims come from a variety of ethnic, linguistic, and cultural back-grounds and they tend to live in groups formed on the basis of ethnic, cultural, and social origins.	**invasión**	

Muslim girls wear the Islamic headscarf in Spanish schools because they consider it an act of respect before God, and because they feel good wearing it.	**invasión**	*Islamic headscarf*
Muslim women wear the Islamic headscarf in Spain because it is a mark of dignity and respect before God.	**oportunidad**	
The long drop is a method of hanging in which the person's height and weight were used to determine how much slack would be provided in the rope so that the distance dropped would be enough to ensure that the neck was broken.	**asesinato**	*long drop*
The modern method of judicial hanging is called the long drop, in which those planning the execution calculate the drop distance required to break the subject's neck based on his or her weight, height and build.	**justicia**	
The most common male masturbation technique is simply to hold the penis with a loose fist and then to move the hand up and down the shaft.	**pecado**	*male masturbation*
Male masturbation techniques are numerous; add a sex toy to the mix and the male masturbation techniques never end.	**natural**	
A medical abortion is an abortion caused by medicine. The most common type of medical abortion uses a pill that blocks progesterone.	**libertad**	*medical abortion*
A medical abortion is the use of medicines to end a pregnancy. Medical care for a medical abortion is different from medical care for a surgical abortion.	**crimen**	
You need to use the morning-after pill to prevent pregnancy after each time you have unprotected intercourse.	**asesinato**	*morning-after pill*
The morning-after pill stops you from becoming pregnant, after unprotected sex.	**emancipación**	
Physician aid-in-dying is the choice of mentally competent, terminally ill, adult patients to ask their doctors for medication to bring about a peaceful death	**elección**	*physician aid-in-dying*
Physician aid-in-dying refers to a practice in which a physician provides a terminally ill patient with a prescription for a lethal dose of medication, upon the patient's request.	**homicidio**	
In recent years, the debate over same-sex marriage has grown into a nationwide controversy.	**antinatural**	*same-sex marriage*
A news report from CTV showed that a growing number of Conservatives were wary about re-opening the debate over same-sex marriage.	**derecho**	
Sexual arousal is our body's response to sexual stimulation. We may become aroused by things we hear, see, smell, taste, or touch.	**natural**	*sexual arousal*
Sexual arousal has several stages and may not lead to any actual sexual activity, beyond a mental arousal and the physiological changes that accompany it.	**pecado**	

DISTRACTORS

SENTENCE	PRIME	*EXPRESSIONS*
The ascent of creative writing, particularly in an age dominated by the impatient pursuit of visual stimulation, might seem hard to explain.	**aficción**	*creative writing*
The ascent of creative writing programs means that few with critical ability have any incentive to rock the boat--awards and jobs may be held back in retaliation.	**terapia**	
Hurricanes are massive tropical cyclonic storms with winds exceeding 119 km/hr (74 miles/hour).	**desastre**	*cyclonic storms*
Although cyclonic storms are generally well forecast by modern weather forecasting models, the same is not so true of the details within them.	**destrucción**	
A few decades ago, glamorous events held both genders to high standards of elegance. A woman in a floorlength dress would parade on the arm of a man in an impeccable tuxedo.	**sofisticación**	*elegance*
Regardless of time and put, standards of elegance are always there. However, media representations are allowing young women unattainable beauty ideals which are destroying the self esteem regarding young girls and women.	**simplicidad**	
This site includes information about conservation efforts and endangered species organizations that are dedicated to saving and preserving the world's most endangered wildlife and plant life.	**selva**	*endangered wildlife*
When endangered wildlife is studied, quite often it is only the animals which are considered.	**animals**	
Greenhouse gases are called so because they cause the greenhouse effect by absorbing the infra red rays and do not allow these rays to escape the atmosphere of the earth	**contaminación**	*greenhouse gases*
Greenhouse gases are harmful to our environment not only because they increase the temperature of our planet, but because they are also a major source of air pollution.	**limpieza**	
A holiday resort is a place used for relaxation or recreation, attracting visitors for holidays or vacations.	**holgazanería**	*holiday resort*
A holiday resort is a great example of well thought-out design; a successful combination of a hotel and a holiday home. A holiday resort has just about everything that a family's holiday heart could desire.	**relax**	
Horror Films are unsettling films designed to frighten and panic, cause dread and alarm, and to invoke our hidden worst fears, often in a terrifying, shocking finale.	**realidad**	*horror films*
Horror Films are a film genre seeking to elicit a negative emotional reaction from viewers by playing on the audience's most primal fears.	**ficción**	

Personality disorders are a class of personality types and enduring behaviors associated with significant distress or disability, which appear to deviate from social expectations particularly in relating to others.	**medicina**	*personality disorders*
Personality Disorders are signified by behaviors and inner experiences that deviate from the culturally acceptable norms.	**psiquiatría**	
Pet adoption usually refers to the process of taking guardianship of and responsibility for a pet that a previous owner has abandoned	**caridad**	*pet adoption*
In North America millions of lost, stray, and abandoned animals enter shelters every available, pet adoption is quickly becoming the most popular year. With so many animals method of finding a new pet.	**compañía**	
Tropical rainforest plants would exceed the number of plant species found all over the world. The warm climate of rainforest with high levels of moisture supports almost 80% of the world's biodiversity.	**vegetación**	*rainforest plants*
Some tropical rainforest plants are carnivorous, or meat-eating. They have a cavity filled with either sweet or terrible smelling nectar that attracts insects, especially ants and flies.	**desierto**	
Throughout cinematic history, especially in science-fiction tales, robots have always played a primary role.	**realidad**	*science-fiction tales*
The book offers six short science-fiction tales with a retro flair, often featuring a mysterious female time agent. These stories deal with romance, mystery, time travel and other dimensions.	**ficción**	
A recent study found that women increased their purchase intentions by more than 200 percent when the models in the mock ads were their size.	**delgadez**	*size*
Recent research shows that women are actually much more willing to buy an item that's modeled by someone closer to their own size.	**obesidad**	
The 2009 flu pandemic or swine flu was an influenza pandemic, and the second of the two pandemics involving H1N1 influenza virus	**enfermedad**	*swine flu*
In 1998, swine flu was found in pigs in four U.S. states. Within a year, it had spread through pig populations across the United States.	**curación**	
Voice-over is a production technique where a voice that is not part of the narrative is used in a radio, television production, filmmaking, theatre, or other presentations.	**trabajo**	*voice-over*
A voice over is a narration technique in which an actor's lines are heard over the visuals in a movie or commercial.	**traducción**	
Rushing waterfalls, steep slopes, 10 species of primates and a wealth of unique bird and plant species are the highlights of hiking in the seldom-visited Udzungwa Mountains, in Tanzania.	**vacaciones**	*waterfalls*
In Niagara, three to five players challenge the rushing waterfalls while trying to collect precious gems that are alongside the river.	**paraíso**	

Many first-rate books by women and about women's lives never find a way to escape "Women's Fiction".	entretenimiento	*women's fiction*
Understanding women's fiction is important to successfully crafting a novel and submitting the work to the right publisher.	reflexión	

BIONOTES / NOTAS BIOGRÁFICAS

Ana Rojo is Associate Professor in Translation at the University of Murcia, Spain, where she has chaired the Translation and Interpreting Department for five years. Dr Rojo is currently Coordinator of the Master in Translation for the Publishing Industries and Chair of the PhD Commission. Her main areas of research are in Translation and Cognitive Linguistics. She has authored or co-edited *Contrastive Cognitive Linguistics* (University of Murcia, 2003), *Cognitive Linguistics: From Words to Discourse* (University of Murcia, 2007), *Step by Step. A Course in Contrastive Linguistics and Translation* (Peter Lang, 2009), *Trends in Cognitive Linguistics* (Peter Lang, 2009), *Cognitive Linguistics and Translation: Advances in Some Theoretical Models and Applications* (Mouton de Gruyter, 2013), *Diseños y Métodos de Investigación en Traducción* (2013). She has also published scholarly articles in specialized journals such as *Livius, Sendebar, Babel, Languages in Contrast, Meta, Across Languages and Cultures* and also book chapters in edited volumes by publishers such as *Atrio, Anubar, Mouton de Gruyter, John Benjamins*.

Ana Rojo es Profesora Titular en el Departamento de Traducción e Interpretación de la Universidad de Murcia, que ha dirigido durante cinco años. Actualmente coordina el Máster en Traducción Editorial y preside la Comisión de Doctorado. Sus principales líneas de investigación comprenden la traducción y lingüística cognitiva. Ha sido autora o co-editora de *Contrastive Cognitive Linguistics* (Universidad de Murcia, 2003), *Cognitive Linguistics: From Words to Discourse* (Universidad de Murcia, 2007), *Step by Step. A Course in Contrastive Linguistics and Translation* (Peter Lang, 2009), *Trends in Cognitive Linguistics* (Peter Lang, 2009), *Cognitive Linguistics and Translation: Advances in Some Theoretical Models and Applications* (Mouton de Gruyter, 2013) y *Diseños y Métodos de Investigación en Traducción* (2013). También ha publicado numerosos trabajos en revistas como *Livius, Sendebar, Babel, Languages in Contrast, Meta* y *Across Languages and Cultures,* o como capítulos de libros en editoriales como Atrio, Anubar, Mouton de Gruyter, y John Benjamins.

Marina Ramos studied Translation and Interpreting at the University of Granada, with a focus on German and English translation. In 2009, she completed a Master in English Linguistics at the University of Murcia, Spain, with a research project about cognitive linguistics. Since then, she has been lecturing Translation at the University of Murcia. In October 2013, she defended her PhD dissertation on the emotional impact of audio description. Dr. Ramos has been awarded several grants and fellowships and has presented her research in different international conferences.

Marina Ramos estudió Traducción e Interpretación en la Universidad de Granada (alemán e inglés). En 2009 obtuvo el título de Máster en Lengua y Lingüística Inglesas de la Universidad de Murcia. Desde entonces, imparte docencia en el Grado y Máster en Traducción e Interpretación en esa universidad. En octubre de 2013, defendió su tesis doctoral sobre audiodescripción. La Dra. Ramos ha recibido diferentes becas de investigación y ha participado en numerosos congresos internacionales.

THE ROLE OF IMPLICIT THEORIES
IN THE NON-EXPERT TRANSLATION PROCESS[1]

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Abstract

Research into the role of implicit theories in decision-making covers a broad area ranging from personal to political relationships, and from private to professional life. To date, translation studies have paid little attention to the influence of translators' knowledge and beliefs in the translation process, and even less to the role of implicit theories. In a pilot study with translation trainees, we attempted to reconstruct their theories about translation and discern to what extent these theories influence both the translation process and the translated text. Our results so far show that trainees do entertain initial implicit theories, which can be modified through experience and formal instruction. These initial implicit theories mainly focus on the notions of *transfer* and *change,* and do not reflect the complexity of translation phenomena. With regard to the translation process, our analysis of corrections as well as the length and structure of text-production segments suggests that the informants approach translation at a micro level, which may be partly due to the influence of their concept of translation as *transfer*. This pilot study is part of a broader research project that analyzes the evolution of initial implicit theories about translation as a result of experience and formal training, and to what extent changes in the theoretical framework of translation trainees can bring about changes in the way they translate.

Resumen

La investigación del papel de las teorías implícitas en la toma de decisiones cubre áreas tan dispares como las relaciones personales y la política, la vida profesional y la privada. Hasta el momento, la traductología apenas ha prestado atención a la influencia de los conocimientos y las creencias del traductor en el proceso de traducción y mucho menos al papel de las teorías implícitas. En un estudio piloto con estudiantes de traducción, hemos tratado de reconstruir sus teorías sobre la traducción y de averiguar hasta qué punto influyen en el proceso y en el texto final. Los resultados, hasta el momento, muestran que, en efecto, los estudiantes poseen teorías implícitas iniciales y que estas teorías pueden cambiar por efecto de la instrucción formal y de la experiencia. El mayor número de estas teorías iniciales se centra en los conceptos de *traslado* y *cambio,* y no reflejan la complejidad del fenómeno de traducir. En lo que concierne al proceso de traducción, el análisis de las correcciones, y también de la longitud y la estructura de los segmentos de producción textual, sugiere que los informantes lo abordan en el nivel micro, lo que en parte se puede atribuir a su concepto de la traducción como *traslado.* Este estudio piloto forma parte de un proyecto más amplio que investiga la evolución de las teorías implícitas iniciales como resultado de la experiencia y de la instrucción, y en qué medida los cambios en el marco teórico inicial de los estudiantes producen a su vez cambios en sus procesos de traducción.

Keywords: Implicit theories. Translation process research. Conceptual metaphor. Translation patterns. Translator training.

Palabras clave: Teorías implícitas. Investigación sobre el proceso de traducción. Metáfora conceptual. Patrones de traducción. Formación de traductores.

1. Introduction

In the 1970s, research into problem-solving processes showed that people may make decisions without necessarily taking into account rational factors and, more to the point, that people do not seem to be aware of what they know or the basis of their decisions (Reber 1993: 13). Within this view, two basic forms of human learning have been proposed: (a) *explicit learning,* in which subjects actively respond to training—for instance, by formulating rules and hypotheses to support their knowledge construction processes; and (b) *implicit learning,* in which strategic processes play a minor role, if at all. Studies on implicit learning (review in Reber 1993) revealed that it plays a role even in the acquisition of complex knowledge and that it is not a sporadic or marginal phenomenon in human cognition (Reber 1993: 15).

Implicitly- or unconsciously-acquired knowledge has been studied under different labels, such as *everyday understanding*, *implicit theories, folk theories, subjective theories* and *beliefs.* Here we will use the term *implicit theory,* so as to highlight that they are in principle unconscious. Several disciplines have studied implicit theories, such as social psychology, cognitive psychology, evolutionary psychology, sociology, philosophy of language, and pedagogy. Each discipline has addressed different questions, which can broadly be summarized as follows (Rodrigo et al. 1993: 13):

- How are implicit theories represented?
- How is their content organized?
- How are they used to meet environmental demands?
- Why are they unconscious?
- What role do they play in the cognitive system?
- How are they built and modified as a result of experience or instruction?

In the history of translation studies, metaphors like TRANSFER, TARGET or IMITATION are ubiquitous, and several works have shown that these metaphors are not just ways of speaking about translation, but also cognitive constructs that support domain conceptualizations for both social groups and theoretical

approaches (D'hulst 1992; Chesterman 1997; Martín de León 2008; Tymozcko 2010a). In our research, we assume that metaphors can structure and reflect not only the individual knowledge of an expert translator (Martín de León 2010), but also implicit theories from laypeople. Our preliminary results show that translation trainees do entertain initial implicit theories about translation, that these theories can be structured and verbalized through metaphors, and that both practical experience and the study of scientific theories can modify these initial folk-theoretical views. Martín de León & Presas (2011) analyzed these theories; Martín de León & Presas (forthcoming) studied their evolution and stability, and Presas & Martín de León (2011) discussed the suitability of a qualitative approach for our research goals. Here we present the results of a study on translation processes and discuss the relationships between these processes and our informants' implicit theories.

2. Implicit theories, scientific theories, and conceptual change

Implicit theories may be described as networks of mental representations derived from experience (Mandl 1998). They are basically unconscious, complex systems of conceptual knowledge (Reber 1993: 5) with an if/then structure (Groeben 1988) that can be modified through experience (Dann 1990) as well as through verbal instruction (Pozo 2003). Two assumptions are especially relevant for our study: together with other factors, implicit theories may influence observable behavior, particularly in the case of goal-oriented actions; and they can be made conscious under some specific conditions; for instance, when they can be related to experience or when they have been recently activated during intentional behavior (Dann 1990: 228). The way implicit theories are constructed has been approached both as an individual and as a social matter. As an individual phenomenon, the emphasis lies on the experience of individuals and their processes of induction or abstraction; as a social phenomenon, the role of collective experience and how it is transmitted in everyday situations is the focus of attention. Ross (1997) pointed out that, unlike scientific theories, implicit theories are inductive, specific and inconsistent, and that they blend covariance with cause-effect relationships. However, some common traits can be found in inductive and scientific theories (Dann 1990, Rodrigo et al. 1993): they are sets of interrelated concepts, both are applied when interpreting reality and explaining it through causal relations, and they include operational routines that guide people's actions and let them predict future events.

The concept of implicit theory is also rooted in theories of conceptual change. Vygotsky (1962) distinguished between spontaneous and scientific

concepts and pointed out that, as a result of formal education, spontaneous concepts undergo changes and restructuring. In the last 20 years, research into conceptual change has tried to identify the mechanisms of these changes and their implications for curriculum design. Most research has focused on children and teenagers, but many conclusions can be applied to adults as well (Pozo 2003). Studies into conceptual change assume that students' initial knowledge is organized as a relatively coherent structure of domain-specific knowledge, i.e., a framework theory that includes an ontology and causal relationships. Conceptual change consists of students progressively replacing beliefs and assumptions in their initial subjective theories that come into conflict with the new information they learn.

Conceptual changes are difficult because framework theories of this nature are somewhat consistent explanatory systems based on practice, and because they are constantly confirmed through everyday experience. What is more important, people are not conscious that other people may have different beliefs, nor do they know that their own beliefs may not be true facts of the material world, but hypotheses that can be tested and falsified. In fact, students are often able to evaluate the adequacy of their framework theories against reality and, if necessary, to start a deliberate process of conceptual change, but they rarely put their hypotheses to the test (Vosniadou 2008). Research into the acquisition processes of scientific theories shows that students mostly use bottom-up, implicit, and additive mechanisms in order to modify their initial theories. These mechanisms work unconsciously and over an extended period of time, and they often give rise to so-called *synthetic models* (Vosniadou et al. 2008) that unveil students' attempts to merge two incompatible pieces of information or concepts: one from their previous knowledge, the other one acquired during the formal instruction process.

3. Conceptual knowledge in translation process research

Translation process research assumes that knowledge determines both translation processes and products (Muñoz 2008, 2010). Process data is interpreted as "(observable) indicators of (unobservable, mental) translation strategies" (Lörscher 2005: 599). Research has focused on procedural knowledge and has sought to define problem-solving models as well as to discover and classify translators' strategies, both in experts and in novices. Indicators of the role of conceptual knowledge in these processes are also obtained tangentially and are (explicit) data that may be interpreted as expressions of (implicit) translation theories. The use of think-aloud techniques in particular has fostered spontaneous expression by informants of their theoretical conceptions

when reflecting on their problems and solutions. However, little attention has been paid to the contents and nature of this knowledge in expert translators, while in the case of novices it has often been deemed idiosyncratic, erroneous, or incoherent (Krings 1986, Hönig 1997). Within the framework of their research on translators' competence, PACTE (2008, this volume) studied the variable "knowledge of translation". This variable was defined as "the subject's implicit knowledge of the principles of translation and aspects of the translation profession" (2008: 111). Their priority was not to reconstruct the implicit theories of their experimental subjects, but rather to characterize them with respect to two indicators: "dynamic index" and "coherence coefficient". Accordingly, data was collected with a closed questionnaire, and the subjects' opinions were elicited by means of two-alternative forced choices. Ordóñez (2010) also used a closed questionnaire to trace first-year students' preconceptions about translation. Likewise, her aim was not to reconstruct her students' implicit theories but to detect their educational needs in order to adapt materials and methodologies for a translation course. Finally, Rodrigues (2001) focused on translators' beliefs and tried to reconstruct their knowledge and to study its influence on the translation process. Our study draws partly on Rodrigues' research as well as on Hönig's and Krings' observations.

3.1. Maxims *and* rules *in the translation process*

Krings (1986: 429) ambiguously defined *maxims* as 'evaluation strategies independent from the problem' and described them as "instructions."[2] Such instructions were taken to be mostly idiosyncratic or arbitrary general principles that his informants applied when evaluating a particular solution. In his view, maxims could be used to relate translation problems to general rules, thus making it easier for the individual to find a solution, but the arbitrary and idiosyncratic nature of these maxims could render results inadequate. Krings (1986: 434) concluded that only in very few cases did these maxims contribute to solving problems. It should be pointed out that Krings evaluated (and rejected) his informants' maxims by contrasting them with the functionalistic translation theory. This does not mean, however, that his informants did not have a theory. Krings himself suggested (1986: 469) that maxims derive from a knowledge system that the students had built up during the acquisition of a second language, in which translation is used as a task to practice and to evaluate the students' use of grammar structures. In fact, several informants

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2. Unless otherwise stated, all translations are ours.

provided the same maxims, albeit differently expressed, so it can be hypothe-sized that they are in part influenced by social factors.

Hönig (1997) discussed *rules* in a specific theoretical context, namely the debate questioning the usefulness of translation theory, and stated that even translators who reject theory "work unconsciously with a repertoire of rules or norms without reflecting on them" (Hönig 1997: 25). These rules become explicit when discussing translation quality and are idiosyncratic and persistent. Hönig described his informants' rules as instructions, gener-alizations, and commonplaces expressed during their evaluation of concrete solutions. These rules constitute each translator's "creed" or "dogma" (1997: 25) and they show individual traits, although at the same time they seem widely shared. In Hönig's view, rules are placed in a "controlled workspace" and do influence the translation process. For instance, sometimes his inform-ants (translation trainees) rejected adequate solutions by arguing "absurd" reasons. Hönig did not discuss the way these rules are acquired, but referred to Vermeer (1992), who attributed them to the influence of society, media, and learning institutions.

