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Abstract:

This paper outlines some of the challenges and possibilities of a corpus-based approach to the diachronic description of the semantics of emotion words. It analyses three German anger words (*Wut*, *Zorn* and *Ärger*) in two corpora: DTA (*Deutsches Textarchiv*, covering the period 1600-1899) and DWDS (*Digitales Wörterbuch der Deutschen Sprache*, which covers twentieth-century German). The study is based on two complementary approaches: a semantic and pragmatic analysis of co-occurrences (Oster, 2012); and the use of semantic foci (Ogarkova & Soriano, 2014). This allows for a detailed description of the semantic evolution of the three anger words for four aspects of emotion – Control, Lack of Control, Visibility and Internalization – while exploring the advantages of a combined quantitative and qualitative corpus analysis.

Keywords: Emotion concepts, corpus-based approach, diachrony, semantic and pragmatic profiling

1. Introduction¹

Emotion conceptualization and expression—especially in the conceptual domain of anger—has been one of the most researched topics in Cognitive Linguistics, ever since Kövecses' seminal works (e.g. Kövecses, 1986; Lakoff & Kövecses, 1987). Much of this research approaches the subject from a synchronic perspective. However, the language conception on which cognitive linguistics is based recognizes the intrinsic historicity of language (Geeraerts, 2010, p. 333) and thus the gradual evolution of grammatical structures and concept configurations over time. This has been applied to the study of metaphor and metonymy (e.g. Trim, 2007, 2010; Allan, 2008) and to the evolution of emotion concepts. Diachronic research on emotion conceptualization has concentrated mainly on the English language: probably largely because of the greater difficulties in accessing appropriate corpora in other languages. The concept of anger in English still attracts the greatest amount of research attention. Researchers have used a variety of different types of data in their analyses: non-linguistic data drawn from art and medicine (Geeraerts & Grondelaers, 1995); co-occurrence frequencies in diachronic corpora (Gevaert, 2001, 2005; Geeraerts, Gevaert, & Speelman, 2012); and combinations of linguistic and historical information (Mischler, 2008, 2013). However, there have also been diachronic studies of concepts like shame and guilt (Tissari, 2006a; Díaz-Vera, 2014), fear (Díaz-Vera, 2013), pride (Fabiszak & Hebda, 2010; Tissari, 2006b) and love (Tissari, 2001, for English; Pagán Cánovas, 2011, 2014, for Greek; or Oesterheld, 2016, for Urdu).

This paper's primary aim is to complement the diachronic research on anger with an in-depth, corpus-based study of the evolution of three German anger words: *Wut*, *Zorn* and *Ärger* from the seventeenth to the twentieth century. Fortunately, in recent years considerable effort has been put into the construction and improvement of historical language resources for German. One of the corpora used in this study, *Deutsches Textarchiv* (DTA), is the fruit of those efforts. It is a relatively new resource (only accessible since November 2014). Given its novelty, together with the methodological

complexity of diachronic corpus-based studies, the paper will include a methodological focus, in an attempt to outline some of the challenges and possibilities of taking a corpus-based diachronic view on emotion words.

The structure of the paper reflects the twofold nature of its aims. First, sections 2, 3 and 4 lay the foundation of the study, with reflections on some of the conceptual and methodological difficulties of corpus-based diachronic research, an overview of previous research on German anger words and an exposition of the method and resources employed in this study. Section 5 provides an account of the semantic classification on which the analysis is based, section 6 describes the quantitative evolution of the previously established semantic aspects over four centuries, and section 7 uses these results as the starting point of a detailed qualitative analysis of one specific aspect, during specific selected time periods.

2. Results quantification and data interpretation in diachronic corpus studies

One of the pioneering diachronic corpus-based studies on anger (Gevaert, 2001; 2005) provides a clear example of the extent to which the ways of accessing the information in a diachronic corpus-based study differ from the procedures used on present-day corpora. Although it is corpus-based and aims to quantify results, Gevaert's study evidences that dealing with older textual material is necessarily a much more manual task. The author states that, during one of the study's methodological steps, "texts written about 1200, 1300, 1400 and 1500 *were selected and read completely*" (Gevaert 2005, p. 198, emphasis added). A procedure of this kind is possible with relatively small corpora. Larger corpora require different ways of accessing the data. Let us therefore begin by considering some of the methodological and conceptual complexities of corpus-based diachronic studies and how they can be addressed in this study.

a) Quantification and visualization of results is a fundamental aspect of corpus-based research. Corpus linguistic studies increasingly rely on sophisticated statistical procedures and exploratory tools to process and present their data. Although both metaphor and emotion analyses and historically oriented studies tend to have clear qualitative foci, even when they are corpus-based, tools of this kind are also beginning to be used in these fields (cf. for example, Glynn & Robinson's recent collected volume (2014) on quantitative corpus methods in semantics and the special volume of *Corpus Linguistics and Linguistic Theory*, edited by Hilpert & Cuyckens (2016), dedicated to corpus-based approaches in English historical linguistics). Some of the more advanced procedures applied to diachronic corpus studies include Lijffijt, Säily & Nevalainen's (2012) procedure to establish the diachronic stability of a corpus, Gries & Hilpert's (2008; 2012) data-driven periodization through hierarchical clustering or Hilpert's (2011) motion charts for the visualization of change, i.e. series of diachronically ordered scatterplots which represent bivariate and even multivariate data sets using multi-dimensional metric scaling.