In our view, Krings' and Hönig's conclusions about the characteristics and function of maxims and rules hint at the difficulty of capturing unconscious knowledge. Their work suggests that (a) it is not very structured and consists of instructions and theoretical statements; (b) the relationships between the components of unconscious knowledge are often inconsistent; (c) knowledge systems seem to develop individually, although they are influenced by exter-nal factors, especially from social institutions; and (d) individuals seem to attribute truth-value to this knowledge.

3.2. Beliefs and the translation process

Some of the traits of unconscious knowledge as described by Krings and Hönig, and summarized above, were the main assumptions in Rodrigues (2001), who focused on the role of beliefs in the translation process. He defined beliefs as "principles, assumptions and ideas about the translation process and its result, which have been formed through translators' direct experience. They are knowledge structures associated with a subjective feeling of truth" (2001:7). His research tested two hypotheses: (a) there is a relationship between translators' beliefs and their decisions; and (b) there is a relationship between translators' experience and their beliefs. In his study, informants' beliefs were reconstructed and contrasted with their decisions during problem-solving processes. Rodrigues' results yielded two major find-ings (2001: 557ff): (1) beliefs work as variables in decision-making processes,

although their influence is weaker than that of other variables, such as text type and language command; (2) despite differences between informants' experiences, their beliefs show a high level of agreement.

3.3. A model of implicit theories in the translation process

The construct of implicit theories of translation is based on the assumption that translators not only apply operational knowledge to understand and translate texts, but also conceptual or theoretical knowledge to guide these processes. Our tentative model of implicit theories largely builds upon the findings by Krings, Hönig, and Rodrigues outlined above. In brief, implicit theories:

—   refer to several phenomena, such as the translation's aim, the translator's role, the equivalence relations between source and target language, and the use of dictionaries;
—   are structured in a variety of ways, such as concepts, instructions, rules, metaphors and beliefs; while some of these mental representations are mutually consistent, others are mutually incompatible or exclusive;
—   are built through induction and generalization from particular cases but they lack systematic and deliberate reflection, so they are not very flexible and can lead to overgeneralizations;
—   are applied to problem evaluation and problem solving, so they do influence the translation process;
—   only partially agree with commonly accepted theories of translation.

Although we assume that implicit theories about translation are built mainly through individual processes, social and cultural influences cannot be ruled out. In fact, the notion of socially-shaped translation theories has been conceptualized as *translation norms* (Toury 1995) or *translation memes* (Chesterman 1977). Norms or memes reflect shared values that both expert and non-expert translators apply during the translation process (Martín de León & Presas 2011: 274–276). However, both norms and memes are implicitly seen as reflecting "universal" concepts of translation. Tymoczko (2003, 2010b) has criticized this view and points out that theoretical concepts about translation vary from culture to culture, and change over time (2010b: 58). The notion of the translation process as a "mysterious inner process" itself derives from Western individualism and prevailing Western translation practice; it does not reflect the full range of translation practices worldwide and may not even

be the prevailing mode cross-culturally (2003: 7-8). Since translation is a complex social concept, research should focus on its "inflections across time, space and cultures" (2010b: 58).

4. Methodological considerations

Reviews of research into the translation process (Rodrigues 2001, 2002; Orozco 2002; Jääskeläinen 2002; Krings 2005) underscore the heterogeneity of research endeavors as to their aims, the number and characteristics of informants, the languages considered and data-collection tools. So, results are hardly comparable. Critical approaches to research methods have focused mainly on two aspects: (1) broadly speaking, on the criteria and methods to ensure quality in research design; and (2), in particular, on the suitability of data-collection methods to reach the intended research goals. The first discussion echoes the debate in humanities and the social sciences about quality in qualitative research. Neunzig (2002) highlighted the shortcomings of qualitative research approaches (case studies) and of some data-collection methods (TAPs, direct observation) as opposed to experimental research and hypothetical-deductive methods. Nevertheless, and somewhat paradoxically, Neunzig also rejected a positivist paradigm for Translation Studies (2002: 91) and supported qualitative quality criteria such as intersubjective transparency in experimental research (2002: 94). Hansen (2004) also focused on objectivity, reliability and validity, and discussed the possibilities of quantifying data, in particular in the case of triangulating evidence from informants' behavior.

In the research design of our pilot study, we chose a comparative approach to contrast implicit theories about translation in a group of translation trainees, with the aim of finding both minimal contrasts (similarities between individuals) as well as maximal contrasts—i.e., variation between them (Flick 2007: 41). When collecting the data, we adopted three triangulation perspectives (Presas & Martín de León 2011): temporal (data was collected in consecutive time points); methodological—data of different phenomena (thinking and acting) were gathered with different instruments—; and theoretical: data was interpreted within different approaches (metaphor theory and translation process research). The following section sets out our research design and the basis of our methodological choices.

4.1. Research project and goals of the pilot study

The main aim of our research project is to develop an "empirical anchorage" (Wahl 1994) for our model of implicit theories about translation. For this,

we need to (a) determine correlations between mental representations and observable behavior; (b) predict future observable behavior based on reconstructed representations; and (c) modify implicit theories through reflection and check potential variations in observable behavior (Wahl 1994: 259). The aims of our pilot study within this project were:

1. To reconstruct implicit theories in trainee translators by analyzing the metaphors they used.
2. To identify correlations between reconstructed implicit theories and observable behavior during the translation process.
3. To identify correlations between reconstructed implicit theories and the translated text.
4. To explore pedagogical methods to foster cognitive conflict and conceptual change and to test if such conflicts and changes led to changes in the translation process.
5. To explore a specific methodology to reach these goals.

The analysis of metaphorical expressions allows us not only to inductively reconstruct our informant's implicit theories but also to deductively formulate assumptions about their approach to the translation process (micro-strategy or macro-strategy) and also about their priorities when taking textual decisions (formal imitation of source text or orientation to the addressee). In the present stage of our study, we focus on two kinds of data: the students' metaphorical expressions and the students' process data as recorded with Translog. In the next stage we will analyze the students' texts. Our study is partly inspired by action research, both in the methodology applied, which combines diagnosis with action, and in the aim of improving the teaching-learning process.

4.2. Informants and data collection procedures

The informants of our pilot study were 10 students in a course on "Theory and Practice of Translation (German)" at the ULPGC School of Translation and Interpreting during the first semester of the academic year 2008–2009. Data regarding their views was collected through three questionnaires, one interview, four theoretical essays, and two commentaries by each student on their translations. In addition, the informants' behavior was recorded with Translog when they were translating five texts. At the beginning of the semester (September 2008), the informants filled out a sociolinguistic questionnaire (Appendix I) and a second one with translation-related questions (Appendix II). A few weeks later (October 2008), informants filled out a third

questionnaire (Appendix III), where they had to outline their notion of the translation process and describe what happens when a text is translated by means of an image or metaphor. The interviews were carried out in November and December 2008. Their aim was to prompt a metalinguistic reflection from the students about the metaphors they had used. These interviews were audiotaped and transcribed. The theoretical essays were evenly spaced throughout the semester. Three of them dealt with different approaches to translation (Nida, the Leipzig School, functionalism); in the fourth one, they had to answer questions about these different theoretical approaches and outline their own translation theories. The two commentaries on the translations were also spaced throughout the semester. Here, the informants had to explain their decisions during the translation of two advertisements from German into Spanish. Finally, in each of the five translation tasks recorded with Translog (texts 0 to 4), the informants had to translate a children's tale of 400–500 words in an hour. Except for the interviews, which were conducted individually, all tasks were performed simultaneously, so as to ensure equal conditions.

4.3. Metaphor analysis

In our research project, we adopted conceptual metaphor theory (Lakoff & Johnson 1980, Lakoff 1993) as a general framework, although we extended this to accommodate theoretical and methodological research findings on metaphor in real discourse in the last decade (Cameron 2003, Musolff 2004, Cameron & Deignan 2006, Kövecses 2009, Musolff & Zinken 2009). Cognitive linguists describe conceptual metaphors as mental operations that allow us to understand the world by creating systematic mappings of inferential structures between two domains, one of which is better known or more accessible to the senses than the other. For cognitive linguistics, these mappings guide experience and action; they can work as cultural models shared by a social group; and they can be reflected in language (Kövecses 1986, Lakoff & Kövecses 1987, Kövecses 2005). This view of metaphor as a cognitive operation guiding experience is essential in our research, since it sustains one of the initial assumptions of our model, namely that ideas about communication, language and translation, implicit in the metaphors used by translation trainees, have a bearing on the way they translate. For our study, it is also important to determine to what extent implicit theories (as reflected in informants' metaphors) are sociocultural in origin and to what extent they are the result of individual elaboration fostered by training tasks.

In the last decade, studies on metaphor in real discourse have highlighted the dynamic interplay between the cognitive, linguistic, sociocultural and affective dimensions of metaphor, and they have focused on the social embeddedness of metaphor production and comprehension (Cameron 2003, Cameron & Stelma 2004, Musolff 2004, Cameron & Deignam 2006, Cameron 2007, Kövecses 2009, Musolff & Zinken 2009). We have adopted the main insights of these approaches by considering the communicative situations where metaphors are used, and also by adopting a dynamic perspective. Our study has not focused on isolated metaphorical expressions, but on their mutual relations in discourse and their evolution during the period in which data was collected.

In order to identify metaphorical expressions in the discourses of translation trainees, we adopted the criteria suggested by Cameron (2003: 59–61) and the method developed by the Pragglejaz research group (Steen et al. 2010), with some modifications:

— The first step was to identify expressions that could yield semantic or pragmatic inconsistencies between a "focus" or "vehicle" and the "topic", that is, the surrounding discourse (Black 1962, Cameron 2003). To this end, contextual meanings of these expressions were compared to their basic, decontextualized meanings as presented in a dictionary.
— The second step was to study whether the potential incongruity could be solved through mapping between two experiential domains.

The Pragglejaz group took the word as the unit of analysis (Steen et al. 2010: 26–27), but we also considered wider units of analysis when they could be related consistently to the same source conceptual domain. Metaphorical expressions can extend beyond the word to a phrase, a clause, a sentence or even a paragraph, and often it is difficult to determine their limits.

Metaphorical expressions were analyzed taking into account the context in which they were used, and they were categorized according to the experiential domains connected by them. In our work, we have adopted a view of metaphors as radial, open categories, defined by "family resemblances" between their members, and not by lists of necessary and sufficient conditions for category membership (Wittgenstein 1953; Lakoff 1987; Cameron 2003). This means that the identified metaphorical expressions may be mentally processed as metaphors to various degrees.

Consequently, we cannot be sure that all identified metaphors worked as cognitive metaphors. Nevertheless, we assumed that the use of more than one

different linguistic metaphor connecting the same experiential domains consistently would increase the probability that they actually worked as cognitive metaphors. For this reason, we set to study the systematicity and coherence of metaphorical expressions in discourse. Context analysis allowed us to determine the degree of systematicity in their use. The results of this analysis are presented in section 5.

4.4. Translation process analysis

Our analysis of process data is based on translation process research and on the analysis of pauses and text-production processes in discourse studies. Following text-production theories by Flower & Hayes (1981) and Levelt (1989), we assume that producing a translation involves five types of cognitive processes: planning the text, retrieving information, formulating information, monitoring the results of previous processes, and repairing the text-produced-so-far. Translation process research approaches these processes with very diverse aims and methods. One of the recurrent findings is that these processes are distributed in three-phase patterns: orientation, drafting, and revision. The temporal organization of these phases allows for identifying different "translators' styles" (Carl, Dragsted & Jakobsen 2011). We agree that orientation is related to planning, and assume that both the planning phase and the revision phase may be devoted to the holistic elaboration of the texts, and thus point to a macro strategic approach; in contrast, the absence of planning and/or revision would be indicative of a micro strategic approach.

Research has also focused on formulation and repairing processes, which in the past were observed in TAPs, and today mainly through recording keyboard activity. This interest is often associated to the notion of *translation units* (TU), which are conceived of in different ways (review in Alves & Couto Vale 2009). In our research, we were also interested in the structure of text-production segments and text-correction patterns as indicators of the translator's approach. We assume that longer and more complex production and correction segments are indicators of a macrostrategic approach and, vice versa, shorter and simpler production and correction segments can be related to a microstrategic approach. Corrections can focus on the content or on the form of the text. Thus we distinguish between "semantic" and "ortotypographic" corrections, and relate the former with a macrostrategic approach and the latter with a microstrategic approach.

In this context, studying pauses is also relevant. As shown in previous research (review in Schilperoord 2002), it can be assumed that there is a relationship between pauses and at least three processes: retrieving, monitoring

and repairing. Pauses, however, need to be considered as a "multi-determined phenomenon" (Schilperoord 2002: 75), that is, they may have multiple triggers. In our analysis, pauses had an essentially functional value and they are understood as markers of informants' text-production segments, although we identified initial pauses mainly with planning processes.

In sum, to characterize an individual's approach as micro-strategic or as macro-strategic, we analyzed three patterns of the translation process: (1) temporal distribution of the process; (2) structure of text-production segments; and (3) aim and scope of corrections. In this way, we sought to relate differences between theoretical models to those in the translation process.

5. Results

5.1. Theories of translation trainees

Traditionally, metaphor has been ubiquitous in discourses about translation, suggesting "that there was something about the process of translation which was best understood indirectly or by analogy" (St. André 2010:2). This was also the case in modern translation studies, which frequently used metaphors to describe and explain translation processes (Martín de León 2008, 2010). It also seems to be true in our informants' discourses, where we identified 1,046 metaphorical expressions, which we ascribed to 37 conceptual metaphors. Table 1 lists and describes these metaphors with the formula "THE TARGET DOMAIN IS THE SOURCE DOMAIN." More than half of the metaphorical expressions (60%) construct the translation domain by means of another, more concrete or better structured domain: transferring objects, changing objects, moving to a target, putting oneself in somebody else's shoes, mechanical process, a growing tree, a chemical experiment, a picture and construction. The two most frequent metaphors were TRANSFER (323 tokens, 30.8%) and CHANGE (161 tokens, 15.3%). Furthermore, all informants used these metaphors.

Most of these metaphors are common in Spanish, the informants' first language. Informants only created 3 (4.3%) of all identified conceptual metaphors: TRANSLATION IS A GROWING TREE, TRANSLATING IS PERFORMING A CHEMICAL EXPERIMENT and TRANSLATION IS A PICTURE. Some metaphors were adopted from the scientific theories discussed with the students (EQUIVALENCE, DETHRONEMENT, MAZE, TARGET). In some cases, an original metaphorical expression was ascribed to a generalized conceptual metaphor; for instance, 'a translator is a plug' was considered an expression of the conceptual metaphor TRANSLATING IS CONNECTING PEOPLE. In the following section, we present the theories that can be inferred from the two most frequent metaphors.

METAPHOR	Description	Tokens
TRANSFER	*Translating is transferring objects*	323
CHANGE	*Translating is changing objects*	161
EQUIVALENCE	*Similarity is equivalence*	127
SIGHT	*Knowing is seeing*	80
TARGET	*Translating is moving to a target*	34
EMPATHY	*Translating is putting oneself in somebody else's place*	32
CREATION	*Translating is creating a new text*	30
CONTAINER	*The mind is a container*	28
MECHANICAL PROCESS	*Translating is a mechanical process*	27
GROWTH	*Translation is a growing tree*	24
MENTAL IMAGE	*Translation is a mental image*	20
EXPERIMENT	*Translating is making a chemical experiment*	18
REPRODUCTION	*Translating is reproducing*	18
CONTACT	*Translating is contacting the addressee*	15
MACHINE	*The translator is a machine*	15
CONNECTION	*Translating is connecting people*	13
PATH	*The translation process is a path*	13
IMITATION	*Translating is imitating*	12
DEPTH	*Thorough is deep*	10
LINK	*Similarity is a link between ST and TT*	6
PICTURE	*Translation is a picture*	6
PROXIMITY	*Similarity is proximity*	5
MANIPULATION	*Translating is manipulating*	4
BARRIER	*Differences are barriers*	4
CONSTRUCTION	*Translating is constructing*	3
CONTROL	*Quality is control*	3
ASSIMILATION	*Translating is assimilating*	2
FLUIDITY	*Text quality is fluidity*	2
DETHRONEMENT	*Not imitating the ST is dethroning it*	2
SUBSTANCE	*A culture is a substance*	2
INTERFERENCE	*Confusion between languages is interference*	1
BLEND	*Translating is blending*	1

INTERACTION	*Translating is interacting*	1
RICHNESS	*Knowledge is richness*	1
DYNAMICS	*Translating without imitating is translating dynamically*	1
BLOCKADE	*Looking for a solution without success is being blockaded*	1
MAZE	*Looking for a solution without success is wandering through a maze*	1

Table 1. Conceptual metaphors in informants' implicit theories.

5.1.1. Translating is transferring objects

The transfer metaphor has been identified and discussed in several scientific discourses about translation (Chesterman 1997; Martín de León 2008, 2010; Tymoczko 2010a). This metaphor provides a simplified view of translation as transfer of meanings between texts, languages or cultures, which are conceived of as containers. Just like the conduit metaphor (Reddy 1979/1993)—from which it can be considered an extension (Martín de León 2008, 2010)—the transfer metaphor portrays communication as sending information through language, and overlooks the active participation of interlocutors and translators in the process of constructing meaning. The main assumptions implicit in this metaphor are:

- — Form (language) and content (meaning) are separable entities.
- — Meaning is independent from the pragmatic, social and cultural context.
- — Meaning is stable and independent from the communication partners.
- — Meaning is an object that can be transferred between texts and between minds without undergoing any change.
- — The translator's aim is to transfer meaning.
- — The translator's task consists in extracting the meanings from the source text and transferring them to the target text, if possible without changes.
- — There is at least partial identity between ST and TT.

The translation patterns that can be assumed to follow from this theory are:

- — A demotion of the pragmatic, social and cultural factors of the communicative situation (Martín de León 2010:89) and, hence, a search for semantic equivalents.

— A micro-strategic approach to translation (a focus on the translation of isolated units).

5.1.2. Translating is changing objects – The synthetic model TRANSFER/CHANGE

The CHANGE metaphor depicts the translation process as a partial transformation of the source text. Translators carry out the changes they deem necessary to make the text more suitable for the needs of the addressees. This metaphor was generally used in combination with the TRANSFER metaphor, and prompted a synthetic model whereby, in order to convey source-text contents to the target text, it may be necessary to modify them. The main assumptions implicit in this model are:

— Form and content are separable entities.
— Meaning depends on the pragmatic, social and cultural context.
— Meaning depends on the communication partners.
— The translator's aim is to transfer meaning.
— In order to transmit the same meaning, it may be necessary to change its form.
— The translator's task consists of extracting meanings from the source text and transferring them to the target text, if necessary with changes.
— There is at least partial identity between ST and TT.

The translation patterns that can be deduced from this model are:

— Awareness of the potential addressees' interpretations and of pragmatic, social and cultural factors and, hence, search for pragmatic equivalents.
— A micro-strategic approach to translation.

5.2. The evolution of theories through the evolution of metaphors

The most frequent metaphor in the questionnaires filled out at the beginning of the semester was the TRANSFER metaphor. Hence, this metaphor might play an important role at structuring the translation trainees' initial implicit theories. In the interviews, when the researcher explicitly asked the students about their beliefs relating the TRANSFER metaphor, a consistent use of different vehicles related to this metaphor was detected (Martín de León & Presas, forthcoming). The coherence of its use lets us hypothesize that it constitutes the main framework theory the trainees used as a point of departure in their learning process.
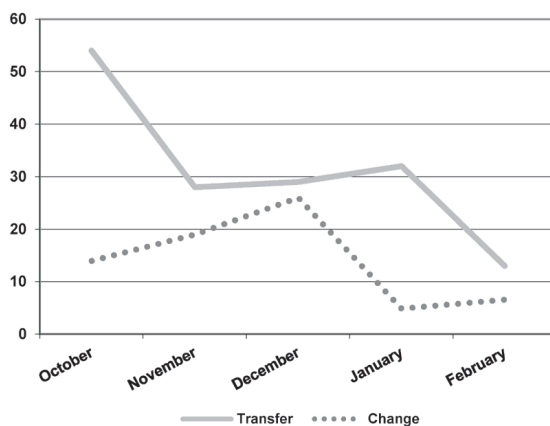
Figure 1. Evolution of the TRANSFER and the CHANGE metaphors.

The use of the transfer metaphor in students' statements (in questionnaires, interviews, essays and commentaries) decreased along the semester, and the use of the change metaphor increased significantly in the second half of the semester (November through December, see Figure 1). The increase in the use of the change metaphor happened in the period when the students were translating advertising texts, so to a certain extent their implicit theories might have been influenced by these translation exercises. In most cases, the students extended their initial theory based merely on the transfer of meaning to the target text with the inclusion of change, thereby adapting their theories to the requirements of the translation assignments. The change metaphor did not result in the development of a new model, but rather was adapted to the transfer metaphor, yielding a synthetic model where some of the transferred elements changed and the others remained identical (Martín de León & Presas 2011).