Hilpert & Gries (2016) have provided a recent comprehensive overview of quantitative methods in diachronic corpus analysis. Their work makes a useful distinction between quantitative approaches that statistically test previously formulated hypotheses (usually based on prior qualitative studies) and exploratory 'bottom-up' approaches that use statistical processing and visualization techniques to discover unexpected structures in

the data and which may be followed up by qualitative studies. The procedure described in Zhang, Geeraerts & Speelman's (2015) study of metonymic patterns for WOMAN in a historical corpus of Chinese texts employs a combination of both approaches outlined above. The study is similar to Hilpert's (2011) visualization of diachronic change, although from an onomasiological perspective. It starts with an initial phase of qualitative analysis, in which a list of potential metonymies for WOMAN is obtained from dictionaries and checked against a diachronic corpus. The resulting metonymical mappings are then classified according to their specific targets and metonymic patterns. The second, quantitative phase aims to visualize diachronic changes in the metonymical expressions. This involves calculating the distances between the metonymic profiles of individual time periods and subjecting them to multidimensional scaling, which then allows the researchers to plot diachronic pathways that represent and visualize changes in the distribution of metonymic patterns.

Finally, we must not underestimate the practical consequences of one of the major drawbacks of historical corpora: they are inevitably much smaller than their modern equivalents, making results much scarcer – no matter what phenomenon the researcher is looking for. This is decidedly relevant in quantitatively oriented studies, especially if the object of study is lexical or semantic, rather than grammatical or constructional. Hilpert and Gries (2016) caution that:

“(...) even a high level of analytical sophistication cannot remedy the problem of data sparseness that is one of the natural limits of endeavour in historical linguistics. Evidently, any analytical method can only produce satisfying results on the basis of rich empirical data and analysts who know the restrictions their methods come with” (Hilpert & Gries, 2016, p. 34).

It is therefore essential to explore potential avenues towards overcoming or mitigating the effects of data sparseness. First, it seems advisable to employ a critical approach that accounts for the possibilities and limitations of the data and methods employed. Secondly, a combination of quantitative and qualitative procedures seems necessary to optimally exploit the available data, while guaranteeing reliable interpretations. Combining data of different types provides a third means of enriching and contrasting results, as exemplified in the works of Díaz-Vera (2013), which combines textual and visual data, and Mischler (2008, 2013), which include linguistic and historical background information. This third approach is beyond the scope of this paper, but the first and second approaches have been incorporated into the heart of its methodology. The present study not only combines quantitative and qualitative analyses, but also provides a careful critical analysis of the data and resources used and the conclusions which can be drawn as a result.

b) In addition to the need to identify appropriate data quantification techniques, interpreting the data generated by corpus-based diachronic studies presents a further challenge. Data interpretation is crucial in every corpus-based study—especially in semantically oriented studies—and presents additional difficulties in the case of historical texts. Approaching the subject from a cognitive linguistics perspective, Geeraerts (2015) warns against possible ways of misinterpreting data in diachronic metaphor analysis, listing four main fallacies:

- The ‘dominant reading only’ fallacy, in which the researcher trusts the current dominant literal reading, oblivious to the fact that this may not necessarily be historically correct.
- The ‘semasiology only’ fallacy, in which the researcher fails to consider other possible conceptualizations of the TARGET or the actual relevance of the SOURCE pattern within its historical context.
- The ‘natural experience only’ fallacy, in which the researcher overestimates the physiological basis of the term and fails to give sufficient weight to the cultural background of experience.
- The ‘metaphorization only’ fallacy, in which the researcher neglects the processes of deliteralization and reinterpretation as sources of metaphoricity and privileges interpretations that assume direct access to the original motivations behind an expression.

Geeraerts’ main conclusion is that “historical metaphor research needs to take the historicity of language as its main starting point” (Geeraerts, 2015, p. 26). This has been incorporated into this study’s methodology in two ways. First, since careful linguistic considerations of this kind are only possible if every co-occurrence is analysed in context, the quantification of results is followed by a detailed qualitative study (section 7). Secondly, the analysis accounts for the extensive descriptions of the emotion words in German historical lexicography (cf. sections 3 and 7.2.2).

3. Object of study: The German anger words *Wut*, *Zorn* and *Ärger*

The object of this study is the category of anger in German, as represented by three of the most basic and frequently used words that express this emotion, according to previous linguistic research (Weigand, 1998; Durst, 2001; Fries, 2004; Ogarkova, Soriano & Lehr 2012). Two of the lexemes (*Wut* and *Zorn*) belong to the anger type labelled as “high-power / active” by Soriano et al. (2013, p. 351). To broaden the representation of the category, the third word (*Ärger*) was chosen from among terms in the “low-power / passive” group.

Since German anger words have already attracted considerable linguistic interest, let us start with a brief overview of the results of previous studies. In view of the diachronic focus of this study, we will begin with the account of *Wut*, *Zorn* and *Ärger* offered by a classic work of historical German lexicography, the *Deutsches Wörterbuch* (DWB). Begun by the Brothers Grimm in 1838 and completed in 1961, the DWB encompasses modern High German usage since 1450 and provides information on meanings, etymology, attested forms, synonyms, etc. and many examples from primary source documents. What follows is a brief summary of the main traits of the three anger words, as described by the DWB (all translations mine).