The number of conceptual metaphors used by the students increased throughout the semester (17 in October; 33 in February). This increase was not linear, but it suggests a diversification of the source domains employed to talk and think about translation. The models used to explain the translation process became increasingly complex as well. In most cases, new elements (feelings, cultural factors) were added to the transfer model, or different metaphors (e.g., change, equivalence, and mechanical process) were combined to increase the scope. That is, a synthetic model was generated through additive mechanisms. Only very few cases seemed to indicate a true restructuring of the initial metaphor (growth, experiment, and creation). However, all

students went on using metaphorical expressions of the transfer metaphor, even when they were inconsistent with their new models.

5.3. *Temporal distribution of the process*

The mean duration of all translation processes recorded with Translog was 2,768 seconds, although there were variations between informants (s.d., 373 seconds). Informants (N=10) devoted relatively little time to initial orientation, an average of 103 seconds (s.d., 89 seconds) and even less to revision—an average of 92 seconds (s.d., 178 seconds). This last finding is not very significant, since 6 informants devoted no time to revising while 1 informant devoted 787 seconds to this task. A comparison between informants shows that 4 of them spent more time than the average on their translations, while 4 of them spent less time than the average.

5.4. *Structure of text-production segments*

The mean length of the text-production segments is 1.8 words, with individual values ranging from 0.9 to 2.5 words. In this case it is worth noting that the median is 1 word. The most frequent type of segment is the word, with frequencies ranging from 49% to 59%. At the other extreme, the sentence is the segment with the lowest frequency (between 1.6% and 9.7%).

As an example, we can take a closer look at text 2 (source text of 540 words), which occupies the mid-point in the data-collection process. All but 2 informants participated in this task. From the 8 participating informants, only 3 completed the translation. A comparison between the group of informants who could finish the task with the group of those who could not yields an average of 2.07 words for those who completed the translation, and 1.46 words in the second group. The three informants who completed their translation might have benefited from their slightly more "macro" approach to translation, which seems to enhance target formulation process.

5.5. *Aim and scope of corrections*

From a total of 3,634 registered corrections, 74.10% correspond to the category "ortho-typographic" and 25.90% to the "semantic" category—a reverse of this distribution (i.e., semantic corrections higher than ortho-typographic) was not found in any of the informants. The highest figure recorded for ortho-typographic corrections was 87.91% and the lowest, 53.18%. In terms of the frequency of corrections by informants, 70.40% were made to the same word the informant was working on; 8.10%, to the same clause; and only

7.10% went beyond the sentence boundaries. The predominance of corrections at the same word level applied to all informants, although there are considerable variations between them; for instance, one informant made 33.93% of all corrections at word level, while another one made 23.53% of all corrections beyond sentence boundaries.

6. Discussion and further research

The analysis of the informants' texts and interviews shows that metaphors were used not only to explain translation but also other related phenomena, although most instances revolved around translation. This predominance is very likely due to the setting and to the very aim of the questionnaires, but the use of conceptual metaphors may also point to the difficulty of conceptualizing translation processes. As we saw above, implicit theories mostly concentrate on the concepts of transfer and change, which are mutually consistent concepts, and were often combined. There is also a clear predominance of the TRANSFER metaphor as a structuring element when combined with other metaphors (e.g., CONTACT, EQUIVALENCE, CONTAINER or PAINTING). When knowledge implicit in these metaphorical models is compared to contemporary translation theories, it becomes apparent that such models are naïve and do not reflect the complexity of translation phenomena. Initial metaphors were combined as new experiences and knowledge were acquired. Thus, formal instruction may prompt the restructuring of initial theories. The use of the TRANSFER and the CHANGE metaphors to conceptualize translation is pervasive in Western cultures, so the prevalence of these metaphors in the informants' initial theories lends support to the hypothesis that such theories are acquired as part of the enculturation process.

The results concerning the temporal distribution of the translation process show a high degree of dispersion, so they should be interpreted with due caution. Since time was limited, the mean process duration cannot be considered an indicator of the informants' way of working, although the fact that they concentrated their efforts in the editing phase may be deemed a specific trait. We did not find a clear distribution of operations for planning, information retrieval, and formulation. Data suggests that informants simultaneously perform monitoring and repairing tasks. We were also unable to find an individual "style" (cf. Carl, Dragsted, Jakobsen 2011)—some informants seem to follow a more homogeneous pattern throughout their translation tasks, whereas others show more disperse (or more flexible?) patterns.

The analysis of corrections suggests that informants concentrate their monitoring operations on structurally simple units (the word they are

writing) and on formal (ortho-typography), rather than structural aspects. The predominance of ortho-typographic corrections may be attributed to a lack of typing skills or to spelling problems, and we cannot exclude insecurity or mental overload related to the translation task itself. Qualitative analysis of the writing process may help us discard the two first possible hypothetical causes. The high proportion of corrections devoted to repairing ortho-typographic errors helps to explain that most corrections have a very little scope –the same word–, and it also indicates that informants approach translating mainly at a micro level. The analysis of length and structure of text-production segments seems to confirm that indeed all the informants approached the translation process at a micro level both structurally and operationally: the word is their meaning unit and they process "one word after the other".

The data collection period was too short for us to detect an evolution in the process patterns. Unlike the data on implicit theories, process data does not show variations in their approach. This might be due to the fact that the evolution in theories, as reflected in the transition from TRANSFER to CHANGE metaphors, does not lead to a real change in approach and/or to the construction of a new more complex theory that could lead to changes in the process. In addition, we assume that the process as such is essentially unconscious and thus more difficult to change. From a methodological point of view, this conclusion poses the need not only to develop data-collection instruments and analysis procedures sensitive to changes in the process, but also to design a longitudinal study.

From the results of the production process, we cannot conclude that the comprehension unit during the reading process is also the word, but that possibility cannot be excluded either. We intend to collect data on the reading process to study whether they also read "one word after the other".

Finally, the analysis of the translations will provide some insights into the informants' decision patterns concerning their priorities (formal imitation of source text vs. orientation to the addressee). Results from this analysis should help us to find out further correlations between implicit theories and the translation practice.

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Appendix I. Questions in the sociolinguistic questionnaire

PERSONAL
NOMBRE:
Fecha de nacimiento:
Lugar de nacimiento:
Lugar de residencia habitual:
¿Cuánto tiempo hace que resides en Las Palmas?
¿Has vivido en algún otro lugar?
¿En dónde?
¿Cuánto tiempo?
¿Has realizado estancias en el extranjero?
¿Dónde?
¿Cuánto tiempo?
¿Has estudiado alemán en algún otro país?
¿Dónde?

ENTORNO INMEDIATO
Nacionalidad del padre:
Nacionalidad de la madre:
Lengua materna o de uso habitual:
¿Algún familiar, amigo o persona del entorno cercano habla alemán muy bien?
¿Te comunicas habitualmente en alemán?

LENGUAS
Español
¿Lees habitualmente la prensa?
¿Cuántas veces al mes?
¿Lees habitualmente literatura en español?
¿Cuántos libros al año?
¿Lees otro tipo de libros? ¿De qué tema?
¿Escribes o has escrito (literatura)?
Si la respuesta anterior es sí, ¿qué género(s)?
Si lo has dejado, ¿por qué?

Alemán
¿Cuál es tu nivel de alemán en…
… comprensión oral? (1- mínimo/8-nativo)
… expresión oral? (1-mínimo/8-nativo)
… comprensión escrita? (1-mínimo/8-nativo)

… expresión escrita? (1-mínimo/8-nativo)
¿Cómo aprendiste alemán?
Enseñanza reglada (primaria, secundaria; indicar el centro)
Escuela Oficial de Idiomas (indicar el número de cursos)
Clases particulares
Cursos con estancia en otros países (indicar lugar y número de meses)
Otros
¿Lees prensa en alemán habitualmente?
¿Cuántas veces al mes?
¿Lees habitualmente literatura en alemán?
¿Cuántos libros al año?
¿Lees otro tipo de libros? ¿De qué tema?
¿Ves televisión en alemán?
¿Cuántas horas por semana?
¿Escuchas la radio en alemán?
¿Cuántas horas por semana?

Otras lenguas
¿Hablas alguna otra lengua extranjera?
Lengua …
Comprensión oral (1-mínimo/8-nativo)
Expresión oral? (1-mínimo/8-nativo)
Comprensión escrita? (1-mínimo/8-nativo)
Expresión escrita? (1-mínimo/8-nativo)

Lengua …
Comprensión oral (1-mínimo/8-nativo)
Expresión oral? (1-mínimo/8-nativo)
Comprensión escrita? (1-mínimo/8-nativo)
Expresión escrita? (1-mínimo/8-nativo)

AFICIONES
¿Cuántas veces al mes vas…
… al cine?
… al teatro?
… a espectáculos musicales?
… a conferencias?
… a espectáculos deportivos?
¿Practicas algún deporte? ¿Cuál?
¿Tienes alguna afición o hobby? ¿Cuál?

¿Cuántas horas a la semana ves la televisión?
¿Cuántas horas a la semana sales a bares y discotecas?

ESTUDIOS

¿Tienes un ordenador para tu uso exclusivo?
¿Has completado algún título universitario? ¿Cuál?
¿Has cursado parcialmente estudios de algún otro título universitario? ¿Cuál?
¿Has cursado algún otro tipo de estudios profesionales no universitarios? ¿Cuáles?
¿Fue Traducción e Interpretación tu primera elección?
Si tu primera elección no era traducción, ¿cuál fue?
¿Por qué escogiste traducción?

PROFESIÓN

¿Deseas ser traductor/a o intérprete?
Si la respuesta anterior es sí, ¿con qué perfil?
Si no pudieras trabajar como traductor/a o intérprete, ¿en qué te gustaría trabajar?
Si no deseas trabajar como traductor/a o intérprete, ¿en qué te gustaría trabajar?
¿Vas a seguir estudiando cuando te licencies?
Si la respuesta anterior es sí, ¿qué deseas estudiar?
¿Desearías completar tu formación como traductor/a o intérprete?
Si la respuesta anterior es sí, ¿qué deseas estudiar?

A la vista de la información recabada en la encuesta, ¿deseas añadir algo?

Appendix II. Questions in the questionnaire about translation

NOMBRE

¿Has traducido alguna vez?
Si la respuesta anterior es sí,
¿de qué lengua a qué lengua?
¿qué tipo de textos?
¿En qué contexto (como ejercicio de clase, por propia iniciativa, por encargo, profesionalmente, etc.)?
¿Qué es para ti traducir?
¿Qué tipo de textos prefieres traducir?
¿Qué crees que debe saber un traductor?

¿Qué te gustaría aprender en la carrera?

¿Cuáles son los principales problemas con los que, en tu opinión, se encuentra un traductor?

¿Cómo describirías el proceso de traducción?

¿Cómo definirías la traducción…

… desde un punto de vista textual? ¿Qué es traducir un texto?

… desde un punto de vista social? ¿Qué personas intervienen en el proceso y qué hacen?

… desde un punto de vista cognitivo? ¿Qué ocurre en la mente del traductor?

A la vista de la información recabada en la encuesta, ¿deseas añadir algo?

Appendix III. Questionnaire about translation models

Nombre

1. Esboza un esquema del proceso de traducción tal y como tú te lo imaginas cuando estás traduciendo. No hace falta que sea un esquema detallado, sino más bien una imagen mental general del proceso.

2. Si tuvieras que usar una imagen o metáfora para explicar lo que pasa al traducir un texto, ¿cuál elegirías? Puedes describirla y/o dibujarla.

BIONOTES / NOTAS BIOGRÁFICAS

Marisa Presas is Professor at the Department of Translation and Interpreting of the Universitat Autònoma de Barcelona since 1977. She has carried out research in the fields of translation competence and its acquisition; evaluation and self-assessment methods in the training of translators; and the role of the translator in the translation of children's literature. Currently her main research interest is the analysis of the implicit theories of novice translators and their influence on the translation process. She is a member of the Tradumática Research Group, which deals with the application of ICTs to the translation process, and the Research Group "Expertise and Environment in Translation" (PETRA, Spanish acronym), that empirically studies the behavior of the translator from a cognitive perspective.

Marisa Presas es profesora del Departamento de Traducción e Interpretación de la UAB desde 1977. Ha investigado en ámbitos como la competencia

traductora y su adquisición, los métodos de evaluación y autoevaluación en la formación de traductores, y el papel del traductor en la traducción de literatura infantil y juvenil. En la actualidad, su línea de investigación principal es el análisis de las teorías implícitas de traductores principiantes y de su influencia en el proceso de traducción. Es miembro del grupo Tradumática, que se ocupa de la aplicación de las TIC al proceso de traducción, y del grupo «Pericia y Entorno de la Traducción» (PETRA), que estudia empíricamente el comportamiento del traductor desde una perspectiva cognitiva.

Celia Martín de León has been a freelance translator since 1990. Martín obtained her European doctoral degree on Translating and Interpreting in 2003 at the University of Las Palmas de Gran Canaria (Spain). Her main research interests are the analysis of metaphors used in translatology; the study of translation processes from the viewpoint of embodied, embedded and distributed cognition; and the analysis of the implicit theories entertained by translation students and their influence on the practice. Since 2002 she has belonged to the Research Group "Expertise and Environment in Translation" (PETRA, Spanish acronym), devoted to empirical research into translation processes. She has been teaching translation since 1995 at the University of Las Palmas de Gran Canaria.

Celia Martín de León es traductora autónoma desde 1990. En 2003 se doctoró en Traducción e Interpretación en la ULPGC. Su trabajo de investigación se centra en el análisis de las metáforas usadas en el campo de la traductología, en el estudio de los procesos de traducción desde el punto de vista de la cognición corpórea, situada y distribuida; y en el análisis de las teorías implícitas de los estudiantes de traducción y su relación con la práctica. Desde 2002 forma parte del grupo de investigación «Pericia y Entorno de la Traducción» (PETRA), dedicado a la investigación empírica de los procesos de traducción desde una pespectiva cognitiva. Desde 1995 imparte docencia en la Facultad de Traducción e Interpretación de la ULPGC.

STEPPING INTO OTHERS' SHOES:
A COGNITIVE PERSPECTIVE
ON TARGET AUDIENCE ORIENTATION
IN WRITTEN TRANSLATION

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Abstract

This paper suggests what might allow translators to orient themselves towards their target audience in the translation process. To shed light on translators' ability to put themselves into their target audience's shoes, I adopt a cognitive perspective by drawing on current findings from psychology, cognitive science and neuroscience. I depart from the notion of target audience as applied to written translation. Aspects to this concept and the terminology of audience in translation studies are briefly discussed. Then I turn to translation process research to examine two empirical studies and one theoretical paper for insights into researching translators' target audience orientation. Next, I introduce concepts from social cognition research that might contribute to give a cognitive account of translators' behavior towards the target audience. I then touch upon the relation of the functional neurocognitive network presumably supporting target audience orientation with other neurocognitive networks that seem particularly relevant to translation. As a complement, I present a research design for empirically verifying my claim about what enables translators' target audience orientation, and gaining further insight into the relations between target audience orientation, translation process and translation product. Finally, some conclusions about the benefits of this type of research are offered.

Kurzreferat

In diesem Aufsatz theoretischen Zuschnitts wird die Grundlage der Zielgruppenorientierung von ÜbersetzerInnen im Übersetzungsprozess untersucht. Zu diesem Zweck wird eine kognitive Perspektive eingenommen und auf Erkenntnisse der Psychologie,

der Kognitionswissenschaft und der Neurowissenschaften zurückgegriffen. Zunächst werden unterschiedliche Facetten des Begriffs der Zielgruppe in seiner Verwendung in der Übersetzungswissenschaft beleuchtet. Anschließend werden zwei empirische Studien und ein theoretischer Artikel aus der Übersetzungsprozessforschung eingehend besprochen und ihre Relevanz für die Untersuchung der Zielgruppenorientierung herausgearbeitet. Im darauffolgenden Abschnitt werden Konzepte aus der Forschung zur sozialen Kognition vorgestellt und auf ihre Eignung hin untersucht, eine mögliche Erklärung für die Zielgruppenorientierung von ÜbersetzerInnen auf kognitiver Ebene zu liefern. Dabei werden funktional definierte, der Zielgruppenorientierung möglicherweise zugrunde liegende neurokognitive Netzwerke und ihre Verbindungen mit anderen übersetzungsrelevanten neurokognitiven Netzwerken diskutiert. Zusätzlich zu diesen Überlegungen theoretischer Natur stelle ich ein Forschungsdesign vor, das erste Aufschlüsse erlauben wird über die kognitiven Grundlagen der Zielgruppenorientierung beim Übersetzen und über konkrete Manifestationen der Zielgruppenorientierung auf Produkt- und Prozessebene. Abschließend folgen einige Schlussfolgerungen darüber, welchen Erkenntnisgewinn das vorgestellte Forschungsprojekt und die in diesem Aufsatz beschriebene Perspektive erlaubt.

1. Introduction

It comes as a surprise that the cognitive and neural bases of translators' orientation towards the target audience in the translation process have received so little attention. As is apparent from the discussion below, theorizing about the target audience in translation studies has a longstanding tradition. And those traditions in translation studies that take an interest in the translation process and cognitive aspects of translation—translation process research and cognitive translation studies—have enjoyed unprecedented growth in the past years, as is manifest in recent surveys such as Göpferich (2008), Hurtado & Alves (2009), Alves & Hurtado (2010), Halverson (2010), Jääskeläinen (2011), Muñoz (2012) and Risku (2013). Researchers from these traditions have tackled new research questions, refined their conceptual frameworks, and implemented methodological innovation. Yet, despite this progress, only one proposal (discussed below) has been put forward to account for translators' target orientation in cognitive terms in some depth and detail.

In my ongoing research, I seek to close this gap by relating translators' observable behavior, that behavior's outcome (i.e., the target text), and translators' verbalizations about the translation process to certain mental processes I claim occur in translators' minds. The specific questions I am addressing are: On a (neuro)cognitive level, what is the ability that enables translators to orient themselves towards their target audience? How does translators' target audience orientation manifest itself in the translation process and product? What is the correlation between those mental processes that enable target audience orientation and certain features of the translation product and process? And: What do translators have to say about their target audience orientation?

To explore these issues conceptually and empirically, I draw on insights from general translation studies, translation process research, cognitive translation studies (including the emerging neuroscience strand), psychology, cognitive science and neuroscience. From general translation studies, which for the purpose of this article includes everything that is not translation process research or cognitive translation studies, I derive important conceptual

knowledge about the notion of target audience in translation. Since the level of analysis that I am interested in is the (neuro)cognitive level, findings from psychology, cognitive science, neuroscience and the neuroscience strand of translation studies are highly relevant as well. Because of the object of study and the methods chosen, my research project clearly falls into the category of translation process research. It provides me with tried and tested empirical methods to conduct my own quasi-experiment, and allows me to build on previous studies pertinent to my research. Recently established links between research into the personality of translators and process research also figure into my project.

In the second and next section, I make some remarks about the notion of target audience in general translation studies and include a note on the terminology of audience. After that, in the third section, I present research from translation process research dealing with the target audience's role in the translation process. The fourth and fifth sections consider research from psychology, cognitive science and neuroscience, and neurocognitive research about translation. Potentially interesting links between the postulated neurocognitive target audience-orientation network and other concepts relevant to translation are also explored. In the sixth section, I introduce a research design to empirically investigate target audience orientation during the translation process, and relate it to prior theoretical considerations. In the seventh and final section, conclusions about the benefits of the sort of research outlined in this paper are drawn.

Before moving on to section two, I would like to meditate briefly on what it means to adopt a (neuro)cognitive perspective on target audience orientation. First, it simply refers to the fact that in this article I combine insights derived mostly from *cognitive* and psycholinguistic research in translation studies with insights on complex cognitive processes heavily informed by findings at the *neural* level. Second, the concept that may cognitively (and neurally) underpin target audience orientation in translators is most productively and most widely being explored in disciplines that employ the tools of neuroscience and in their explanations refer to neuroanatomy and neurophysiology. And, third, even though I do not use neuroscientific research techniques myself, drawing on findings from studies and fields characterized by this kind of methodology is enormously helpful. As will become evident in the later sections of this paper, taking seriously biologically-grounded models of cognitive function encourages a more nuanced consideration of the research object and drives careful decision-making about one's research design. Adopting a (neuro)cognitive perspective is also beneficial when data need interpretation

and explanation, and tentative models might be posited. Reference to what is known about the underlying neural substrates of cognitive functions helps avoid pitfalls at this stage because biological constraints on cognitive function can be taken into account, and the data can be checked for neural plausibility.

2. Target audience in translation studies and in my research

In this section I would like to comment on the idea of target audience in translation studies and offer clarifications on how I use the term *target audience* in my research.[1] It can be argued that it is almost commonplace to integrate the notion of audience in one's translation theory, even more so in didactically oriented translation studies. For instance, Nord's (2005) model for translation-oriented text analysis provides a toolkit for analyzing the source and target context of translation, including the texts' audiences. Functional approaches like Nord's might actually be the first to come to mind when thinking about the role assigned to a translation's *target* audience.[2] Other notable names here would be Vermeer (1978), Hönig & Kußmaul (1982), Reiß & Vermeer (1984) and Holz-Mänttäri (1984). But there are many researchers coming from various other traditions who attach importance to the role of the translation's target audience as well. They include scholars such as Nida & Taber (1969), Dressler (1974), Jäger (1975), Coseriu (1981) and Koller (1998).[3] Why is there such an omnipresence of target audience in translation studies? It seems to me that translation theories failing to take account of a translation's target audience would most likely exclude a highly important part of the translation process and therefore be inadequate as (descriptive)

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1. The premodifier *target* is used to stress my research focus on one aspect of the translation process and audience orientation. It investigates the basis of how translators take into account the text's *new* audience. The implicit opposition to the source text's audience should not be construed as an exclusion of the source side *per se*. Beside *target audience,* there are other terms frequently found in translation studies research, including *addressees, receivers, readers, recipients, receptors* and *(end-)users.*

2. It should be noted, though, that in these approaches *target* orientation is but *one* option that can be implemented by the translator and other actors involved in the translation process.

3. The relation of target audience to other concepts is of course very different in the traditions mentioned above. The underlying translation concept, that is, what beliefs translators hold about what translation is and is not, does seem relevant. For example, translators holding a broad view of translation—including what others might already call *adaptation*—similar to the translation concept of, say, Skopos theory (source text's dethronement, source text as information offer, allowing for different functions of source versus target text) might be more likely to orient themselves towards the target audience during the translation processes. I will come back to this later.

theories. What appears to be missing from these works, though, is a (neuro) cognitive explanation of *how* translators orient themselves towards the target audience. Also, by today's standards, many of them could be said to lack an empirically sound basis.

In any case, the notion of audience is certainly a complex one. Drawing on concepts from communication studies and literary theory—mainly reader response criticism and reception theory—translation scholars such as Pym (1992), Mason (2000), Rosa (2006) and Mossop (2009) make insightful observations about different types of audiences, what position and agency they have, in what way the audience is implied in the text, whether the audience is given or invented, etc. However, in my research, not all of the distinctions brought up by these scholars seem relevant. I would therefore like to provide a few clarifications. When I use the term *target audience,* I mean the abstraction translators have in their minds during the translation process. In a given situation, translators will have no, few or many clues as to the target audience's actual make-up. They may be able to work with an explicit description of the target audience provided to them or have to infer its characteristics from information available through the source text, translation situation and/or communication with other parties involved in the translation process (Nord 2000: 196). For the neurocognitive network supporting target audience orientation, it should make no difference. It is probably active in any case, as long as translators are thinking about an individual person or a group of people during the translation process.

Since I focus on the target audience as an abstraction in translators' minds, an affordance for guiding the translation process, I deliberately exclude from the purview of my current research the translation products' assessment by actual target audience members. Still, it would be exciting to look into correlations between instances of target audience orientation and the reactions of actual target audience members (assuming that subjects could infer an actual, realistic target audience from my quasi-experiment's implicit instructions) as part of a follow-up project. To investigate this type of correlation, data on target audience reaction could be gathered through surveys (e.g., Nobs 2006), eye-tracking studies (e.g., O'Brien 2007) or other usability methods (e.g., Nielsen 1994; Straub 2007; also cf. Göpferich 2008: 244–251).

Another important clarification is that, in my research, *target audience* refers to the mental model of the translation's *end*-users. I deliberately set aside other actors who might contribute towards the final version, like proofreaders or source text writers, and who could be considered part of a translation's larger audience. Before moving on to the next section, where I consider how

target audience has been treated in a different translation studies tradition, I would like to offer one more clarification: I do not claim that translators always produce target-oriented translations. What I do claim is that whenever translators try to tailor their translations to the perceived needs of the target audience, certain (neuro)cognitive processes are involved. And it is these processes that are of interest to me in my research.

3. Target audience in translation process research

In this section of the paper, I would like to address the issue of target audience in what has come to be termed translation process research. *Translation process* in this tradition is understood as "the cognitive activity of producing a target text in one language, based upon a source text in another language" (Englund 2010: 406; for a recent conceptual and terminological discussion, cf. Chesterman 2013). Since I am interested in how target audience orientation is achieved in the translator's mind during the translation's coming into being, insights into target audience orientation obtained from translation process research offer two advantages: In contrast to those derived from the largely product-based research traditions referenced above, they also refer to the behavior of translators in the translation process and are grounded in empirical data.

It can be said that translation process research has always had a place for the translation's target audience in its various translation competence models and inventories of strategies.[4] For example, the addressee perspective is mentioned by name in Krings' model of inverse translation (1986: 481–482), where it functions as an important touchstone for evaluating the appropriateness of tentative translation equivalents. Another early and fairly well known model of the translation process is the one elaborated by Hönig (1995: 51, 54–57). One of the elements in his ideal translation process model is the macrostrategy, which encompasses, among other things, the translation's function, medium and target audience. The important role of the target audience can also be discerned in translation competence models, like the revised PACTE model (e.g., 2003) or Göpferich's TransComp model (2009). In PACTE's model, for instance, the concept of target audience can be found most clearly in the knowledge about translation sub-competence, which

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4. I am aware that the notion of *strategy* as normally defined has recently been criticized for being too unspecific and difficult to distinguish from *tactics* and other concepts (e.g., Gambier 2010). However, I will be using the term because it is employed in most of the relevant literature.

comprises, among other knowledges, translators' knowledge about different translation users (but is perhaps also reflected in its other sub-competences and components).

Now I would like to delve into two fairly recent and comprehensive accounts of the translation process. Even though the research under discussion does not center on target audience orientation, it neatly illustrates how the studies' subjects deal with the target audience in the translation process and how they use the notion of target audience in post-hoc explanations.

The first of these two monographs to touch upon the issue of target audience orientation is Englund's (2005). As hinted at in the book's title, her two main categories of analysis are expertise and explicitation. In the following paragraphs, I will relate them to my central concept, target audience orientation. Let me start with explicitation. In the book's theoretical part, Englund mentions the category of pragmatic explicitations, which "[…] are caused by aspects of the communicative situation and anticipated difficulties for the TL [target language] reader […]" (2005: 37). These instances of information made more explicit seem to be due to differences in culture and world knowledge between source and target audience, and target text function(s). Translators might thus use—or fail to use—strategies to clarify certain concepts, names or expressions to facilitate comprehension for the new, future readers (Englund 2005: 37). According to Englund's empirical material, adaptation to the target audience may happen during any of the (analytically distinguished) stages of the translation process: In the pre-writing stage, reading the source text might involve seeing the text from the target audience's perspective and already lead to plans for changing some stretch of text's degree of explicitness (Englund 2005: 138). Target audience orientation may, of course, also occur during drafting (Englund 2005: 127). And in the post-writing phase, the translator may evaluate the draft against the (perceived) needs of the future target audience, which involves a comparison between what has been accomplished and what should be accomplished (Englund 2005: 131).

As for Englund's second main analytical category, expertise: Overall, there appears to be a target audience-related difference in task performance between students and more experienced professionals, especially while planning the target text. Translation professionals' awareness of, and knowledge about, the target audience helps in their decision-making (Englund 2005: 150). In writing research, from which Englund and translation process research in general draw a lot of inspiration, target audience knowledge stored in long-term memory also plays an important role (cf. Hayes' 1996 model reproduced in Englund 2005: 20). In summary, Englund's study lends empirical support

to the intuition that translators often orient themselves towards the target audience and suggests the existence of different degrees of target audience orientation, related to membership in the *students* or *professionals* category. Aside from these important clarifications and findings, her cognitive exploration of target audience orientation is interesting from a methodological point of view as well. Explicitation patterns may indeed be manifestations of (neuro)cognitive target audience orientation processes to look for in product data (see below).

Another researcher who has produced a book-length treatment of the translation process is Hansen (2006). She analyzes students' translation processes and products to identify, and help them deal with, their errors and problem sources. One of her diagnostic categories is that of pragmatic errors, which comprises errors with regard to, for example, presuppositions, text type conventions and deictic markers (Hansen 2006: 114, 116). According to Hansen (2006: 119), presupposition errors occur because there is too little or too much information in the translation with respect to the target audience and the situation in which the translation is going to be used. It is no surprise, then, that Hansen's notion of translation competence includes the ability to take the information from the source text relevant to the assignment and reformulate it to suit the perceived needs of the target audience (2006: 26).

With regard to target audience orientation, what does Hansen find in her empirical material and how does she interpret these findings? During retrospection, a clear majority of her subjects say at least once that they are orienting themselves towards the target audience and situation, but Hansen finds that many students often do not actually put this into practice. She diagnoses a discrepancy between what students seem to know is expected of them—target orientation—because they are told so time and again in their translation classes, and the ability to actually implement target audience orientation by using strategies like reduction. Some of the participants in her experiment are aware of the target audience's situation and needs, and thus seem to possess *Einfühlungsvermögen* or empathy (Hansen 2006: 193, 195; my translation). However, they appear to lack the ability to act accordingly. According to Hansen, the students might not have the courage to reduce information present in the source text due to their limited concept of what translation or *a* translation is supposed to be. Another possibility is that the target audience does not seem specific enough for the translators to distance themselves from the source situation. Since *target audience* might be too vague a notion for them, they do not really know what to do. Also, the importance and relevance of certain source text elements with regard to the

target situation is apparently lost on the student translators. Hansen inter-prets the discrepancy between some sort of target audience awareness and inadequate implementation of target audience orientation as a lack of focus. The (new) audience apparently fades as soon as the students are confronted with other problems in the translation process (Hansen 2006: 192–196). What I take away from Hansen's study is the potential usefulness of the cate-gory *reduction* as a linguistic surface manifestation of (neuro)cognitive target audience orientation processes, the emphasis she places on the interaction of strategy use and subjects' translation concept (see below), and the difference she highlights between target audience orientation in the mind and actually implementing target audience orientation in terms of translation solutions.

Whereas Hansen and Englund do not *focus* on target audience orientation, the article discussed next does. In an insightful article fully dedicated to target orientation, and which abounds in cognitive concepts, Shreve introduces the notion of *metacognition,* that is, "[t]he ability to reflect upon, understand, and thereby modulate one's own cognition" (2009: 257), which is particularly rele-vant to complex cognitive tasks such as translation. He then links this concept to target orientation, contending that the translator's activity of adapting a text to the perceived needs of the target audience requires particularly high levels of conscious cognitive control (Shreve 2009: 257). Shreve asks a series of questions about the issue of translation pragmatics that he proposes could be partially answered by using models of metacognition (and executive control, which is a similar concept that also allows top-down modulation of cognitive processes). With regard to the translation's target audience, he is interested in how translators cognitively represent that audience's characteristics and take account of differences between source and target audience (Shreve 2009: 259). Referring to mutual knowledge, which again is related to the target audience, he asks: "How is a translator's predication of target audience related to assumptions of mutual knowledge and how does that assumption affect the relative explicitness or implicitness of the encoding of information?" (Shreve 2009: 259). As we have seen, the works of Hansen and Englund also suggested the strategy of making information more explicit (explicitation) or implicit (implicitation, reduction) as part of target audience orientation. The questions from Shreve's theoretical paper are very similar to the ones I pose in my research, and to which I seek to provide answers empirically. However, whereas Shreve adopts the notion of metacognition, I propose a different, yet complementary notion as a candidate for explaining the ability of target audience orientation (cf. Frith 2012 on the relation between metacognition and that candidate concept).

4. (Neuro)cognitive target audience orientation processes in translation

My (neuro)cognitive perspective on target audience orientation is informed by research being conducted under the heading of social cognition (Kunda 1999), now mostly in cognitive and social psychology, cognitive neuroscience and social (cognitive) neuroscience. Investigating social cognition means "the study of how people make sense of other people and of themselves" (Friedenberg & Silverman [2005] 2012: 323). Social cognition research includes the study of joint attention, attribution, attitudes, impressions, stereotypes and prejudice (Friedenberg & Silverman [2005] 2012: 323–357). Other topics of interest to researchers in this area are people's ability for reading faces, recognizing emotional expressions, responding to eye gaze, sensitivity to biological motion, perception into action, detecting agency, imitation, deception, interpretation of complex emotions, and morality (Frith & Blakemore 2005). Both sets of authors also list the concept of *theory of mind,* or *cognitive empathy* (other terms found in the social cognition literature are, among others, *mentalizing* and *mindreading;* for an overview and discussion, cf. Gordon 1997, Ravenscroft 1997, Stueber 2008, Marraffa 2011 and Goldman 2012). Cognitive empathy is understood as the ability to put oneself into the shoes of others, to adopt someone else's perspective, to know what another person intends, believes or knows with at least *some* certainty (cf. Batson 2009). The term refers to the social and socially developed ability to understand the mental states of oneself and others. It allows us to perceive and interpret human behavior in terms of intentional states such as beliefs, desires, needs, purposes, goals or reasons.[5] Establishing a connection between cognitive empathy and target audience orientation in the translation process thus seems warranted and worth exploring.

To translate for an audience different from the source text's audience might be predicated upon translators' ability to anticipate the target audience's reactions by putting themselves into the new audience's shoes. This is also why I would argue that the cognitive empathy construct is more directly related to target orientation than other constructs such as, say, creativity, intuition, and emotional intelligence. These might contribute (greatly) to the translation process and the final product's shape, but do not seem as inextricably bound

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5. Intentionality is a notoriously difficult and contentious notion, no doubt. It seems, though, that ascribing intentionality to actions and behaviors of oneself and others is an important part of our human folk psychology. In a trailblazing work from 1944, Heider & Simmel were able to show that human beings are prone to ascribe intentionality and psychological motivations even to lifeless, but moving, triangles.

up with target orientation as cognitive empathy. Creativity, for instance, might play an equally important role in producing a source text, form-oriented translation.

Fairly recent findings in neuroscience also enable us to relate the concepts introduced above to functional neural networks. Through lesion studies and neuroimaging, neuroscience appears to have identified the brain areas metabolically active during mental state attribution, and thus the neural correlates of cognitive empathy. According to a recent meta-analysis (Lieberman 2010; also cf. van Overwalle 2009), cognitive empathy seems to be supported, to different degrees, by the following brain areas: dorsomedial prefrontal cortex (DMPFC), temporo-parietal junction (TPJ), temporal poles (TP), posterior superior temporal sulcus (pSTS), precuneus/posterior cingulate cortex (PC/PCC) and medial prefrontal cortex (MPFC). Note that (de)activation of one or several of these areas depends on which specific aspect of cognitive empathy becomes relevant in a given task or situation. Before moving on to the next section, where I discuss interfaces between the presumed target audience orientation network and other neurocognitive networks relevant to translation, I would like to put the spotlight on translation studies work that employs cognitive empathy or similar notions from cognitive science or neuroscience: Tymoczko (2012: 94, 97) touches upon empathy and its role in anticipating the target audience's responses; Martín (2012) gives thought to the related concept of mental simulation; in Presas & Martín's corpus of translation students' implicit theories (this volume), empathy and the conceptual metaphor TRANSLATING IS PUTTING ONESELF IN SOMEBODY ELSE'S PLACE make an appearance; Annoni et al. (2012) invoke the notion of theory of mind in another recent article, derived from work carried out within the University of Geneva's *Translation competence and Theory of Mind* project. Finally, a recent article from interpreting studies (where the neurolinguistic paradigm has enjoyed a certain popularity for quite a while)—Setton (2013)—also refers to the relevance of theory of mind.[6]

Neuroscience or research at the neurocognitive level provides us with neuroimaging (e.g., PET, fMRI, NIRS) and electrophysiological techniques (e.g., EEG, MEG) for triangulating data gained through other well-established data-gathering methods in translation process research, and affords new insights into the translation process at a different level of analysis (O'Brien 2013: 9). Taking into account findings from cognitive and social neuroscience

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6. Tied to different traditions, empathy has also been invoked by translation scholars such as Dussart (1994), Kohlmayer (2003, 2004) and Collombat (2010).

research may also help us verify and refine existing translation process and competence models, and perhaps highlight the need to add to, restructure or even replace them. In particular, we might be able to check current cognitive accounts of translation with a view to their neural plausibility.

Diamond & Shreve (2010) are among those select few who have already ventured into the world of neural and physiological correlates of translation and interpreting. They close their groundbreaking analysis of neural networks relevant to translation and interpreting by stating that "translation and other language mediation activities most likely involve many other systems, not all of which are language-specific" (2010: 309). In my opinion, the cognitive empathy network is a likely candidate for becoming recognized as such an important neural network relevant to translation. A research design and methods to test this claim will be presented after the next section (in section six).

5. Interaction of (neuro)cognitive target audience orientation processes with other translation-relevant processes

Since a lot of research conducted on cognitive empathy is also situated at the neural level of analysis, links to other translation-relevant neurocognitive networks might be established at the same level. Before looking at other networks relevant to translation (and interpreting), perhaps the notion of neurocognitive network deserves a brief aside: In the human brain, activation of various distributed and interconnected neuronal populations is required for accomplishing complex cognitive functions and tasks; it should therefore not be assumed that there is just one, specialized neural network responsible for translation (and interpreting), nor that any of the supporting networks works in splendid isolation (although they can of course be analytically distinguished). So which neurocognitive networks relevant to translation (and interpreting) have already been identified in the literature? Drawing on (neuro)cognitive research, scholars such us Diamond & Shreve (2010), Muñoz (2011) and García (2013) have highlighted the relevance for translation (and interpreting) of, among others, the networks supporting (multiple) language(s), language switching, attention, and various forms of memory. I believe it would be well worth exploring the relation between neurocognitive networks like these and the cognitive empathy network. Let me examine just three such networks and their relation to the cognitive empathy network: the memory network, and the language and communication networks.

Cognitive empathy and social cognition in general seem to be associated with a particular kind of memory. Recently, such a special kind of memory for

holding social information has been postulated, called social working memory (Meyer & Lieberman 2012, Meyer et al. 2012). Since (working) memory use, depletion, etc., has been a major issue in translation (and interpreting) process research, and the relation between social working memory and canonical working memory is a complex, tricky one, we might ask ourselves how comprehensive and accurate our models of working memory are for dealing with target audience orientation and other social processes involved in translation (and interpreting). Also, ultimate performance in target audience orientation might be influenced by how empathy (and social working memory) interacts with working memory. To get a clearer picture of the cognitive and neural underpinnings of target audience orientation and to be able to draw more reliable conclusions from empirical data, it might make sense to administer a working memory test. In my study, I will be taking a look at how these two factors, cognitive empathy and working memory, interact by measuring both (see below).

The other networks I want to discuss in relation to the cognitive empathy network are the networks supporting language and communication. The relationship between the cognitive empathy and language network in human phylogenesis and ontogenesis has been widely discussed (e.g., Malle 2002, de Villiers 2007, Milligan et al. 2007). The direction of causality, that is, which of the two networks precedes and is necessary for the other's development, remains controversial, as does the possibility of co-evolution. Doubts also remain as far as the interdependence of the neural substrates supporting language, communication, and cognitive empathy is concerned. Researchers in (cognitive) neuroscience distinguish the language network per se from the neural network underlying human communication (Noordzij et al. 2009). The former corresponds to the classic language areas whereas the latter includes other parts of the brain responsible for pragmatically appropriate language use at the discourse level, comprising those related to cognitive empathy (e.g., Stemmer 2008, Balconi 2010, Ferstl 2012; also cf. Indefrey & Levelt 1999, and Rickheit et al. 2008 for models of text production and communicative competence that include the cognitive empathy network). Some sort of communication based on mental state attribution appears to be possible even when the language network is impaired or destroyed (Willems et al. 2010, 2011), but more sophisticated communication (including translation) obviously requires both, mental state attribution *and* language.

What does that spell for research into the role of target audience orientation in the translation process? In healthy human beings, it is knowing a

language (and even more so two languages; cf. Kovács 2009) at a very high level enough for target audience orientation, because superior language competence is supposed to be already built on high levels of cognitive empathy? Is language competence therefore enough for explaining the target audience orientation ability?[7] An objection immediately comes to mind: The cognitive empathy network's engagement during a translation task might not automatically also imply successful activation of the language network, since translators might succeed in putting themselves into their target audience's shoes without being able to come up with an actual translation solution, or linguistic expression. A way to test this assumption empirically would be to look at neural activation during an *authentic* translation task, but it will take some time before neuroimaging technology has become miniaturized and sophisticated enough to allow for ecologically valid research designs. Let me suggest another, far more feasible possibility: We could find out how measures of language competence and cognitive empathy correlate with target audience orientation. Or we might use homogeneous subject populations to exclude the unwanted influence different levels of language competence would exert on the translation process and product, so that the correlation between cognitive empathy and target audience orientation can be measured more reliably (for subject profiling in translation process research, cf. Muñoz 2009). In my study, I will be taking a look at how these two factors, language competence and cognitive empathy, interact by measuring both (see below).

Having established links between the cognitive empathy network and other neurocognitive networks relevant to translation and interpreting (studies), and having discussed some implications of that for translation process research and cognitive translation studies, in the next section I present selected aspects of a research design for investigating (neuro)cognitive target audience orientation processes.

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7. I do not want to call into question the importance for translation of other knowledges and competences beside language competence. Others have been postulated such as an "instrumental subcompetence" (PACTE, e.g., 2008: 106); PACTE has also postulated a (bi)cultural or "extra-linguistic subcompetence" (e.g., 2008: 106), which I would say is supported by the brain's long-term memory network (in PACTE's model, extra-linguistic competence is distinguished from bilingual competence with reference to the distinction between declarative/procedural knowledge). In my study, the impact of both, instrumental competence and extra-linguistic competence, will be controlled for by choice of source text and translation assignment.