The basic definition of *Wut* is that of an ‘intense mental and physical state of excitement (*Erregung*) and its manifestations’. Relatively few instances of the word are reported before the early New High German period and it does not come into more frequent use until the literary works of the Baroque and Enlightenment. The DWB lists four meaning variants (*Bedeutungsbereiche*), each occurring in different, but partially overlapping, epochs:

- A. ‘State of being physically/mentally beside oneself (*außer sich*) and beyond conscious self-control’. In Old High German times, *Wut* designated various disease patterns or mental states of agitation that were ascribed to demonic possession. Traces of this variant are still present in the Modern Age, in which *Wut* can designate pathological mental alterations, certain ecstatic states of exaltation (bacchantic, religious, erotic, poetic, etc.) or rabies.
- B. ‘Intense, passionate, purposeful but not aggressive/hostile state of excitement’. The two main types are passionate (sexual) desire and an exaggerated eagerness to do something. Used from the mid eighteenth to mid nineteenth century, sometimes in a derogative sense.
- C. ‘Exacerbated animosity beyond rational control’. From the middle of the eighteenth century onwards, this is the prevalent reading of *Wut*.
- D. Finally, *Wut* can be figuratively applied to human passions, physical or social needs or natural forces, expressing their vehemence or violence.

DWB’s depiction of *Zorn*, on the other hand, is less complex. *Zorn* can be experienced either by humans or by god-like entities (gods, the devil, destiny, etc.) and is defined as follows: ‘A sentiment of dissatisfaction directed against its cause or causer, expressed through uncontrolled words or actions, accompanied by a vivid expressiveness of face and body and which usually comes and goes quickly’.

By contrast with the extensive entries for *Wut* und *Zorn*, *Ärger* is defined only through its Latin translations (*indignatio, ira*) and German near-synonyms (*verdrusz, Zorn*) and characterized as a ‘curious word-formation that does not appear until the previous century’.²

Most studies of the contemporary usage of German anger words have focused on the contrast between *Zorn* and *Wut* (e.g. Durst, 2001; Fries, 2004; Oster, 2014), charting the major differences between the two words. According to these scholars, the meaning of the twentieth-century concept of *Wut* seems to have narrowed in scope to DWB’s meaning variant C (‘a feeling of exacerbated animosity beyond rational control’). In this sense, *Wut* is generally described as an unreflective emotion. Other aspects that differentiate *Wut* from *Zorn* include its more physical nature; the fact that it is generally triggered by some concrete event (for example, a personal insult); that it often leads to acts of aggression or destruction; and that it is frequently accompanied by an inability to act. *Zorn*, on the other hand, is a more justifiable emotion, often felt by someone in a situation of relative power.³ Metaphorically, it is often conceptualized as an autonomous force. It typically causes body temperature to rise, something which is perhaps analogous to the DWB’s ‘vivid expression of face and body’. And, whereas *Wut* is often a reaction to personal issues, *Zorn* is more frequently related to “noble” causes, often appearing in response to acts of injustice or the actions of authorities (cf. Oster, 2014). Despite these differences, *Wut* and *Zorn* are both assigned to the “intensified” end of the spectrum of German anger (Weigand, 1998, p. 51). *Ärger*, by contrast, is described as a “neutral” element in that category (Dem’jankov, 1998, p. 110) and is sometimes treated as equivalent to the English *annoyance* or *anger* (Weigand, 1998, p. 51).

4. Method and resources

This paper's description of the semantic evolution of *Wut*, *Zorn* and *Ärger* will involve three different, yet complementary, methodological steps. First, the paper will describe the ways in which the usage of these anger words reveals how they are conceptualized in terms of four contrasting aspects: Control, Lack of Control, Visibility and Internalization. In step two, we will examine the diachronic axis, tracing the quantitative evolution of each aspect from the seventeenth to the twentieth centuries. This will allow us to detect noteworthy trends and changes in the conceptualization of the emotion. The third and final step will involve a detailed, qualitative analysis of one particular aspect (the expression of Lack of Control for *Wut*) during specific subperiods. Including this qualitative data analysis allowed us to validate our quantitative findings and investigate the background to the changes detailed above. The research goals, analytical methods and data sources involved in each step will be discussed in more detail below.

4.1 Step 1: Tracing the regulation and expression of *Wut*, *Zorn* and *Ärger*

This part of the study establishes a framework for the description of the selected anger words in terms of a limited set of semantic aspects: namely, regulation (+/- control) and expression (visibility vs. internalization). This provides a basis for both quantitative and qualitative analyses. In order to construct this basis, the study draws on previous work by myself and others. Methodologically, the study (a) utilizes my corpus-based approach to the semantic and pragmatic description of emotion words (Oster, 2010; 2012); (b) sources its data from the updated results of an in-depth, synchronic, corpus-based study of German anger words (Oster, 2014); and (c) groups the data structurally, employing Ogarkova and Soriano's (2014) notion of semantic focus.

a) Corpus-based semantic and pragmatic description of emotion words

Our approach (cf. Oster, 2010; 2012) combines fundamental ideas from cognitive semantics, such as conceptual metaphor and metonymy, with a corpus-based methodology that employs key corpus-linguistic notions like semantic preference and semantic prosody, in order to examine the following aspects (all examples are taken from Oster, 2014):

- Metaphorical conceptualizations such as THE EMOTION IS AN ENTITY IN A CONTAINER or THE EMOTION IS AN AUTONOMOUS FORCE.
- Metonymical conceptualizations in which the emotion is represented by a physical manifestation such as *a change in facial colour* or *a rise in body temperature*.
- Conceptual proximity, which provides information about related feelings and the relative position of the emotion word both within the conceptual domain and with respect to other emotion concepts. For example, both *Wut* and *Zorn* are overwhelmingly mentioned alongside other negative emotions, though *Wut* is much more frequently encountered in combination with words expressing *an inability to act*.
- Semantic preferences of the emotion word. These can reveal:
 - the semantic categories with which it is frequently combined, including prototypical causes (for example, *others' attitudes or behaviours*), experiencers (*individuals, deities*) or consequences (*acts of destruction*) of the emotion
 - the way the emotion is described (particularly through its combination with adjectives). For example, the main aspects of *Wut* highlighted are

extension (*grenzenlos* [boundless], *groß* [big]) and irrationality (*wahnsinnig* [insane], *hemmungslos* [uninhibited]).

- Semantic prosody, i.e. evaluative (positive or negative) expressions with which the emotion word is frequently combined. This is especially relevant to *Zorn*, which elicits an overwhelming number of adjectives related to the emotion's justification (*heilig* [holy], *gerecht* [just], *verständlich* [understandable]).

b) Data sources

The preliminary analysis (step one), drew on data from two very large corpora of contemporary German texts: the collocation database (CCDB), based on a 2.2 billion word subset of the German Reference Corpus (DEREKO); and the DWDS (Digitales Wörterbuch der deutschen Sprache des 20. Jhs.), consisting of 120 million words.⁴ The analysis was a two-step procedure (cf. Oster 2010, 2014). First, data was generated through corpus searches for *Wut* and *Zorn* which produced lists of co-occurrences with access to concordance lines. These lists were then completely processed (up to a minimum frequency of 2), to allow co-occurrences relevant to one or more of the abovementioned categories to be identified and coded.⁵ Oster's 2014 results were supplemented by additional searches for *Wut*, *Zorn* and *Ärger* in the new version of the DWDS corpus, which includes enhanced information accessing facilities for typical co-occurrence partners, through the "word profile" (*Wortprofil*).

c) Semantic foci: the regulation and expression of emotions (Ogarkova & Soriano, 2014). Conducting a diachronic study of every single aspect of the descriptive model would have resulted in an extremely complex description. An attempt was therefore made to reduce the items under consideration and create coherent groupings of several different types of conceptualizations and expressions. To do this, the study employed the concept of 'semantic focus', as defined by Ogarkova & Soriano (2014). In their intercultural study on the conceptualization of anger in Russian, Spanish and English, Ogarkova and Soriano distinguish between two pairs of dimensions related to the regulation and expression of emotions: first, the dichotomy between the semantic foci of *enhanced regulation* and *unrestrained manifestation*; and, secondly, the distinction between *free expression of the emotion* and "*internalized*" *anger*, with an emphasis on the emotion inside the body. Ogarkova and Soriano have demonstrated that these semantic foci constitute critical points of interlingual comparison that illustrate how different cultures conceptualize emotion and which aspects they foreground. Given the constant changes cultures and languages are subject to, as well as their interrelations and mutual influence, the present study is informed by the awareness that such conceptualizations are not necessarily stable within any one culture and that semantic foci can provide a means of tracing changes over time.

Ogarkova and Soriano's (2014) approach was thus applied to the results obtained through the procedures outlined in (a) and (b). The lists of co-occurring expressions were re-examined, re-grouped and classified into two dimensions, each with two opposing semantic foci: Regulation (Control vs. Lack of Control) and Expression (Visibility vs. Internalization).

4.2 Step 2: a quantitative diachronic analysis of *Wut*, *Zorn* and *Ärger* (1700-2000)

Our list of focus-related co-occurrences provided a starting point for the second step: a quantitative, semi-automatic, diachronic analysis which traces the evolution of the three anger words in terms of the four semantic foci (Section 6). This involved conducting a new round of queries in a diachronic corpus: searching for the three German anger words in combination with all the expressions identified in step one, for each of the semantic foci (cf. Appendix I). Combined occurrence frequencies were then established, for each emotion word and semantic focus, at 50-year intervals. See Appendix II for a simplified version of the resulting frequency table.

For the quantitative and qualitative diachronic analyses, our corpora were the *Deutsches Textarchiv* (DTA) and the *DWDS Kernkorpus*, which together span a period from the seventeenth to the twentieth centuries.⁶ The DTA is a carefully constructed historical corpus, whose texts were selected, according to pre-established criteria, to be optimally representative of written German in each period. It has been lemmatized and tokenized and linguistic variants have been dealt with. The DTA (seventeenth to nineteenth centuries) contains 140 million tokens, while the *DWDS Kernkorpus* (twentieth century) contains 100 million. The DWDS interface allows the user to generate histograms representing the absolute or relative frequency of any given search word. Outliers are corrected using a variety of parameters, including windowing and pruning. For a more detailed description of the DTA and its possibilities, see Geyken et al. (2015) and Haaf and Thomas (2016).