6. Measuring (neuro)cognitive target audience orientation processes

In this section, I introduce and discuss a research design for indirectly measuring the role of (neuro)cognitive target audience orientation processes with regard to translation. Special emphasis is placed on methodological insights derived from theoretical considerations brought up in this paper.

As acknowledged above, I want to explore the claim that cognitive empathy helps translators orient themselves towards the target audience in the different phases of the translation process. How can we support or reject the claim that it is cognitive empathy that helps translators put themselves into the target audience's shoes? In order to find out more about this, I will be conducting a quasi-experiment that involves a translation task. Data will be gathered on the product, process/behavioral, and process/verbal levels; data will be collected through key and screen logging (Inputlog/BB FlashBack), cued retrospection (BB FlashBack), a product analysis, a translation concept questionnaire (PACTE 2008, see below), a working memory test (WAIS Working Memory Index), a language test (in all likelihood, the WAIS Verbal Comprehension Index) and a self-developed questionnaire on subjects' personal and biographical background. Taking a cue from translation process research's recently awakened interest in personality psychology (e.g., Hubscher 2009, forthcoming; Jääskeläinen 2012), I will also be asking my subjects to fill out a self-administered questionnaire that measures trait (cognitive) empathy. I will use the questionnaire developed by Baron Cohen & Wheelwright (2004), which calculates a metric called the Empathy Quotient. It has been psychometrically validated (Muncer & Ling 2006, Allison et al. 2011), also cross-culturally (e.g., Wakabayashi et al. 2007, Berthoz et al. 2008), and seems to be the most reliable instrument around for measuring (cognitive) empathy (Stueber 2013). Statistically significant correlations between Empathy Quotient scores and empathy-related brain activation also have been found, for instance by Lamm et al. (2007).

What I am interested in is if there is a positive correlation between Empathy Quotient (first variable) and frequency of target audience-related adaptations on the product level, target-audience related behaviors on the process level, and explicit or implicit references to the target audience in subjects' retrospective verbalizations (second variables for correlation). On the product level, my indicators for target audience orientation include explicitations and implicitations (or reductions)—a choice that seems justified considering Hansen's and Englund's results—, other non-obligatory shifts, word choice and changes of perspective. Note that the absence of this sort of shifts may not necessarily be an indicator of a lack of target audience orientation. As a result

of mental target audience orientation processes, translators may conclude that for a particular source text segment and translation assignment there is no difference in knowledge or values between source and target audience that would necessitate adaptation. On the process/behavioral level, I assume target audience orientation to show in pauses, recursivity or changes from previous versions. On the process/verbal level, target audience orientation can be expected to manifest itself in explicit or implicit mentions of the target audience. My hypothesis is that the higher a subject's Empathy Quotient is, the more target audience-related adaptations/behaviors/mentions that subject is going to make or show. In case positive correlations are indeed found, we would have evidence supporting the assumption that cognitive empathy plays a (potentially major) role in target audience orientation. It is no easy feat to conclusively link behavior to mental processes, but data triangulation should contribute greatly towards ensuring certain shifts/behaviors/retrospective verbalizations are in all likelihood related to (neuro)cognitive target audience orientation processes.

Let me briefly address a few more issues, some of them already brought up above: Earlier, we came across the possibility that the cognitive empathy network and the communication network (including the classic language areas) overlap at the neural level. Assuming that it is impossible to find a homogeneous subject population with regard to language competence, I believe we could still find out whether a certain behavior is due to a lack of cognitive empathy or a lack of language competence in the target language. In case of an apparent failure in taking account of the target audience's perceived needs, the data obtained from the quasi-experiment through triangulation should allow us to find out if the subject really did not engage the neurocognitive target audience orientation network or failed to come up with a solution at the linguistic level. In the latter event, the subject would have realized the difference in presupposed knowledge or values between source and target audience, and hence the need for adaptation. He or she just would not have had the means to achieve the desired effect. Another indicator would be poor performance on the language test administered precisely for the purpose of distinguishing lack of target audience awareness from lack of language competence in the target language.

Let me quickly and generally remark upon the choice of source text and the nature of the instructions given to those participating in the quasi-experiment: The combination of source text and instructions should be such that target audience adaptations seem likely to occur and should reflect an authentic translation situation. The instructions should be subtle enough to

not give away the quasi-experiment's exact nature or push subjects too much towards target audience orientation. Yet, they should also be clear enough to allow subjects to form an image for what and by who the translation will be used.

At this point, let me stress the importance of taking into account subjects' translation concept in a quasi-experiment like mine. Why? As hinted at in Hansen's research (see above), the implicit theory of what (a) translation is or should (not) be might severely constrain the neurocognitive target audience orientation network. For example, it would be next to impossible for a translator who has internalized strong source text orientation and predominantly literalist translation strategies to bring to bear his or her trait cognitive empathy on a translation task. Again, if it is not possible to use a homogeneous group of pre-screened subjects, the impact of this important contextual variable should be monitored to be better able to account for the encountered data. To control for subjects' translation concept, I will use the questionnaire developed by PACTE (2008).

To conclude this section, let me offer a few remarks on some obvious limits of my research: My focus on the individual level could be criticized because translation is hardly a lonely activity, and target audience orientation might involve more parties; think, for example, of the discussions translators might be having with their colleagues or clients to better capture the perceived needs of the target audience. This extended nature has been reflected in pleas for the extension of translation process research's object of study, and the introduction of new methods for studying cognitive processes (Risku 2004, Hubscher 2011, Tiselius 2011, Risku & Windhager 2013, Risku et al. 2013; Risku, this volume; also cf. the notion of post-process in writing research, e.g., Atkinson 2003, and Wolf's sociology of a more widely understood translation process, 2007: 15–16). But then, cognitive empathy is a trait that has social roots. And since I cannot really build on much previous research, I have decided to begin at the individual level. As for the results' validity, caveats certainly apply to the validity of self-administered questionnaires (e.g., de Leeuw 2008), for participants in the quasi-experiment might only report what they *believe* to know about their empathy. Mixing methods and triangulating our data might offer a way out. For additional data triangulation in my study, one could think of conducting longer semi-structured, qualitative interviews to supplement data gained from the questionnaire and the verbal data. Conducting them would provide us with potentially richer statements about translators' cognitive empathy, and issues only touched upon during retrospection could be further explored. The limited number of subjects participating in our experiments

jeopardizes the generalizability of our results, but at this juncture it might make more sense to refine research designs and methods before conducting experiments on a large scale.

7. Conclusion

This paper set out in search for the cognitive and neural underpinnings of translators' ability to orient themselves towards the translation's target audience during the translation process. Clarifications were offered as to what target audience refers to in my research. Drawing on research on the translation process, broad analytical categories were identified that appear to capture cognitive target audience orientation processes on the product and process level. (Neuro)cognitive concepts such as long-term memory and metacognition invoked in relation to target audience orientation were reviewed. Building on current findings from psychology, cognitive science and neuroscience, the case was made for a different concept to account for translators' ability to put themselves into their target audience's shoes: cognitive empathy. The cognitive empathy network's relations to other functional neural networks relevant to translation were also explored. A research design was proposed to test the cognitive empathy network's relevance for target audience orientation and its impact on translation product and process.

What benefits might the sort of research described in this paper yield? First, it adds to the extant body of knowledge related to audience orientation in written translation by providing a (neuro)cognitive framework for explaining target audience orientation; second, it discusses target audience orientation in relation to translation process models and componential translation competence models, and could help establish the criterion of neural plausibility; third, it contributes to a tentative (neuro)cognitive translation model by combining insights about cognitive empathy with insights about translation from other studies situated at the neural level; fourth, it helps extend research designs and improve methods typically used in translation process research and cognitive translation studies.

I hope that in the future we will see more studies combining findings (and methods) from social and cognitive neuroscience, and personality psychology, with behavioral analyses of the type we have grown accustomed to from translation process research. This might indeed usher in an interesting new phase in the evolution of cognitive translation studies and translation process research.

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BIONOTE / KURZVITA

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TRANSLATION PROCESS RESEARCH AS INTERACTION RESEARCH: FROM MENTAL TO SOCIO-COGNITIVE PROCESSES

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Abstract

The main methodological approaches used in cognitive translation process research have hitherto been inspired by methods originally developed in the behavioural sciences, especially psychology. This article contends that mainstream experimental research in laboratory settings needs to be complemented with other methodological approaches such as qualitative, ethnographic research in order to be able to account for the situated, embedded and extended aspects of cognition – as described in current cognitive science approaches. In addition, it presents the empirical research design and initial results of an ethnographic field study into the socio-cognitive aspects of translation. The results show the complexity of the social network involved in the observed case of freelance translation, the tendency of the translator to externalize parts of the process and thus transform the internal processing into an interaction with self-produced outer stimuli—thereby reconfiguring the cognitive space—and the existence of distinct, iterative interaction patterns that stand out as behavioural and cognitive routines in the way the translator works.

Kurzreferat

Die zentralen methodologischen Ansätze der kognitiven Translationsprozessforschung orientierten sich bisher an jenen Methoden, die ursprünglich im Rahmen der Verhaltensforschung, allen voran der Psychologie, entwickelt worden waren. In diesem Beitrag wird argumentiert, dass die etablierte Tradition der experimentellen Laborforschung mit weiteren methodologischen Herangehensweisen, etwa dem ethnographischen Forschungsansatz, ergänzt werden sollte. Entsprechend der gegenwärtigen Auffassung in der Kognitionswissenschaft bietet eine derartige Erweiterung die

Möglichkeit, dem Konzept der *situated, embedded* und *extended cognition* Rechnung zu tragen. Des Weiteren werden in diesem Beitrag das empirische Forschungsdesign sowie erste Ergebnisse einer ethnographischen Feldstudie zu soziokognitiven Aspekten von Translation beschrieben. Die Beobachtungen einer freiberuflichen Übersetzerin offenbaren zunächst die Komplexität ihres sozialen Netzwerkes. Zudem wird die Tendenz der Übersetzerin deutlich, Teile des Arbeitsprozesses zu externalisieren, wobei interne Verarbeitungsprozesse zu Interaktionen mit selbst generierten Artefakten umgewandelt und kognitive Räume somit neu konfiguriert werden. Nicht zuletzt wird die Existenz verschiedener, iterativer Interaktionsprozesse veranschaulicht, die spezifische Verhaltens- und Denkmuster der Übersetzerin darstellen.

1. Introduction

The paper begins with a brief description of the goals and methodological development of the study of cognition in translation. The main experimental path in cognitive translation studies is outlined, and a complementary, ethnographic studies approach is suggested in order to be able to account for the situated, embedded and extended aspects of cognition, as described in current cognitive science approaches. The empirical research design and first results of a field study into the socio-cognitive aspects of translation are also presented.

The case described in this paper forms part of preparatory research for the "Extended translation: Socio-cognitive translation processes in the workplace" (ExTra) project that is being carried out by the Translation: Cognition and Cooperation (TCC) Research Group in the Department of Translation Studies at the University of Graz from 2014 to 2016.[1] Given the growing appreciation of the need to recognize the extended, embodied and situated nature of human cognition, this project has been specifically designed to take an extended approach to capturing and exploring some of this complexity and heterogeneity. Translation processes are examined in terms of translation networks, actors and environments. Our aim is to acquire rich descriptions of individual cases which can then be related to each other—using a methodological approach which could be labelled as an ethnographic, multi-case method and includes qualitative interviews and participant and non-participant field studies. These different forms of analysis are inspired by diverse, yet compatible theoretical frameworks and will collectively help to create a comprehensive picture of the dynamics and the embodied, extended and situated cognitions involved in translation processes.

In line with the concept of "theory as process" (Glaser & Strauss 1974), the case described in this paper is the first field study for this project and allows us to generate initial results as data-oriented hypotheses. In addition, it serves to test the ethnographic viability of the data acquisition methods

chosen and the adequacy of the method of data analysis. This first case also serves to explore the practical challenges of entering and carrying out research in the field (see also Ehrensberger-Dow, this volume) and in the specific translation situation: a freelance translator working directly for clients, not for translation agencies. However, these methodological considerations do not form the subject of this paper, which instead presents the first preliminary results for the project.

2. The experimental and the ethnographic path

A central goal of cognitive science approaches in translation studies is to model the cognitive processes in translator actions. The ultimate aim of such modelling enterprises is to establish a deeper understanding of how translations are produced, thus identifying the main factors on which the translation process depends and how these factors influence each other. Even though the end product, a translation, is the indisputable main goal of the process studied, from a "translator studies" perspective (Chesterman 2009), the research focus lies explicitly on the translation process, and less on this translation as the end product. There is a considerably strong consensus that analysing an end product will not reveal the factors that made it the way it is – to uncover these, we have to analyse the actual process itself and the factors that influenced this process (and, in our case, lead to the translation product).

The main methodological approaches used to make these processes and factors visible and analysable in cognitive science approaches in translation studies or cognitive translation studies have hitherto been inspired by methods originally developed in the behavioural sciences, especially in psychology. The methodological challenges of this line of process research include establishing an exact definition of the variables to be studied, hypothesizing a correlation between them, being able to manipulate a particular variable, setting up an experimental and a control sample/group, and analysing a statistically sufficient amount of data or subjects to verify or falsify the hypotheses. Due to the need to control the confounding variables, the empirical research is mostly carried out in a laboratory setting.

In such approaches, the persons translating a text specifically chosen for the study are observed, primarily using the thinking-aloud method, retrospective interviews, keylogging, and/or eye-tracking. This line of methodological development can be regarded as the mainstream of translation process research. It has been the subject of considerable constructive criticism in the last decades, mainly with regard to the need to establish a control group, argue for the choice of participants (laymen, learners, translation

graduates, working translators), define the necessary criteria for their inclusion as participants, control the variables, include other data than just verbal, introspective data, involve a sufficient amount of data or subjects, and carry out other preparations to make sure the study actually measures what it is supposed to measure. Thus, this line of criticism and the subsequent development of the research designs are aimed at the fulfilling of the requirements set for classic scientific experiments. This development follows a positivist line of thinking, relying on a quantitative analysis of data as required in controlled experiments. In my view, these improvements were (and still are) necessary to correctly define the scope of the experimental data and the status of the results as well as to unlock the full potential of the mainstream experimental path.

However, my main point in this article is that we will also need other methodological paths of inquiry to model the cognitive processes in translation and to establish a deeper understanding of how translations are produced. Present cognitive scientific views of human intelligence, such as the *situated, embodied* and *extended* cognition approaches (see, e.g., Suchman 2007, Clark 2008, Clark & Chalmers 1998), suggest that cognitive processes are context-dependent, i.e., they are dependent on and partly constituted by the social and physical environment in which they are carried out. Cognition is made up of parallel processes like bodily movements and neurological activity, action and perception, externalization and internalization inside and outside the mind (the leaky, situated mind; Clark 1997). Furthermore, these processes are path-dependent processes that do not conform to stable rules but instead depend on the point in time in which the individual cognizers happen to be in the cognitive and environmental dynamics (Clark 1997:204ff). Cognition itself is heavily dependent on the sequence of prior learning and doing (Elman 1994). Its context- and path-dependency suggests that we will actually also have to study translators in their authentic, personal, historically embedded environments and translation situations if we want to be able to describe the cognitive process—i.e., if authentic translation processes are to be included in the research object.

Translation process research has hitherto focused strongly on the mental processes of individuals in isolation, while situated and embodied cognitive science approaches describe the situation as part of the thought process, and cultural artefacts as cognitive scaffolds used for support in cognitive activities (Clark 1997, Clark 2008, Hutchins 2010). Accordingly, one of the goals of the present project is to investigate and understand the relevance and consequences—in terms of practical decisions in translation process research

projects—of translation not being an internal symbol-manipulation process that is independent of time, place and history. The research design takes into account those recent professional developments that can be characterized as a move towards a computer-assisted network economy (Abdallah 2010, Risku 2009, Risku & Dickinson 2009, Abdallah & Koskinen 2007). The research focuses on the interaction between translators and their environments and the resulting dependencies. In doing so, it addresses heterogeneous areas like cooperation with subject matter experts and colleagues, terminology management and contacts with customers. In essence, this perspective enlarges the object of process research, which can then be styled as *extended translation,* i.e., as a form of coupled system between human organisms and external entities. Thus, in addition to the experimental, quantitative line of empirical research, we will also need descriptions of translatorial cognition and action in its dynamic and social setting.

3. Exploring the methodological consequences

The contemporary debate on the theoretical consequences of the current cognitive scientific approaches to the concepts used in cognitive translation studies is lively and productive (see, for example, Muñoz 2013, Martín de León 2013, Risku 2010). Indeed, it would seem that a lot of rethinking, reorientation and restructuring need to be done to take the cognitive scientific developments into account in our theoretical work. The need for innovation would seem to be even more pressing on the methodological level: Scholars of cognitive translation studies have only just started to develop and pilot new research designs that have the potential to cope with the overwhelming changes in research methodology needed to study situated, embodied and extended cognition.

The present article is a report on one of my first tentative steps in exploring the practical possibilities of doing justice to the research object—cognition as described in the situated, embodied and extended cognition approaches—in the practical decisions of empirical research design. With this aim in mind, I have placed special emphasis on studying factors that have not been the centre of attention in translation process studies in recent decades, such as the social, historical and environmental embeddedness of cognition in translation. The ethnographic path lends itself nicely to such purposes. Here, qualitative field studies with participant observations are conducted to reveal an internal view of how meaning is constituted by the participants themselves in their own particular situations. In contrast to the quantitative, experimental path described above, the methodological challenges of this line of translation

process research include being able to describe or at least approximate the perspective of the participants in their authentic situations of action, and being able to show how they construct meaningful action and structure the research object. Accordingly, the object of research can be described as the "methodology" of everyday cognition (as emphasized in the ethnomethodology approach; Garfinkel 2002).

One of the essential differences to the controlled experiment path is that the factors to be studied are not defined and determined exactly prior to empirical inquiry; they are identified through the empirical research itself. With recourse to prior research (both theoretical and empirical), there will be prior assumptions regarding the kind of factors that will probably be relevant. These assumptions are necessary to allow some structuring of the research object prior to empirical inquiry in order to decide on the data sources to be included. However, the aim here is to approach the research object as something "other", so that previously unknown phenomena can become visible through empirical observation and analysis (Hoffman-Riem 1980). Thus, the basic hypothesis is that the research object will include factors that were not thought of when planning the research. The researchers are like anthropologists entering partly unknown territories and cultures, trying to find out how the research object is structured in the first place.

Again, in contrast to controlled experiments, ethnographic research has developed a systematic procedure not just for testing but also for developing hypotheses. According to the "theory as process" approach (Glaser and Strauss 1974), first data-oriented hypotheses are generated through the first field study or studies. These hypotheses will be expressed using labels that are as close to the data as possible in order to avoid premature, undue generalisation. They also influence the choice of the next case or cases to be studied (a procedure called *theoretical sampling*). The subsequent cases are again observed and analysed in a data-oriented manner, so that new hypotheses can be generated, and the prior hypotheses can be tested and adapted through systematic comparative analysis. This procedure of expanding the field, data-oriented and comparative analysis, and generating and testing hypotheses is repeated (if possible) until theoretical saturation is reached and new cases do not provide any essential new insights into the specific research object and research interests.

Ethnographic field studies often include methodological triangulation: Information on the research object is gathered through different methods from independent data sources in order to increase the validity of the results. Such data-gathering methods can include observation, interviews, and document

analysis. Through independent analysis by different researchers, an intersubjective account of the data is provided (intercoder reliability).

4. Cognitive-scientific framework of research

Sketching the theoretical concepts used to approximate the research object poses a special challenge in the situated, embodied and extended cognition approach, as there is no well-established tradition in translation studies to rely on and no ready-made cognitive scientific models to apply. The situation would be different if we were relying on older, more traditional cognitive science approaches. For example, in the propositional theory of mind (Fodor 1981, Pinker 1997), where cognitive processes are described as linguistically transparent and rule-based symbol manipulation processes, we could apply algorithms to simulate the mental computerization. We could also describe the cognitive structure as semantic networks that include a logical order and definable mental units with specific characteristics. In such a case, abstracting a symbolic representation of the mental processes that are assumed to produce the observed translator behaviour would suffice as an explanation. However, this information-processing view of cognition—with its metaphor of the mind as a computer—seems to fall short as a model of real-life, real-world human cognition. Another well-established and popular line of cognitive science, connectionism, describes cognition as parallel distributed processes of pattern recognition in the neural network of the brain (Rumelhart & McClelland 1986). The connectionist approach is an essential move towards neurological plausibility in cognitive science, but its sole concentration on mental, internal processes of the brain now seems insufficient in light of the findings of the many cognitive scientific approaches that began to tackle the challenges of "bodies, the world, and dynamic systems" as well as "societies" in the 1980s (Thagard 2005: 191ff). In the course of the subsequent decades, there has been an increasing amount of evidence that body, world, time, and social activity play essential roles as constituent parts of cognitive processes. The approaches developed in this paradigmatic change in cognitive science—e.g., situated, embodied, embedded, dynamic systems and extended cognition— belong to a group or cluster of several current cognitive scientific approaches with different conceptual frameworks and foci but similar, "broadly compatible" and "loosely united" research interests (Atkinson 2010: 606; see also Clark 1998).