4.3 Step 3: a qualitative case study

This final step explored one of the trends observed during the quantitative analysis. A detailed qualitative study was performed on one semantic focus (Lack of Control) for one of the anger words (*Wut*). The comprehensive, manual co-occurrence analysis was designed to check the results of the semi-automatic procedure employed in step two and to find further evidence for changes in the conceptualization of the anger words. We analysed all the contexts in which *Wut* occurs during three representative periods (1700-1789: 1159 contexts; 1790-1889: 1564; 1950-2009: 648) in order to quantify and classify those co-occurrences that indicate Lack of Control. In order to provide an additional indicator of conceptual change, all contexts were also coded to indicate which meaning variant of *Wut*, as described in the DWB's historical account, was at work in each case. The frequency evolution of the meaning variants was then compared across the relevant historical periods and in the contemporary data.

5. Framework: Tracing the regulation and expression of *Wut*, *Zorn* and *Ärger*

In order to define a framework for the diachronic analyses of steps two and three, this section will, first, outline a classification of co-occurring expressions according to their semantic foci (5.1); then, apply this classification to the twentieth-century data in order to highlight differences in the construal of the three emotion words with regard to their regulation and expression (5.2); and, finally, provide an overview of the frequency of types and tokens registered under each semantic focus (5.3).

5.1 Classification of co-occurrences according to the semantic foci

I will now explain what is meant by each semantic focus, which categories of the descriptive model (conceptual metaphors and their subtypes/entailments, physical

manifestations, conceptual proximity, characteristic consequences, description and evaluation) have been most productive and illustrate them with sample co-occurrences.⁷

5.1.1 Regulation: Control

Under the semantic focus of Control, expressions have been grouped together that highlight the experiencer's attempt to retain control over herself and her actions instead of letting the emotion determine them. This focus primarily includes expressions of three of the major metaphor types. Many of these expressions fit the metaphorical conceptualization of ANGER IS AN ENTITY IN A CONTAINER (THE BODY), especially its subtype KEEPING CONTROL IS KEEPING ANGER INSIDE OR DOWN: see, for example, expressions like *unterdrücken* ('to suppress') and *herunterschlucken* ('to swallow'). The metaphor ANGER IS AN OPPONENT is present in expressions describing the emotion as SOMETHING YOU FIGHT BACK AGAINST, as in *bezwingen*, *besiegen* ('to defeat') and *widerstehen* ('to resist'). Finally, anger is also viewed as an AUTONOMOUS FORCE in the form of A BEAST YOU TRY TO KEEP UNDER CONTROL (*zügeln*, *Zaum*, *bändigen* → 'to keep a rein on') or as A NATURAL FORCE: WATER (*kanalisieren* → 'to channel').

5.1.2 Regulation: Lack of Control

The expressions listed under the semantic focus of Lack of Control reflect the diametrically opposite idea: losing or lacking control over one's actions or countenance because of the intensity of the emotion. This typically makes the experiencer act in an uncontrolled way.

This semantic focus is especially productive for four different metaphor types and their subtypes/entailments.

- First, the conceptual metaphor ANGER IS AN ENTITY IN A CONTAINER (THE BODY) gives rise to a series of expressions evoking the idea that the anger trapped in the body expands and that the experiencer loses control at the precise moment at which the emotion manages to escape the body. Examples include *aufsteigen*, *hochkommen* ('to come up'), *Ausbruch*, *hervorbrechen* ('outbreak') and *platzen*, *zerspringen* ('to burst'). The combination of the CONTAINER metaphor with the generic metaphor INTENSITY IS HEAT leads to the subtype ANGER IS A BOILING LIQUID. Some of the co-occurrences of this group are classified as Lack of Control, namely those that refer to the moment at which the substance boils over, i.e. can no longer be controlled (*überschäumen*, *hochkochen* → 'to boil over').
- The metaphor ANGER IS AN OPPONENT, specifically AN ATTACKER, is present in a series of semantically related verbs expressing the idea of 'attacking' (*packen*, *überkommen*, *übermannen*, *schütteln*, *ergreifen*).
- A number of subtypes of the metaphor ANGER IS AN AUTONOMOUS FORCE are also productive for this semantic focus: for example, anger seen as:
 - a destructive force (*rasend*, *toben* → 'raging');
 - a natural force like water (*branden* → 'to surge') or fire (*entflammen*, *lodern* → 'to go up in flames');
 - or a beast out of control (*wild* → 'fierce'; *zügellos*, *unbeherrschbar*, *unbändig*, → 'unreined').

- And finally, instances of a relatively infrequent metaphor like ANGER IS DRUNKENNESS were also located and this is undoubtedly another expression of Lack of Control (*trunken* → ‘drunk’).

However, it is not only the metaphors which can be classified as indicative of the semantic focus Lack of Control. This focus also extends to many of the emotion’s characteristic consequences, especially those that include acts of aggression or destruction – such as *zerschmettern* (‘to smash’), *zertrampeln* (‘to trample down’) and *einstechen auf* (‘to stab’) – because these typically occur when a person has lost control. Another revealing aspect of this focus is conceptual proximity, i.e. the word’s co-occurrence with feelings related to aggression, such as *Angriffslust* (‘belligerence’) and *Rachedurst* (‘thirst for revenge’). Finally, the description of the emotion was found to be relevant to the expression of Lack of Control in two ways: it is irrational (*sinnlos, heillos, unreflektiert, blind*⁸) and disproportionate (*maßlos, grenzenlos*).

5.1.3 Expression: Visibility

The first semantic focus of the expression dimension relates to the free expression of anger, which leads to its visibility. There are some similarities with the semantic focus of Lack of Control in that there is absence of control over the emotion. However, the emphasis is not on the experiencer being overwhelmed by emotion but on making the emotion visible, either voluntarily or involuntarily. Some of the expressions of the metaphor LOSING CONTROL IS SUBSTANCE GOING OUT OF THE CONTAINER, such as *rausschreien, hinaussschreien* (‘to yell out’), can therefore be classified under this category since their primary focus is the expression of the anger.

As expected, several physical manifestations classifiable under this rubric have proven quite productive:

- Anger causes agitation. We find expressions referring to trembling, stamping, gnashing one’s teeth, etc. (*zittern, stampfen, Zähneknirschen, trampeln*, etc.).
- Anger causes screaming or crying (*Träne, weinen, heulen*, → ‘tears’, ‘to cry’, ‘to yell’, etc.).
- Anger shows in the face (*Gesicht, Augen, funkeln* → ‘face’, ‘eyes’, ‘to glare’, etc.).
- Anger causes a change of colour: in this case typically reddening the experiencer’s face (*hochrot, erröten* → ‘red’, ‘dark red’, etc.).
- Anger causes contraction, as in *ballen, verzerren* (‘to clench’, ‘to distort’).
- Anger causes a rise in body temperature. Although increased temperature might not be as visible as other physical effects, examples like *glühen vor Zorn* (‘to be red hot with anger’) can be considered instances of this semantic focus.

5.1.4 Expression: Internalization

On the opposite side of this dimension, we find the semantic focus of Internalization, a conceptualization of the emotion as located in the body, but affecting it in an internal, not an external way, by contrast with the focus of Visibility. Internalization is typically conveyed through expressions based on the metaphor ANGER IS AN ENTITY IN A CONTAINER (THE BODY). Three metaphor subtypes instantiate this idea:

- ANGER IS SOMETHING INSIDE THE BODY, with expressions like *voll*, *voller*, *innerlich*, ('full of', 'internal') and various body parts (*Leib*, *Bauch*, *Herz*, *Seele* → 'body', 'belly', 'heart', 'soul').
- ANGER IS SOMETHING THAT COMES FROM THE OUTSIDE, typically expressed through *erfüllen mit*, *angefüllt mit* ('to fill with').
- AN EMOTION THAT IS STRONG IS DEEP INSIDE THE BODY, as in *tief* ('deep').

On the other hand, perhaps surprisingly, there are some physical manifestations that can be interpreted in this way, namely when they affect the body by reducing its expressiveness, as in *stumm*, *sprachlos* ('mute', 'speechless') and *blass*, *bleich*, *erblassen* ('pale').

Some expressions that demonstrate semantic prosody and therefore evaluation have also been included in this group: for example, expressions that present the emotion as something potentially shameful, which should be concealed, like *verhehlen*, *uneingestanden* ('to disguise', 'unconfessed').

5.2 Characterization of *Wut*, *Zorn* and *Ärger* in terms of Regulation and Expression

The diachronic analysis of the three anger words in section 6 will concentrate on the dimensions of Regulation (Control vs. Lack of Control) and Expression (Visibility vs. Internalization). Let us therefore first establish which additional insights this perspective can provide, regarding the construal of *Wut*, *Zorn* and *Ärger*, from a contemporary perspective. In order to illustrate this, the frequencies of foci-related co-occurrences are represented in a radial diagram (Fig. 1), with Regulation (with its two semantic foci) plotted along the vertical axis and the expression-related foci along the horizontal axis. This results in quadrangles of different shapes and sizes that offer interesting additional insights through a visual representation of the major differences between the words.

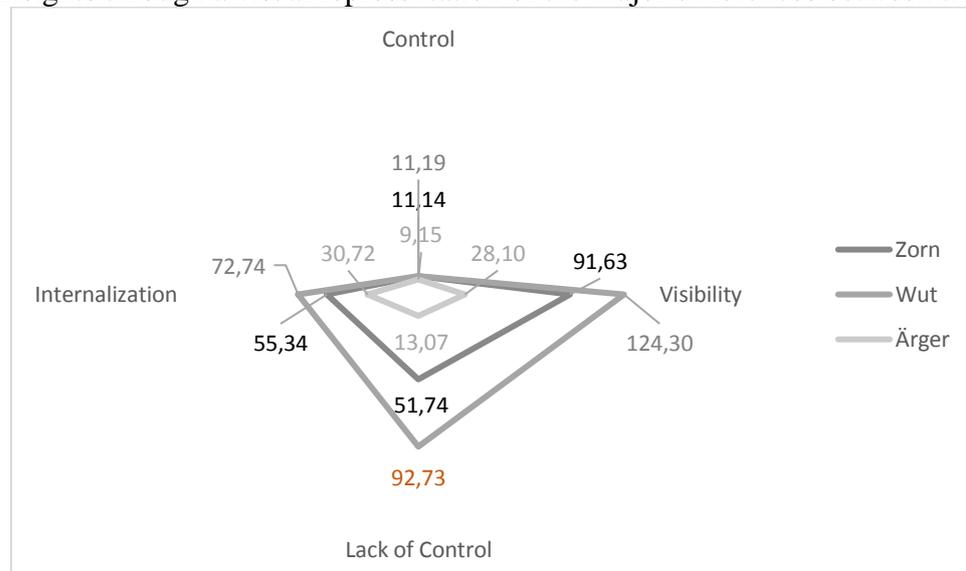


Fig. 1: Radial diagrams for *Wut*, *Zorn* and *Ärger* (1900-1999, frequency per 1000 tokens)