However, these cognitive approaches have not developed established, neatly presented models of cognition that include the factors needed to explain cognitive processes. This is probably due to the fact that not only are they

themselves still in a relatively early phase of development, but also that the concrete factors which influence cognition in an individual case are, by definition, situation-dependent. If we take the claim seriously that cognition is a distributed process that not only includes the brain, but also the body and the environment of the brain, we will have to decide what parts of the potentially relevant environment need to be taken into account in a specific translation process research study. Should the cultural, ecological, physical, historical, social and other aspects of the environment be included? If so, how should this be done? The observation should potentially include the use of artefacts like information and media infrastructures, architecture and the spatial and geographic context, the biological and ecological environment, as well as the social spaces and the areas of interaction—all in their dynamic, cultural and historical contexts. Obviously, there are project-specific decisions to be made here, since each research endeavour will focus on specific research questions and naturally cannot include the whole complexity of human cognition.

5. Prior modelling of the research object

As mentioned above, we need to do some structuring of the research object prior to an empirical inquiry in order to decide on the data sources to be included. In a recent article (Risku, Windhager & Apfelthaler 2013), my colleagues and I relate the current cognitive science discussion to an integrative approach in the field of social network analysis: We draw from Schweizer's (1996) dynamic network model to include both environmental as well as mental aspects in the analysis, and adapt it for our cognitive translation studies purposes to form a dynamic model of translatorial cognition and action. In the present paper, data acquisition is incorporated and discussed in line with the six aspects differentiated in this adapted model: cognition, action, social network, artefacts, environment, and time.

Cognition refers to self-organizing processes of interconnected sensorimotor sub-networks of the cognitive system (Peschl 2002) and includes all operations that work on internal and external representations with the aim of creating translations, building, for instance, on memorized knowledge (of languages, translation, business, communication and cooperation methods) and including all manner of associations, knowledge and expectations. *Action* refers to all physical translation activities that involve task-oriented operations and actions as behavioural, observable action patterns. The *social network* includes all actors with their specific roles in formal and informal networks, along with their relational ties, which often include the coordination of responsibilities and workflow patterns. *Artefacts* include the material

and immaterial objects used as tools, such as mental and physical checklists, texts, software and hardware. The translation *environments* include the source, target, client, and translator activity systems, as perceived and operative from the point of view of the translators or other actors involved in the translation process. They form the ecological, physical, geographic, economic, political, demographic and social boundary conditions of action. Finally, *time* here refers to the temporal changes and developments in each of the above aspects, their relations and the overall situation. Thus, time is not an independent aspect, but will be discussed as the temporal-historical dimension of the other five.

6. Data gathering

In line with this initial structuring of the research object, data were gathered on the following points:

Cognition: This aspect essentially deals with the person and his/her thinking in his/her historical and present context. Which cognitive resources and experiences inspire the person being studied? Where does he/she come from? How did he/she end up in a translation-relevant role? How does he/she see himself/herself? How does he/she feel in that situation? It is to be presumed here that the prior and current education, training, academic background and work experience of the person studied will have an influence on his/her associations, knowledge, expectations, interests, emotions and evaluations.

Action: Given the increasing differentiation and heterogeneity of the tasks performed in the field of translation, this aspect can theoretically include translatorial actions that extend from the translation of certificates, technical texts and literature through to the localisation of video games and the different actions included in terminological research, project management and participation in online discussions.

Social network: In his/her current work processes, an individual translator can be integrated into complex, higher-level processes with complex forms of work distribution, virtualisation and networking. The translation process is increasingly mediated by different people and instruments in an increasingly longer chain and increasingly larger and more complex networks (Buzelin 2005). Target language material (e.g., in the form of glossaries, translation memories, parallel texts and text modules made available by others) provided to the translator or third-party revision processes can strongly impact the final translation. These developments indicate a shift in perspective from the

individual to a network level, suggesting a need to revise the individualistic concept of "*the* translator". This project will therefore place an emphasis both on such networks of actors and on the aspect of computer-assisted collaboration, where the negotiation of complex activities and conflicting interests are a daily task.

Artefacts: Artefacts are material and immaterial objects formed and used by humans in cognition. As cognitive scaffolds (Clark 1997), they help and structure thinking by serving, for example, as reminders, retainers and organizing elements. From the theoretical perspective, the fundamental role played by artefacts has been stressed by the common predecessors of the situated, embodied and extended approaches, e.g., in the work of Vygotsky (1986), who emphasizes the social aspect of learning and the way in which adults, peers and experts with their cultural concepts, models and artefacts facilitate and enable cognitive development. Thus, artefacts are not just restricted to modern information and communication software and tools, but also include all the material and immaterial objects we use to avoid having to try to store and process all the relevant information we need in the brain. As current trends indicate, while an increasing use of digital technologies is evident in many fields, including translation, there are still some individual possibilities to deviate from the mainstream: Depending on the paths their lives and work take, people can become data hermits, luxury 'offliners' (who have no access to digital media or consciously reject the use of digital media and participation in digital networks) or indeed couch potatoes or online nomads—who use digital media intensely and participate in digital networks either from home or other locations (Hartmann & al. 2001).

Environment: The translatorial environment and the client's environment usually form part of the source or target system. However, this does not always have to be the case, since translation projects are frequently outsourced and offshored to distant locations, often for economic reasons. Thus, the physical, geographic, economic and political conditions of action are not self-evident and must be studied on a case by case basis.

7. The case and its participants

This project is a further step in an ongoing body of research aimed at establishing a theoretical foundation of an extended view of translation and exploring the methodological choices and decisions to be made. Since my last empirical research project in this area (Risku 2009) included a field study at

a reasonably large translation agency and dealt mainly with the complexities of translation management and working with numerous clients, agencies and freelance translators, I felt that my next case for scrutiny should be one that was able to extend this picture of translation processes as they can be observed today.

It can be reasonably assumed that a contrasting translational setting would, for example, be one in which a single translator works in direct contact with a client who has written the source text himself/herself. Since my research interest lies not in the achievements and deficits of laypeople or students, but in translators who have demonstrated and achieved a continuously high level of translating performance (Ericsson 2010: 254), the object of study was chosen based on personal recommendations from several independent clients of the translator. These recommendations correspond to "the expert's superior performance" described by Ericsson (2010: 256) in an interpreting context: "If we are primarily interested in the development of elite interpreting performance, it may be necessary to seek out those individuals that have attained an outstanding, reproducible level of interpreting performance", while "it is likely that elite interpreters have studied and practiced interpreting for 10–20 years". The translator observed conforms to these criteria with the exception that she did not study translation; she is an English native speaker who originally studied modern languages (French and German).

In this project, the observation will also not be restricted solely to *one* person during *one* phase of the production process, but will instead reconstruct the entire collaborative "making-of" a translation: from the early pre-production phase to the actual work involved in creating the translation and the subsequent post processing. For this reason, I selected a translation project for which the whole "principal-agent dyad" (Abdallah & Koskinen 2007) of client and translator can be included as research participants.

8. Data acquisition and preparation

A combination of interviews and participant observation was used in the data acquisition process. Qualitative, semi-structured interviews served to reconstruct the complete translation process from both the client (a retrospective interview lasting 1h20min) and the translator perspectives (a retrospective interview lasting 1h09min and several short interviews both prior to and after the observation periods). The interviews were audio-recorded. Two days of participant field observation were carried out to obtain insights into the translation processes carried out by the translator (detailed protocols of day I: 2h25min, day II: 2h25min; the equal duration of the two observation

periods is merely a coincidence, yet indicative of the concentrated, continuous working time spans of the translator observed). During the observation, hand-written notes were taken to document the translation process. These notes were then used in the verbal dictation of the observation protocol onto audiotape immediately after each observation period. The interviews and observation periods were protocolled according to GAT conventions (see Selting & al. 2011).

In the present case, it was not possible to observe the translation process that was the topic of the interviews carried out with the translator and the client. Instead, the translator was observed translating a similar text (a detailed, informative report on the results of a research and development project) in a similar situation (translating for a "direct" client, not for an agency). The target audience for both the reconstructed and the observed translation processes is the international community in a particular field; the language can be categorized as generally understandable, non-technical and non-literary; and the translator is translating from German into English (her mother tongue). Even though the observation period also included other ongoing projects, the results reported here rely solely on the analysis of the cognitive aspects of the original, reconstructed project and the very similar project the translator was working on during the observation.

9. Data analysis

The interview and observation protocols were analysed according to the qualitative analysis method proposed by Mayring (2000), which relies on the data-oriented development of themes, categories and patterns. The topics identified in the material were contextualized and the relationships between the topics were analysed. Two researchers independently carried out first data coding and analysis, followed by common coordination sessions in which a consensual categorization was attained, thus providing intercoder reliability. The main actors and tools mentioned by those interviewed and/or observed were documented. The network that became visible in the analysis (from the point of view of the interviewed/observed individuals) was visualized as a simple network graph. The individual relationships were described in writing.

10. Preliminary results

Since we are currently still at the stage of analysing the interview and observation protocols, I am only in a position to report on some initial, preliminary results of a striking, palpable nature; their existence as cognitive characteristics

of the research object appears quite evident right from the first analyses. Likewise, since we are still working on the implications of the analysis and seeking to obtain an overview of the complex, heterogeneous dynamics involved, I can only offer a brief glimpse at some of the results on different levels, without integrating them at this stage into a single system or model. By necessity, less attention will be paid in this article to other data gathered; the relevant environments (physical, geographic, economic and political conditions of action) and the personal histories of the actors involved, for example, will not be addressed in any kind of detail in this paper. However, there are three phenomena which I can already mention with a fairly high degree of reliability. These are described briefly below from the macro to the micro-level of the activity system analysed: (1) network complexity; (2) interaction—reconfiguring the cognitive space; and (3) iterative operation patterns.

10.1. Network complexity

From the social network perspective, this case could be presumed to exhibit characteristics of the classic single principal-agent dyad, not a complex multi-node network. After all, a "classic" case of a single translator working directly for a client-author was deliberately chosen as the smallest translatory
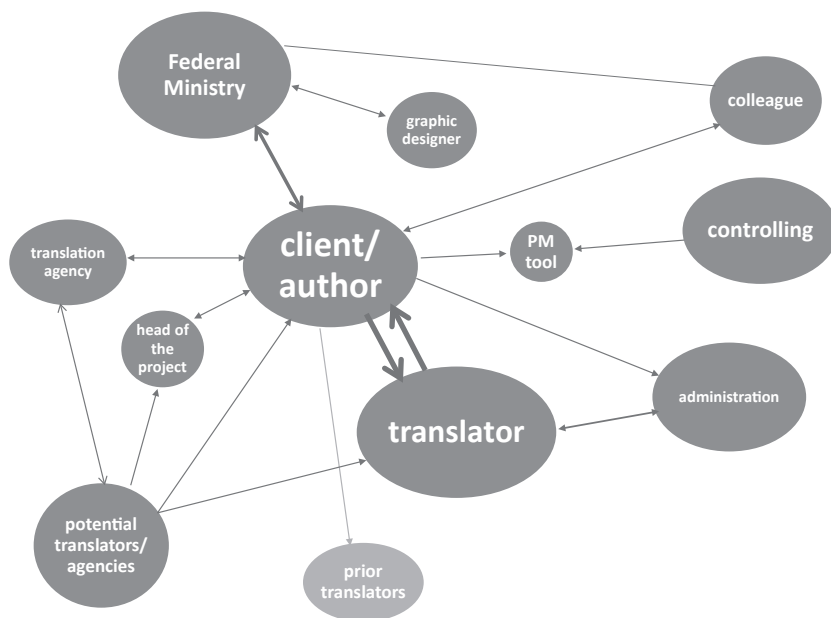
Figure 1. The client / author network.

project unit. Such units are supposed to be relatively independent in their mutual negotiation of project conditions, i.e., without intermediaries (Abdallah 2012: 46). However, it was strikingly apparent that the translation project actually involved a whole network of actors and tools, both on the client and on the translator side. To exemplify this point, let us take a closer look at the client network.

The client acted as one node in a project-relevant network with several other actors and environmental constraints (see figure 1). The (ego-) network that became visible here included (in order of appearance in the project):

— the sponsor/contractor of the research and development project (and via the sponsor/contractor, the graphic designer) who financed the project, including dissemination (of which the translation formed a part),
— the head of the research and development project (to whom the client himself reported),
— the project management tool (and via the tool, the controlling department in the client's organization) as the project handbook in which he documented the contents of the project, hours worked, correspondence, and monthly financial reports,
— prior translators and the client's cooperation experience with these translators,
— the translator, translation agencies and other freelancers considered as potential translators for the project,
— an administrative unit in the client's organization to whom he forwarded information on the translator and the project to enable them to draw up the necessary contract,
— a translation agency which had been commissioned for another translation for the same organization, but for another client and project,
— a colleague of the client who was asked to revise the translation and whose overwhelming revisions were completely ignored by the client (with reference to their low quality).

The client was very aware of the influence of these actors and tools on the project and its end product.

10. 2. Interaction: Reconfiguring the cognitive space

The translator's workplace is set up with all the necessary tools at hand around her (quite literally "around" her, on all four sides of her seat, see

figure 2): From right to left, she has her mobile phone, two screens (each with a specific function), a keyboard in front of them, a pile of notepaper and a pen between the screens (behind the keyboard), an iPad, a printer, files and folders, various books and dictionaries and a shredder. There are only a couple of books on the desk (e.g., on English style, a parallel text); most other translation-related books (e.g., dictionaries, grammar books, etc.) are stored in a bookcase directly behind her seat, but none of these were used during the observation period.

Figure 2. The front part of the translator´s workplace (the Union Jack coffee cup was only placed on the desk after the observed working period).

The translator leans on external (in the sense of non-mental) and, probably more interestingly, externalized resources in several ways. For example, as external resources, she uses

- the source text (which she reads through in its entirety and then translates from the beginning to the end),
- online dictionaries ("for inspiration"),
- online parallel texts (mainly to check correct usage of terminology), and
- prior translations she has done herself (to maintain consistency with prior solutions).

The use of these external resources was observed and noted during the workplace observation, and their role in the translation process was described by the translator in the retrospective interviews.

In addition, the translator showed a clear tendency to externalize a part of the process and thus transform the internal processing into an interaction with self-produced outer stimuli. For example,

a. She wrote down a term found in a parallel text on a piece of paper to have it to hand for subsequent use in the current translation, only to throw the piece of paper away afterwards. This way, she changed the task from trying to remember a term to using external memory aids.

b. She repeatedly wrote a draft translation of (part of) a sentence, which she then went back to and changed immediately after she had written it. Thus, she did not first formulate a satisfying, sufficiently adequate (part) sentence in her head and then write it down, but preferred to first write a rough initial suggestion and only then formulate the sufficient solution by manipulating the already externalized words and utterances.

c. After translating a couple of further sentences, she read and revised this sentence again. Given the types of revisions she made, for example, adding context, improving the style, and adding the word *Austrian* (which was not necessary for the source text readers, but is needed for the target text readers), it would seem that she was then mainly looking at the translation as an independent text from the target reader perspective. In doing so, she seemed to write a second version of the target text and changed her task from writing to editing.

d. Repeatedly, while reading some paragraphs of her translation immediately after writing them, and without writing or correcting anything, she moved the cursor back and forth, up and down, pointing to the area of interest and following her gaze. In this way, she changed the task from keeping track of the flow of text to following the cursor.

e. After writing several paragraphs, she changed her sitting position, took her hands off the keyboard and mumbled the last translated paragraphs half loud to herself, sometimes quickly correcting a point or two. When asked about this mumbling in a retrospective interview, she said that she usually does that in order to "hear what the translation sounds like". On the one hand, through this repeatedly observed pattern, she generated a break (a turning point) to mark a closing of a task, and on the other hand, she produced outer stimuli to avoid

purely internal processing—she could then actually hear what the translation sounded like instead of just trying to imagine it.

The above externalizations demonstrate interaction loops that clearly consist of cognition, action, use of artefacts and environmental organization—epistemic actions that serve thinking and change the nature of our tasks (Kirsh & Maglio 1994). As Clark (1997:207) notes, public speech and inner rehearsal are typical tools for changing the type of task from mental processing to interaction with the environment and thus reconfiguring the cognitive space.

10.3. Iterative operation patterns

During the planning activities, the text preparation, and the parallel production and revision of the translation, there were several observable, iterative, regular patterns that stand out as behavioural and cognitive routines in the way the translator works. Two main processes can be clearly distinguished. The first of these is the fluent alternating of her attention in line with certain iterative patterns between information resources on the left screen and writing the translation on the right screen (copy and paste of source and target text terms from right to left and left to right, searching in online resources in a specific, typical order on the left screen, etc.). The second process takes place within the production and processing of the translation on the right screen. Typical routines observed here include, for example,

a. repetitions of the sequence of "writing, rewriting;"
b. after completing 1–2 paragraphs, repetitions of the sequence of "reading, rewriting, adding context;"
c. changing sitting position, leaning forward, repetitions of the sequence of "mumbling, rewriting;"
d. deleting the source text passage translated, changing sitting position and marking the completed work both physically and with a verbal or para-verbal utterance like *done!* or *phew!*

In view of the above mentioned findings, it seems that the usual description of different mental problem-solving patterns in translation process research could be complemented with the description of such cognitive *interaction* patterns. On the one hand, this would emphasize the role of fluent interaction in translation, whereas translation process research has traditionally strongly concentrated on the strategies translators use when encountered with explicit or implicit translation "problems" (causing, e.g., pauses or problem verbalizations; see also Muñoz 2010). On the other hand, it would avoid

the expectation in translation process research that all the remembering, processing, and monitoring is done in the head, since major parts of this seem to be shifted to bodily movements, spatial organization, and interaction with artefacts.

11. The socio-cognitive extension to translation process research

One aspect that surprised me in the initial results from this project was the complexity of the networks on both sides, i.e., on the side of the client and on the side of the translator. In my search for the smallest possible unit with a minimum number of process participants, I had chosen a dyad and ended up with complex full-grown interactive networks. The other two distinctive phenomena observed, interaction (reconfiguring the cognitive space), and iterative operation patterns, however, confirmed the theoretical assumptions: They seem to be symptomatic of the social embeddedness of cognition and of the human tendencies to externalize mental processes, shift cognitive processing load to external aids and transform mental processes to interaction between embodied action and artefacts. As Clark (1997:207) says, "Again and again we trade culturally achieved representation against individual computation".

All in all, our dynamic model of translatorial cognition and action (Risku, Windhager & Apfelthaler 2013) was crucial in allowing us to model the object of interest and design the data acquisition and analysis in a way that revealed the above mentioned phenomena. The fact that the ongoing research project takes the situated, embedded and extended cognitive scientific approaches as its basis provides a double extension to mainstream translation process research in its methodological design. On the one hand, the concept of the translation process itself is widened. The process is defined as starting with the decision to have something translated and ending when the translation is approved and paid, last contacts in the project are completed and the translation is made available in the target setting. All through this process, decisions are made that depend on the cognitive processes in the different interactive situations and influence the final outlook of the translation. On the other hand, the scope of cognitive research to translation is widened from mental to socio-cognitive aspects, including the social and artefact-mediated processes that form part of cognition—the whole system that constitutes human intelligence (Clark 2008). These extensions might help us conceptualize translation in a broader sense and avoid ahistorical, reductionist fallacies. Since a research project can always only describe a part of the complex socio-cognitive dynamics involved in translation, opening

the map to include socio-cognitive processes might be helpful in pinpointing which part and which aspect of which sub-process we are taking a closer look at in a given research project.

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CHALLENGES
OF TRANSLATION PROCESS RESEARCH
AT THE WORKPLACE

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Abstract

Translation usually takes place at translators' workplaces, yet much translation process research refers to data collected under controlled conditions such as the classroom or the lab. Pursuant with recent descriptions of translation as a situated activity comes the necessity of investigating that activity where and when it occurs. Many of the methods that have proved useful in the lab have also been applied in the field, and some of the challenges associated with investigating translation at the workplace are common to any kind of empirical translation research. However, certain workplace constraints present special challenges to everyone involved. Some solutions that were developed for a workplace study in Switzerland may prove useful in other investigations and might allow new questions to emerge in this developing field.

Kurzreferat

Übersetzen findet für gewöhnlich am Arbeitsplatz von ÜbersetzerInnen statt, doch ein Grossteil der Übersetzungsprozessforschung bezieht sich auf Daten, die in einem kontrollierten Umfeld wie dem Klassenzimmer oder dem Labor erhoben wurden. Neueren Beschreibungen des Übersetzens als situationsgebundene Tätigkeit entsprechend besteht die Notwendigkeit, diese Tätigkeit dann und dort zu untersuchen, wann und wo sie ausgeübt wird. Zahlreiche Methoden, die sich im Labor als nützlich erwiesen haben, wurden auch im Feld angewendet und einige der Herausforderungen, die mit der Untersuchung des Übersetzens am Arbeitsplatz verknüpft sind, sind jeder Art von empirischer Übersetzungsforschung gemein. Dennoch stellen einige Einschränkungen am Arbeitsplatz für alle Involvierten eine besondere Herausforderung dar. Gewisse Lösungen, die für eine Arbeitsplatzstudie in der Schweiz erarbeitet

wurden, könnten für andere Untersuchungen hilfreich sein und neue Fragestellungen in diesem sich entwickelnden Gebiet hervorbringen.

1. Introduction

Graduates of our programs report that some of their courses prepared them for the realities of the professional translation workplace but that the range of tasks they were expected to perform there often surprised them. Some of them discovered that much of their work time was spent not just translating source texts in one of their languages into target texts in another. Instead, adapting texts for different readerships, editing, post-editing, revising non-native users' writing, and proofreading seemed to have become a big part of their brief. Developments in software applications and business processes in many translation companies have kept pace with some of these changes, but relatively little research has been done in the workplace to determine how professional translators are coping with the new demands placed upon them. Since professional translation is an economic activity, there are commercial interests and needs to consider. As Martin (2007: 60) puts it, translators must "balance risks and resources" to achieve economical "fit-for-purpose" translation, with quality demands ranging from modest (e.g., for gist translations of content for company-internal use) to extremely high (e.g., for image-relevant or legally binding material). Throughout the process, translators occupy a central position as experts in the complex system of translational action (cf. Holz-Mänttäri 1984), managing their attentional resources (cf. Campbell & Wakim 2007) and bringing various types of competence to bear in order to complete the task at hand.

Current models of translation competence, which outline the expert knowledge and cognitive components assumed to be necessary for effective translation work, recognize the situated nature of translation to various degrees. The best-known model, proposed by the PACTE group (e.g., 2003, 2011), represents translation competence as comprising six interacting sub-competences or components. One of these, the instrumental sub-competence, underlies research and information technology skills. The psycho-physiological components in their model include cognitive/behavioral components and psychomotor mechanisms, which clearly relate to interacting with the environment. With her model of translation competence, Göpferich (2008,

2009) suggests that the sub-competences and other components of translation competence are necessarily embedded in working conditions and influenced by external sources such as translation software. However, most of the studies about translation competence have investigated differences between groups (e.g., students and professionals or translators and non-translators) in controlled settings such as university classrooms or labs or are based on surveys of practicing translators and/or their employers (e.g., Lafeber 2012). Putting aside for now the question of whether all professionals can be assumed to be competent or indeed what it means to be competent, the issue of how factors at the workplace can influence translation performance remains.

Certain developments in translation studies reflect an appreciation of translation as a system that involves not only multiple agents but also human-computer interactions (e.g., Risku 2009, 2010; O'Brien 2012). As Risku (2002: 529) points out, "Translation is done not only by the brain, but also by complex systems, systems which include people, their specific social and physical environments and all their cultural artifacts." Some researchers have investigated the realities of the translation workplace with respect to team interactions, roles, and daily activities (e.g., Hébert-Malloch 2004; Koskinen 2008; Kuznik & Verd 2010; Risku 2009). Others have done ethnographic research at the workplace to explore questions related to resources and tools (e.g., Désilets et al. 2009; Karamanis, Luz & Doherty 2011; Le Blanc 2013). Most of this workplace research has been based on interviews and (participant) observation. However, the possibilities offered by other techniques that have become common in translation process research in controlled settings have not yet been fully exploited in workplace settings.

Understanding the situated activity of translation obviously requires investigating professional translation activity *in situ*. According to Risku (2009, 2010), a situated cognition perspective can account for the special role of context and tools to explain their impact on the translation process and the quality of the product. In a similar vein, Muñoz (2012a: 179) points out that considering translation performance in terms of mental load and automation could have implications for professional practice. This is echoed by Christensen (2011: 139-140) in her plea for more workplace research:

> What we need to do is to combine investigations on what happens in a translator's mind with what happens elsewhere, e.g. in translators' hands, in their computers, on their desks, in their work environment and in their dialogues and interactions with their collaboration partners.

The realities of the workplace, though, demand compromises that fly in the face of proposals and attempts to standardize methods in translation process

research (e.g., Muñoz 2010, 2012b). This paper addresses some of the challenges encountered in a recently-completed project at a language service provider (LSP) in Switzerland, explains how they were dealt with, and makes some modest recommendations for future research. The aim is to open up the discussion of good practices of applied translation process research.

2. A Swiss workplace investigation

As part of our institute's *Capturing Translation Processes* (CTP) project, staff translators were monitored at their usual workplaces over a period of approximately six months and took part in experiments in our institute's lab (Ehrensberger-Dow & Massey 2013; Ehrensberger-Dow & Perrin 2013). The original motivation for including professionals in the project design was not only to test predictions derived from competence models but also to investigate translation at the workplace. Another important consideration was that the project was funded by a special program, since disbanded, of the Swiss National Science Foundation to encourage industry involvement in applied research projects. According to the conditions of the program, at least 30% of the overall cost of the project had to be carried by the industry partner, whether in cash or services in kind. One of the first challenges for the project leaders was therefore to find a willing partner and to convince them to commit themselves to a substantial investment of money and/or time in the project. This and some other challenges that arose during the course of the project are described in the sections below.

2.1. Finding the right partner

In Switzerland, the dominant language for professional translation work is German, either as the target from English, French, or Italian, or as the source for translation into those three languages. For our project, we were interested in finding an LSP that had a high volume of work in these language versions. The company we approached specializes in the financial and life sciences sectors and offers a comprehensive range of services for end-to-end multilingual text management, which is a good fit with the curriculum of our BA and MA degree programs. As the largest employer of staff and free-lance translators in Switzerland, the company is the single most significant contact for graduates from our programs. Perhaps for this reason, the executive board indicated that they would be willing to cooperate in our institute's research project and approved an internal budget on the basis of our executive summary and

calculations. The time between initial contact with the LSP about the project and board approval was about two months.

Among other services in kind, the LSP board agreed to place junior and senior translators with various language combinations at the disposal of researchers on our team on a regular basis for a certain number of hours per month and to allow us to examine computer loggings and screen recordings of those translators' translation and revision processes. They designated a project manager to handle all contacts between their translators and our research team. In return, the LSP expected to receive answers to specific research questions concerning strategic and instrumental sub-competence as well as to be offered bespoke professional development courses designed to increase the efficiency and effectiveness of working practices among their staff. The LSP's involvement was also to be acknowledged in project websites as well as in presentations and publications pertaining to data collected from its translators.

Language versions and text genres are obvious prerequisites for determining whether the right partner has been found, but other factors are also important. For example, the partner's reputation in the market, both as a service provider and an employer, gives an indication of whether its workplaces and procedures are representative. Translations done in a company that is not known for its reliability may not reflect models of good practice. An LSP's quality assurance and official certifications provide indications of whether its translation work is considered fit for the market. For longitudinal research, the sustainability and size of an LSP can be critical to a project's success. A reasonably large firm can usually handle the disruptions and additional demands on staff time that involvement in a research project entails, whereas a small firm might be overwhelmed by unexpected problems or delays. Fluctuations in workload or staffing can affect the outcome of a project, especially if they are not anticipated in the initial design of the study.

2.2. Designing the study

The CTP project was designed to acquire as much information as possible about translation processes in a naturalistic and non-invasive way, combining observation of the workplace, interviews, questionnaires, computer logging, and screen recordings as well as eye-tracking and retrospective verbalizations whenever feasible (see 2.5). Since the professionals' processes and retrospections provided a basis for comparison with students at various stages in the latter's careers, another challenge was to ensure at least partial comparability

between the groups, task demands, and source materials for the professionals and the students.

2.2.1. Groups, versions, settings

The design of the main project originally included four different levels of experience (beginners, advanced students, relatively inexperienced professionals, and experienced professionals), two directions (into the first language/L1 or second strongest language/L2), two settings (workplace and lab), and three different language combinations (German with each of English, French, and Italian). One of the first compromises to a balanced design had to be made with respect to directionality, since the professionals at our LSP partner only translated into their L1. The second compromise concerned language versions. Since the LSP had a heavy workload of translations out of German, their primary interest was those versions. However, the LSP project manager understood that a comparison between language versions would be interesting and agreed to include translation from English into German as well. This was very important to the research team, because it is the most subscribed version in the institute's translation degree programs. Based on the same rationale, the design was also slightly modified for the student groups to ensure that enough translation processes into L1 as well as from German into English could be collected in the lab. The final compromise had to do with level of experience. Although the LSP officially has two levels of translator experience (juniors and seniors), in-depth discussions with management revealed that this distinction seemed to be related to length of time at their company rather than to overall experience or expertise. For this reason, the decision was taken to group the professionals together.

The gold standard of random assignment of participants to groups is far removed from the realities of workplace research. In a lab setting, students who are attending translation courses in various language combinations and both directions of a particular combination may be randomly assigned to a group. However, it would make little sense to do this with professionals who habitually translate one version of a language combination and in any case would be impossible in the workplace. The compromises that had to be made to the planned study groups and translation versions are probably typical of workplace investigations and point to the necessity of flexibility in this type of research.

2.2.2. Task demands

Translation process research at the workplace can also be much more challenging than in the lab because the object of study can move between various agents and is not clearly delineated. For example, a translator might begin a translation task, realize that the job is too large to be done alone within the time available, ask one or more colleagues to help, split up the job, put it back together, review it, and send it to someone else for quality assurance before it is considered complete. Even in the relatively simple scenario with a single translator, the complexity of the translation process is obvious in the twelve stages described by Gouadec (2007: 14-21), ranging from getting the job to translating, checking, revising, and delivering the final version to the client.

Revision processes should be taken into account in workplace investigations, since the definition of translation work has broadened in recent years to include post-editing of machine translation output and revision of other people's texts (whether translations, adaptations, or original texts written by non-native speakers). Some aspects of checking or self-revision (Asadi & Séguinot 2005; Englund Dimitrova 2005; Robert 2008) and so-called other revision (Brunette, Gagnon, & Hine 2005; Mossop 2007) have been identified, but again there has been little investigation of translators and revisors at their workplace. If a translation job could be followed from a translator's to the revisor's workplace as it is sent to be revised, a realistic picture of professional translation and revision might emerge.

Our team decided to try to capture as much of the process as possible, from the point that a translator first accepts a job through quality assurance, if done, until the target text is sent back to the translation project manager for further processing. For our study, "task" had to be defined as anything that a translator at the LSP was expected to do in the course of producing target texts that were fit for purpose/delivery (cf. Martin 2007). The level of quality and the time available for the task were determined by the LSP's usual procedures and could not be influenced by the researchers. This presents obvious problems for comparisons of individual processes with processes produced by translators working at other LSPs or by students but does allow comparisons between groups of translators working for the same LSP. Indeed, one of the LSP's research questions was why translation from German seemed to be more time-consuming into some languages than into others.

2.2.3. Source materials

The source texts that staff translators are confronted with at the workplace may be quite different from those chosen as stimuli in lab settings. This was made clear to us by a comment from a staff translator, translating what we considered a rather unexciting journalistic text in one of our experiments (e.g., *Oh, this is fun*). Cao and Zhao (2008: 29) point out that "Despite the long history of translation and multilingual practice at the UN, very little has been studied and written as to the nature and difficulties of translating documents at the UN". This is true not just of institutional translation but of many other professional settings. What we do know about source texts at the workplace tends to be based on personal experience or analyses of published output from institutions. It is much more difficult to get an overview of what kinds of source texts a typical LSP might have to deal with, since most of them work for various clients.

Analyses of translation processes often only make sense with respect to problems presented by source texts, so it is important to ensure that these are also available to the researchers. The LSP in our study defines source texts as belonging to one of over 40 categories. The category descriptors refer variously to the type of content (e.g., pharmaceuticals), corporate department (e.g., finance) or genre (e.g., directives), which may or may not be a useful categorization for analysis purposes. In any case, the translation processes of a representative selection of texts of the same genre, subject field, and length can be compared post-hoc across language combinations and versions.

Most workplace source texts are only translated once (and not by numerous translators, as happens in experiments or in the classroom) yet some of them might be translated into different languages, which could allow for interesting comparisons between combinations. Since the processes collected during a workplace project are part of the translators' normal workloads, researchers cannot count on having such comparisons at any particular point in time but should still prepare for them.

In our experience, source materials at the workplace comprise not only the texts to be translated but also the supporting or reference materials. Again, it is important that researchers have access to those materials, in order to be able to fully understand how translators use them during the translation process. This can be very difficult if they are confidential (see 2.4).

2.3. *Recruiting participants*

A real challenge in workplace research is recruiting participants and keeping them on board throughout the course of a study. We convinced the executive board of the LSP quite quickly about the usefulness of our project but anticipated that it might be harder to convince professionals that involvement in empirical research might be more than just a bother. All of the translators based at the LSP's head office were invited to a short preliminary information session, in which the study methods, time commitment, and logistics were explained. Although the session was on company time, not all of the translators chose to attend, either because they had already decided whether they would participate or because they were in the middle of an urgent job. Most of the translators who came to the session did indicate their willingness to take part. Participation was voluntary, which meant that the translators were self-selected, interested, and probably quite highly-motivated. The positive aspect of this was that attrition was expected to be relatively low, but the negative aspect was that the sample could not be considered representative. It is impossible to know why a person chooses not to take part in a study, and it is rather unethical to ask. For example, we only found out much later that a couple of translators refused to become involved because they had heard we were planning to do something with their eyes (i.e., track eye movements).

With participation voluntary, the issue immediately arose as to how to attain the group sizes that we had anticipated in the study design. When we first planned the study, the LSP project manager informed us that there were large numbers of translators working in each version of interest, which were what we based our grant application and budget on. By the time the grant was approved and we began recruiting translators, circumstances had changed at the LSP and one language version (German-Italian) was no longer being done at the head office. Due to restructuring and natural attrition, the number of participants changed again, most noticeably in the German-French group, so that by the time data collection at the workplace actually began, almost a year after recruitment, the study had essentially become a comparison between English-German and German-English processes.

In complex workplace projects, a delicate balance has to be struck between recruiting participants, maintaining project momentum, and collecting reliable data. The time lag between initial recruitment and data collection at the workplace in our project certainly contributed to the attrition rate. If we had been in a position to collect workplace data immediately after recruitment, we would have had much larger groups. However, the decision was taken with the LSP project manager to launch the project and recruit translators before

all of the software issues associated with recording processes at the workplace had been resolved (see 2.5.3). The reason for this was that translators knew that they would be asked to be involved in a research project, had heard something about the software issues, and needed to be informed about the study. Some of the translators who contributed to the main project by completing questionnaires (see 2.5.2) later left the LSP or were transferred to other locations, making further involvement in the study difficult or impossible.

2.4. Maintaining confidentiality

Anonymity is always important in empirical research, in order to protect the participants' identities and to heighten the objectivity of data analyses. For an LSP competing for market share, these concerns are compounded with serious reputational risks. An LSP must be protected from any hint that its translators' performance is being called into question, while at the same time researchers might be exploring possible weaknesses or potentials for increased efficiency. Texts that are being translated cannot be the primary focus of interest, since many are highly confidential and subject to special security considerations. For example, an extract from one of our LSP's brochures reads as follows:

> THE ULTIMATE IN SECURITY
> Do you work with confidential documents or sensitive information? With our services, you can rely on the highest standards of security. As well as using encrypted data transfer, we maintain strict confidentiality at all times. Whether you are entrusting us with a confidential memorandum containing the unpublished results of a study or your company's financial results, [LSP] guarantees maximum security coupled with top-quality service.

Workplace researchers must be prepared to observe this level of security and to treat all client data with absolute confidentiality. All identifying information should be removed from data for analyses, and any data or examples used for publication or educational purposes must be modified to ensure anonymity of the participants or be approved in advance by the LSP. In some cases, security considerations might preclude the possibility of recording data on certain days from certain translators or from certain workplaces. In our study, for instance, one of the original questions that the LSP was interested in concerned texts that proved to be too sensitive for the research team to have access to. The research design and team need to be flexible enough to cope with such restrictions.

In other cases, time can work in the researchers' favor: certain texts are only sensitive until publication and afterwards become part of the public domain, so analyzing processes may be unproblematic later. Our LSP set a

default period of six months for the release of data, which meant that nothing concerning clients' texts could be removed from their premises before that time. In addition to all of our team members signing confidentiality agreements, the on-site researchers effectively became employees of the LSP during the data collection and data preparation phases of the study, bound by the same security restrictions as the translators they were investigating. As such, they acquired an insider status in the workplace that probably contributed to a level of rapport with the translators that might not have been possible otherwise.

2.5. *Collecting data at the workplace*

One of the most convincing arguments for workplace research is its ecological validity: investigating translation processes becomes truly relevant to translation competence and practice when the processes reflect actual practices of working translators and not artefacts of experimental settings and tasks. Our multi-method approach combines ethnographic observations, interviews, questionnaires, computer logging, screen recording, retrospective commentaries, eye tracking, version analysis, and translation evaluation whenever possible. It is relatively non-invasive and provides sources of both quantitative and qualitative data to obtain a rich description of translation processes (cf. Ehrensberger-Dow & Perrin 2013). The multiple sources of data are crucial to this type of research: only by triangulating information from various perspectives can a complete pattern of the translation process emerge.

The following sections outline the challenges associated with applying various data collection methods in the workplace. In some cases, we found solutions that met our needs, and in other cases we had to make compromises. Some of those solutions and compromises were relatively easy to absorb into the project design, but others had consequences that threatened the credibility of the study.

2.5.1. Ethnographic observations

During the planning phase of a workplace study, researchers should try to create opportunities to spend time in the respective company or institution. It is only on the "translation floor" of an LSP that certain potentially interesting factors as well as problems can be identified and built into the study design. Factors such as economic, institutional, and technological influences on the work situation as well as the types of tasks that translators are usually engaged in (including expected quality level, deadlines, etc.) should be noted and

included in design considerations as well as later in the translators' profiles. All of these factors are part of the real world that informs translators' mental representations and motivates their actions. Data from ethnographic observations can provide qualitative indicators that contribute towards interpreting the appropriateness of translation solutions with respect to the constraints that translators work under.

During the data collection phase in our workplace study, two researchers went in and out of the LSP offices two or three days a week for almost a year: the pilot testing began in January; the kick-off information session with the whole research team and participating translators was in March; actual data collection began the following week; translation process data was collected until August; related materials such as source texts and supporting documentation were compiled until October; and data preparation such as converting and backing up files was done on-site until November. By December, all of the workplace data were collected, stored at the LSP, and prepared for the time of their release to the research team for the analysis phase.

The on-site presence of the researchers in the workplace was much longer than had been anticipated for a variety of reasons. Because of new security regulations introduced by the LSP board, many of the processes done each day by the participating translators could not be included in the corpus, so the data collection phase was extended to be able to capture a representative number of hours from each of the translators. This made it impossible to finish data collection before the summer, which was when the LSP moved offices. That move affected most of the translators, further delaying the data collection and extraction of the relevant documentation for the project corpus. However, new research questions at the workplace emerged before, during, and after the move (see section 3). These might have remained hidden if data collection had proceeded according to the original plan.

The on-site researchers' involvement in the workplace was not ethnographic in the strictest sense (cf. Atkinson et al. 2001) because they were there to collect data and not work as translators, but both had been trained and had worked as professional translators. This may have contributed to their presence at their workplace being well accepted by the translators who were being monitored. Originally, the researchers' workstation was foreseen in an empty office at the other end of a long hallway from the translators. This was changed at the request of both, because the LSP project manager (a former translator and graduate of our institute) thought that physical proximity could improve the acceptance of the study. The workstation was then set up in the corner of an office with several participating translators. Although its

location meant that the researchers had to be sure that their activities did not disturb the translators, it provided them with an insider's view of life at the LSP. Being in the translators' proximity also fostered informal contacts to such a degree that many data collection logistics were considerably facilitated (see 2.5.3). For example, without any special requests being made on the part of the research team, the manager responsible for the office move ensured that the researchers were allocated a workstation close to the translators in the new premises.

A comment by one of the LSP translators towards the end of the data collection phase nicely sums up the value of long-term researcher involvement in the workplace:

> It's useful that you're actually here for quite some time and you're doing it regularly rather than just once. 'Cause if you did it, if you did it just once everybody would be sort of, feel slightly less comfortable or they wouldn't know what to expect and they would translate less naturally. (ProE4)

2.5.2. Interviews and/or questionnaires

Just as in any other type of translation process research, detailed metadata about participants need to be obtained at the beginning of their involvement in a study and updated if anything changes. Interviews or questionnaires can be used to elicit metadata, which include personal information (e.g., age, sex, handedness, eye color, linguistic biography, education), translation experience and level (e.g., student, freelance, staff, part-time, full-time), and workplace conditions (e.g., private or shared office, translation memory use). It can also be very interesting to obtain information about what participants consider their usual translating and revising procedures to be, in order to allow comparisons with actual practices. However, such preliminary interviews or questionnaires only provide researchers with information about what translators think they do or intend to do and their awareness of it. They do not necessarily tell researchers what translators actually do.

Trying to acquire as much information as possible about translators' practices and processes through interviews and questionnaires can actually be detrimental to a workplace monitoring study. If translators tell researchers about their practices in an interview and shortly afterwards are observed while translating, there is a risk of them becoming self-conscious about what they are doing, no longer behaving naturally, losing face, or questioning the point of other data collection methods. All of these possibilities would threaten the validity of a study that sets out to investigate what translators normally do at the workplace. To reduce this threat, it would be advisable to create a

gap between obtaining self-report information and observing workplace practices. This gap can be produced through timing (i.e., having the preliminary interviews and questionnaires done far in advance of other data collection) or job assignments within the research team (i.e., having different types of data collected by different researchers).