The sizes of the quadrangles represent the expressiveness of the words' use: the bigger the quadrangle, the more metaphorical, metonymical and other figurative co-occurrences

related to the control and the expression of anger were found. Figure 1 shows that *Wut* is by far the most expressive of the three and *Ärger* the most neutral. The shapes are also revealing because they visualize which aspect is most prominent for each word. *Ärger* is, once again, the most neutral of the three, with near-balance on both the Visibility-Internalization and the Control-Lack of Control axes. *Ärger* is represented by an almost perfectly rhomboidal shape, while *Zorn* and *Wut* display a more distorted kite shape that gives more weight to Visibility over Internalization and to Lack of Control over Control. *Zorn* and *Wut* are both particularly characterized by Visibility. *Wut* exhibits an additional very strong inclination towards Lack of Control.

5.3 Productivity and creative use of the four semantic foci

As section 5.1 demonstrated, some semantic foci are represented by a greater variety of expression types than others. For example, Control is only expressed through a small number of conceptual metaphors. For Lack of Control, on the other hand, in addition to various metaphorical expressions, we find co-occurrences that pertain to the categories of conceptual proximity, physical manifestations, consequences and descriptions of the emotion. Furthermore, some aspects are instantiated through a single expression, while others exhibit far greater variability. In anticipation of the quantitative co-occurrence data which section 6 will present in detail, I'd like to provide a brief overview of the frequency of types (i.e. number of different expressions) and tokens (total number of expressions) for each semantic focus (cf. Table 1).

Semantic focus	Tokens	Relative token frequency	Types	Relative type frequency	Types per 100 tokens
Control	168	5.0%	18	8.9%	10.7
Lack of Control	1092	32.2%	97	47.8%	8.9
Visibility	1165	34.3%	60	29.6%	5.2
Internalization	968	28.5%	28	13.8%	2.9
Total	3393		203		

Table 1: Frequency of types and tokens per semantic focus (collapsed across *Wut*, *Zorn* and *Ärger*)

In this case, the variety of categories noted above is a good predictor of productivity. Lack of Control is the most productive semantic focus, both with respect to number of tokens (34.3% of the total) and types (47.8%). Conversely, Control is the least productive with only 5.0% of tokens and 8.9% of types.

Another way of looking at these figures is to put the number of types in relation to that of tokens, i.e. to calculate how many different types there are per 100 tokens. This indicator (termed the creativity ratio by Oster, 2010) can indicate whether the semantic foci are realized through a set of a few, stereotyped expressions or whether the speakers of a language explore those foci more creatively. Interestingly, the least productive semantic focus for German anger (Control) also has the highest rate of types per 100 tokens (10.7). Internalization, by contrast, is much more stereotyped in its use, with only 2.9 types per 100 tokens.

6. Quantitative study: a diachronic analysis of *Wut*, *Zorn* and *Ärger*

The main aim of this part of the study is to provide a diachronic description of the three German anger words *Wut*, *Zorn* and *Ärger* with regard to the semantic foci explained above. The results will be discussed in section 6.2. Before tackling such a complex issue, however, we should briefly examine the frequency evolution of the three anger words themselves over the centuries to see whether one occurs more frequently than the others and, if so, whether this has changed over time.

6.1 Incidence of *Wut*, *Zorn* and *Ärger* from the seventeenth to the twentieth centuries

When dealing with relatively infrequent lexical items, like those analysed here, there is a rather high possibility of low incidence, especially in the smaller, earlier sections of the corpus. Also, not every year is represented by an equal amount of data. Examining the seventeenth-century section of the DTA reveals, for instance, several years with only one book (1633, 1654, 1655, 1695) or none at all (1687, 1694). On the other hand, if an idea is mentioned in a text at all, it is likely to appear more than once, which makes the ratio per token rise sharply. So, if the time interval chosen for a search is too small, the resulting histogram consists of a succession of large peaks, alternating with years of zero incidence. Smoothing the timeline by grouping the data in ten or fifty-year intervals therefore appears to be the best solution. In this case, since the study focuses on broad tendencies, a fifty-year interval was chosen. In order to visualize the three curves simultaneously, the frequency data was manually extracted to a spreadsheet and plotted on a single graph (cf. Fig. 2). This review of four centuries of the evolution of *Wut*, *Zorn* and *Ärger* reveals contrasting tendencies: *Zorn* is used much more frequently in earlier periods and then rapidly diminishes in frequency, whereas the evolution of *Wut* and *Ärger* is more stable, but at a lower level. The frequency of *Wut* increases conspicuously in the eighteenth century and maintains itself practically on a par with *Zorn* from then on. *Ärger* is less frequent historically and only reaches a similar frequency to that of the other two in the final decades of the twentieth century.