In our project, the timing of the preliminary interviews was planned carefully and changes in the research team probably also contributed to creating plausible information gaps. The researcher who carried out most of the preliminary interviews left the team before the other data collection started, but of course the information he had collected stayed within the project. This might not have been as obvious to the participating translators, since they repeated some of that information to the on-site researchers. Having transcribed the questionnaires and interviews or at least having read through them before starting to collect the other workplace data, the on-site researchers found it quite easy to remember details about the translators and to gain their trust quickly.

Preliminary interviews and background questionnaires were done in a quiet room at the LSP premises. It could be argued that translators might not feel completely relaxed talking to a researcher about themselves, their work, and their working conditions while at the workplace, but there was no reason for us to believe they would be more relaxed in an unfamiliar setting such as
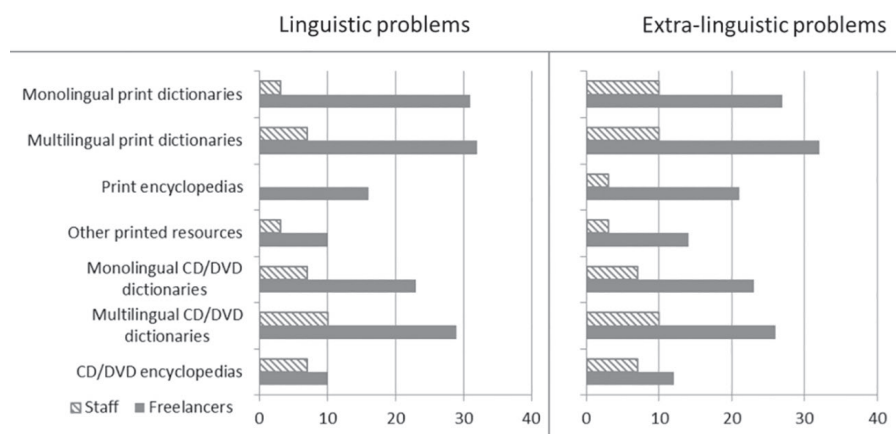
Figure 1. Percentage of "very often" / "often" responses by freelancers (n=110) and LSP staff translators (n=29) to the question of whether a print or CD/DVD resource is consulted to solve linguistic or extra-linguistic problems.
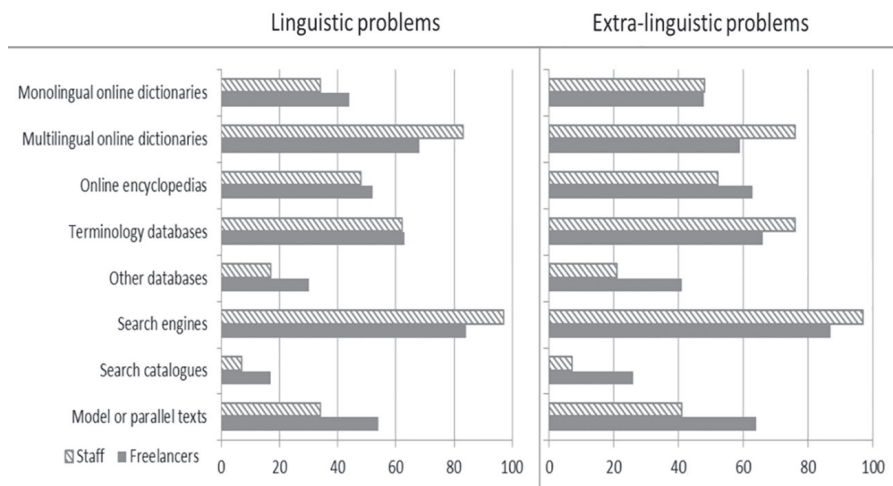
Figure 2. Percentage of "very often" / "often" responses by freelancers and LSP staff translators to the question of whether an online resource is consulted to solve linguistic or extra-linguistic problems.

in our lab. In any case, the sessions were on company time at the translators' convenience, so there was no choice about the location. Doing the preliminary sessions at the LSP's offices had the advantage that a member of our research team could spend some time on-site before the other workplace data collection started (see 2.5.1). None of the information at the preliminary sessions was recorded electronically, which meant that resources were required for the subsequent transcriptions and may have resulted in some loss of information. However, the simple pen and paper data gathering in the interviews seemed to have contributed to the informality of the situation, which may have helped to establish rapport with the translators.

We also used an online survey to collect information from the translators about their research behavior and tool use. Although this technique is not particular to workplace research, the data gathered in the preliminary interviews and ethnographic observations were very useful in tailoring the survey to the LSP's circumstances while still allowing comparisons with other groups of translators. For example, our survey with freelancers (Massey & Ehrensberger-Dow 2011a) showed that they were far more likely to say that they used print and CD resources to solve linguistic and

extra-linguistic problems than the LSP staff translators were (see figure 1) whereas the two groups reported similar behavior with respect to online resources (see figure 2).

The differences between the responses about print and CD/DVD use by the LSP staff translators surprised us and prompted a discussion with the LSP project manager and IT officer. We knew from our ethnographic observations that print dictionaries were readily available at the LSP (i.e., close to or on the translators' desks). The IT officer also informed us that a wide variety of CD/DVD resources had been installed in the LSP system. She speculated that they were so easily accessible that the translators might have thought of them as online. Another possibility might be that not all of the translators were aware of the resources that their employer had put at their disposal. In any case, the IT officer decided that it was time for an information update. Since being part of an organization can affect that organization's practices, workplace research often takes the form of action research (cf. Cravo & Neves 2007). One of our study goals was to release expert knowledge to the organization, so we did not try to stop this action despite its precluding a validation of the survey data with observational data collected at the workplace later.

2.5.3. Computer logging and screen recording

In the workplace, computer logging is more commonly known as spyware and has received a great deal of bad press. One challenge in including it in a workplace study is to convince the translators that the motivation to use it is to gain information about translation processes and not about them. Another challenge is to sort out the keystrokes related to translation processes from those involved in unrelated tasks such as responding to email. We discovered, however, that the greatest challenge was to obtain a keylogger that could actually capture the data we were interested in, since everyone concerned had underestimated how difficult it would be to log translation memory input. For data security reasons, our industry partner wanted to have a custom-designed keylogger developed by their IT service provider to the specifications of our project team. The automatic logging was to be linked to the individual translator's login and designed so as not to influence the performance or integrity of the system. The keylogger tested reasonably well in isolation, but it turned out to be impossible with the allocated resources to achieve a solution that was capable of accurately logging keystrokes and translation memory input at the translators' own workstations.

The study design had foreseen automatic keylogging over an extended period and a short phase of screen recordings, but the decision was made

partway through the study to shift the focus to screen recordings and to abandon the keylogger. Because screen-recording software slowed down computer responsiveness in pilot tests, a proxy solution was devised with the actual recording done on three "slave" computers that were linked to the translators' computers. Despite careful pre-testing, various new problems arose at the beginning of the data collection at the workplace. For example, the on-site researchers discovered that they needed to move the slave computer's mouse regularly or the screen saver would be activated, resulting in a useless recording of a potentially interesting process. The IT support staff's ingenuity at developing work-around solutions was much appreciated. By the second or third week of data collection, all of the software problems were solved and the translators seemed to have grown accustomed to the researchers' presence.

Issues concerning client confidentiality and translator privacy had to be dealt with delicately with respect to screen recording, and the whole process had to fit in smoothly with the workflow. The original plan was to have the researchers check the work assignments for the day and decide which processes to record and from whom, in order not to bother the other translators unnecessarily. However, the better solution turned out to be for the on-site researchers to contact the translators each morning to ask whether they had processes that could be recorded and for the translators to notify the researchers to interrupt the recording whenever they wanted. The IT support staff had arranged for a small notice to appear on the translators' screens while recording was on, so the translators always knew when they were being monitored. They notified the researchers to stop recording when confidential work suddenly had to be given priority but rarely did otherwise. The researchers had made it clear to the translators from the beginning that they were only interested in non-confidential translation processes. The fact that they were in the same room as the translators and could be observed cutting out sections of the recordings that were not related to translation probably contributed to the translators' relaxed attitude towards the monitoring. Although they had been told they could, none of the translators ever asked for any recordings to be deleted from the corpus.

Rather than being perceived as a bother, the necessity of communicating with the researchers several times a day seemed to have had a positive influence on the translators' motivation. Their interest in the study remained high throughout the 6-month data collection phase, and all of them said that they enjoyed being involved. This might call into question the representativeness of the translation processes collected in the study, since not all staff translators

might be as motivated and interested as these ones were. However, the processes are rich in details about how professionals deal with translation tasks at their workplaces and can serve as a corpus to develop hypotheses to test with other groups.

2.5.4. Retrospective commentaries and interviews

On analogy to research that our team has done in controlled settings (e.g., Massey & Ehrensberger-Dow 2011b), each of the participating translators was shown a 20-30 minute recording of one of their workplace translation processes and asked to comment on it. The verbalization sessions were scheduled as soon as possible after the process, in order to minimize memory effects, and long enough after to give the researcher time to prepare the recording. The maximum 24-hour delay set at the beginning of the study meant that one of the sessions had to be aborted, because the translator became tied up in work and could not do the verbalization when planned. A different process was chosen on another day. In general, processes were chosen based on convenience sampling (i.e., the processes that were done the day that a translator said he or she had the time or inclination to do a verbalization) and the researchers' observations of what seemed to be typical of a particular translator's workload. Since the verbalization sessions only began two months after the start of screen recording, the researchers had gained a fairly reliable impression of typical jobs by then.

The translators were asked to verbalize what they saw themselves doing and what was happening on the screen. Creating an information gap was difficult in this case, because the researcher listening to the verbalization was the same one who had made the recordings that day, selected the process to be commented on, and cut the video file to exclude anything unrelated to the translation process. Nevertheless, the translators verbalized a lot and about a wider variety of concerns than they had done when they had commented on their recordings in the lab. The comments that indicated metalinguistic awareness of what the participants were doing and why (i.e., not simply descriptions of the screen events or research activity) were extracted and coded in an iterative process with respect to their focus. The resulting codes were then grouped into six categories that ranged from a focus on the micro level of words and phrases to the translator as part of a system (see table 1 for a comparison of the comments about the lab and the workplace processes by the English-German and German-English translators).

Category	Examples from workplace commentaries	Lab	Workplace
Words and phrases	*it's just a, a literal translation, which is useless*	27	57
Sentence structures	*I've turned the sentence around in the English*	73	86
Text quality	*that is not particularly nice English*	93	93
Loyalty to ST	*the German actually uses the 'you' form*	67	93
Readership	*because this is a journalistic article*	87	71
Accountability	*I'll have to put a note in for the QA person*	27	93

Table 1. Percentage of translators (n=14) making comments in each category.

Almost all of the translators made comments at the workplace that reflected their awareness of their role in a service industry. These included mention of responsibility to the client, references to colleagues and quality assurance, and reminders to add things to the translation memory system. Katan (2009) also identified these multiple concerns in a survey of professional translators, who spread their loyalty across various focal points that included the source text, target text, and client.

After the commentaries about the workplace processes, the translators took part in an interview about their views of translation in general, their experience in the study, and their own practices. As our experience with students and teachers has shown (Massey & Ehrensberger-Dow 2011b), viewing translation processes and reflecting on the process can have a learning effect. Several of the translators mentioned that they had become more aware of how they translate, as example 1 indicates.

(1) I think, my approach, generally, maybe that I noticed or that I became aware of again, is that I have a kind of an iterative approach to translation. (ProE2)

Others identified room for improvement, such as in example 2.

(2) Well, as I've said, not looking up stupid little words (laughs) and I'd like actually using my brain a bit more. (ProE1)

And, in line with Gouadec (2007)'s twelve stages, example 3 indicates that translators can become more aware that interlingual transfer is only part of their job.

(3) Because actually, when I do a translation I find that all of the kind of peripheral work, all of the things like downloading the text, checking it, checking whether it should be UK or US English, checking things

> online—they often take more time than the actual translation itself…
> and watching that video of myself I realize I actually translated the text
> quite quickly and it was everything else that took the time. (ProE4)

Something that was quite unexpected in the translators' comments about
their workplace processes was how the same tools and translation aids were
mentioned both positively and negatively. Even low-level decisions concern-
ing punctuation have to be checked against what has been documented in
style guides, parallel texts, concordances and, of course, translation mem-
ories. The translators' comments indicated that translation aids and tools
have the potential to seriously constrain the translation process and thus
limit translators' autonomy and creativity. Comments included: "none of the
searches were helpful, so I can just translate it"; "I can decide myself"; "then
I got the solution from my own brain". Nothing like this had emerged in
the lab processes, yet it has important implications for how translation tools
and aids might be changing the task of translation at the workplace. It is
difficult for translators to come up with new, potentially very good solutions
to translation problems if they are supposed to find and use existing solutions
first (and their cognitive processing capacity is occupied with this). This sug-
gests further directions for explorations at the workplace, some of which are
outlined in section 3.

2.5.5. Eye tracking

The use of eye tracking in the workplace remains a challenge for translation
process research. In our project, the intention had been to investigate the
amount of attention to the source and target text during various phases of
the translation process as well as the number and direction of eye movements
when translation problems were encountered. We carried out a feasibility
analysis to determine whether our institute's eye-tracking monitor and soft-
ware could be used at the LSP, but security regulations precluded it. Having
a stand-alone eye tracker set up somewhere in the LSP offices would have
been an option, but the ecological validity would have been little better than
in a lab setting, since the translators would have to work at an unfamiliar
workstation.

Trials were also carried out with eye-tracking glasses worn by four of
the LSP translators for periods of one to two hours as they performed their
normal work. Unfortunately, the quality of the eye-tracking recordings from
the glasses was too poor to justify including this method of data collection
in the study. However, they did provide some indications of issues associated
with computer settings and workplace arrangements, which would be worth

exploring further (see section 3). Newer models of eye trackers, such as those that can be installed under an existing monitor, may offer solutions that allow reliable eye-tracking data to be obtained under naturalistic workplace conditions.

2.6. Completing the workplace study

The data collection goals of the study had to be adapted as the on-site researchers coped with the realities of the workplace, and determining the completion date became a challenge. In the original design, all of the data collection methods were to be administered to all of the recruited translators. Due to attrition, this proved impossible (see table 2 for a summary of the data collected in the workplace study). Since security regulations at the LSP precluded the possibility of just turning on a screen recorder and letting it run every day for a certain length of time at each translator's workstation, non-confidential tasks had to be identified each day, processes recorded, and recordings edited to exclude anything unrelated to the translation task.

Type of information	n	Data collection instrument	Form of data*
personal data, sociolinguistic background, and education	30	questionnaire	transcript
self-report on typical translation process	30	semi-structured interview	transcript
self-report about tool and resource use	29	online questionnaire	statistics, comments
translation situation	18	field notes	notes
cue-based retrospection about selected translation process	18	audio recorded over SCR	ST, TT, RVP, tagged transcripts
specific aspects of translation practice	18	semi-structured interview	transcript
translation processes (about 20 hours/translator)	225	various genres of STs with SCR	ST, TT, tagged transcripts
quality assurance processes (about 5.5 hours/translator)	99	various genres of TTs with SCR	ST, TT, tagged transcripts

* SCR=screen recording; ST=source text; TT=target text; RVP=retrospective verbal protocol

Table 2. Corpus of data from LSP staff translators collected during the CTP workplace study.

The goals were redefined as 10 separate processes and at least 20 hours of processes per translator. Once all of the recordings were edited, the team realized that this goal had been reached for almost all of the translators (89% and 83%, respectively). Since the lowest number of hours was just under 20 (namely, 19 hours and 21 minutes), the decision was made not to risk the ecological validity of the data collection by isolating specific translators and requesting more recordings. It was felt that this might put certain translators under pressure and was contrary to the procedure of letting the translators tell the on-site researchers when they had processes to be recorded.

The on-site researchers continued to work at the LSP workstation after the data collection phase had ended. For example, they edited recordings to delete sections unrelated to translation and to anonymize them. All of the processes were labeled with codes, and meta-information about the date, time, urgency, etc. was documented. By the time the data were released from the LSP to the project team, all of the data preparation had been completed and the analysis phase could begin.

One of the consequences of the lack of keylogging data was the necessity to develop a new way of coding and representing activities that a translator engages in during the translation process. The screen events were transcribed using XML-markup conventions based on the TEI (2008) guidelines, as suggested by Göpferich (2008: 72-81, 2010). The coding conventions had been developed and refined for the lab recordings (cf. Ehrensberger-Dow & Massey 2013), but it proved necessary to add several more codes to accommodate the activities recorded at the workplace (e.g., related to translation memory, interruptions in the process, comments for colleagues). However, the distribution of the core activities of writing, self-revision, consulting, and pausing did not seem to be very different between the lab and workplace in the processes examined thus far. About half of all the activities in the processes that the translators had commented on (one in the lab and one in the workplace) concerned self-revision, followed by writing, and roughly equal percentages of pausing and consulting activities (e.g., dictionaries, online searches). The results for the English-German and German-English translators are shown in figure 3, which includes the additional category of matches for the workplace processes, since translation memory was used there but not in the lab.
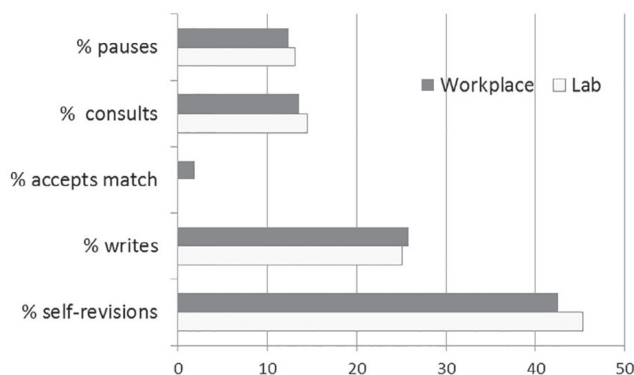
Figure 3. Percentages of activities during the translation processes in the lab and in the workplace (n=14).

Activities in the translation process could also be charted over time, for example, to capture the iterative nature of the translation process that some of our translators commented on. The additional challenge that workplace processes present is how comparisons can be made when so many factors differ (e.g., translators, source texts, duration, use of translation memory). As more researchers become involved in workplace studies, solutions to this challenge are also likely to emerge.

3. Further directions

In summary, the choice of LSPs is crucial to the success of workplace research: they should be interested enough and large enough to handle the demands on staff resources that involvement in such a project inevitably entail. Before the project begins, researchers should spend time on the LSP premises in order to better anticipate and find solutions for possible problems and complications. If keylogging, screen recording, or eye tracking is planned, then sufficient lead time and the support of the LSP's IT services will probably be required. For ethical reasons, participation by individual translators should be voluntary, and their anonymity must be guaranteed by removing all identifying information from data for analyses. Any data or examples used for publication or educational purposes should be modified to ensure anonymity of the participating translators and to protect the LSPs from reputational risk. Confidentiality issues cannot be underestimated, and protocols should be worked out well before data collection begins.

Despite or perhaps precisely because of these challenges, our experience suggests that doing translation process research in the workplace is well worth the effort. Long-term involvement with the realities of a translation workplace allow challenges to be dealt with and solutions to emerge that can lead to new research questions that might be just as relevant to practice and theory-building as the ones originally driving a research project, if not more so.

The motivation for the follow-up to the CTP project came directly from observations made in the workplace study. As discussed above (see 2.5.1), one of the sources of data was ethnographic observations, which revealed the constraints that the translators were working under. During the course of the study, some of those constraints changed for some of the translators, and it became increasingly clear that a closer examination of external influences would help us to understand their work demands and practices. We are convinced that good practices emerge when translators manage to break out of workplace constraints and free up their cognitive resources to allow for innovative solutions. Our new focus is on the cognitive and physical ergonomics of the translation workplace, which we are investigating in order to identify issues in human-computer interaction and physical conditions that might affect translation performance. If translators are unnecessarily constrained by the tools they are using and the system that they are working in, then it will be very difficult for them to demonstrate the adaptability and flexibility that is expected of them as professionals.

Workplace studies can be motivated by a pedagogical interest in knowing what professional translators do, in order to better prepare students for their future profession. They can also be motivated by economic concerns, such as ways of optimizing performance without detrimental effects on motivation and translator autonomy. Or they can be motivated by a desire to test theoretical models of extended cognition and situated activity. Understanding how translators cope with the demands on their cognitive resources while doing their job extends beyond the various agents in the situated activity of translation. It is also highly relevant for members of any professional group that operates at the human-computer interface.

Acknowledgements

CTP and its follow-up project can be found at <www.linguistik.zhaw.ch/iued/capturing> and <www.linguistik.zhaw.ch/ergotrans>.

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BIONOTE / KURZVITA

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AIMS / OBJETIVOS / OBJECTIUS

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Each issue will be thematic, providing an in-depth analysis of translation- and interpreting-related matters that meets high standards of scientific rigour, fosters debate and promotes plurality. Therefore, this journal is addressed to researchers, lecturers and specialists in Translation Studies.

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