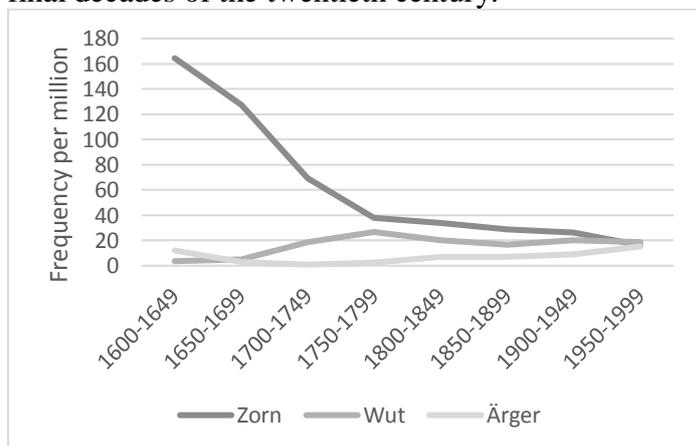


Fig. 2: Evolution of *Wut*, *Zorn* and *Ärger* in the DTA (1600-2000)

6.2 Evolution of the presence of the semantic foci

Moving on from the initial synchronic characterization of *Wut*, *Zorn* and *Ärger* in terms of Control, Lack of Control, Visibility and Internalization (cf. 5.2), let us now investigate how this picture may have changed over the centuries. As explained above, queries were conducted in the DTA corpus for all the search words identified for each of the semantic

foci, in combination with *Wut*, *Zorn* and *Ärger* (Appendix I). As a result, the interface displays a histogram showing their frequency per one million tokens in each diachronic subsection of the corpus. In order to draw meaningful conclusions about the evolution of the semantic foci over the centuries, however, what we need is a means of calculating the frequency of occurrence relative to the number of tokens of *Wut/Zorn/Ärger* in each period. Since such a procedure is not supported by DTA's interface, the data (i.e. absolute co-occurrence frequencies for each semantic focus and number of tokens of the anger word) was extracted manually for each time period and anger word, after which the frequency of expressions representing the four dimensions per 1000 tokens of *Wut/Zorn/Ärger* was calculated. The resulting relative frequencies were plotted on a single graph for each emotion word. The graph contains four curves, one for each semantic focus (cf. Fig. 3). This yielded clearly differentiated results which may be summarized as follows.

- The charts confirm that Control remains at a low level for all three anger words (blue curve).
- However, Visibility of anger (grey) gains dramatically in influence for all three emotion words over the centuries, especially for *Wut* and *Zorn*.
- The most remarkable thing about *Wut* is that Lack of Control (red) predominates strongly over the other three foci from the middle of the seventeenth until the end of the nineteenth centuries, not showing a marked decline until the twentieth century, when it is overtaken by Visibility (as demonstrated by the contemporary data discussed in the previous section).
- For *Zorn*, Lack of Control and Internalization (red and yellow) seem to develop largely in parallel. They peak during the first half of the nineteenth century and then gradually fall. From the middle of the nineteenth century onwards, Visibility is the most prominent semantic focus.
- *Ärger*, finally, shows more similarities with *Zorn* than with *Wut*, although at a somewhat lower level. In the first half of the seventeenth century, it scores very low on all four dimensions, probably due to the extremely low overall frequency of *Ärger* during this period (cf. Fig. 2). Historically, Internalization is by far the most prominent aspect, but from the mid-nineteenth century onwards, Visibility becomes equally important.

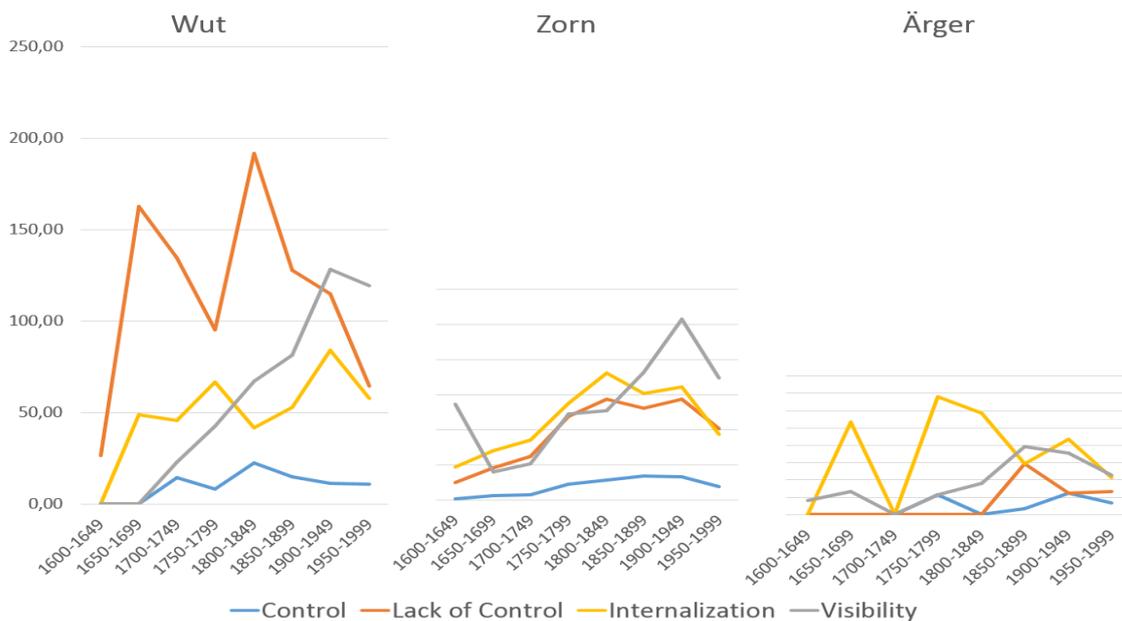


Fig. 3: The evolution of the four semantic foci in combination with *Wut*, *Zorn* and *Ärger*

Another interesting finding can be obtained by considering all three lexical items as a whole, thus hinting at the diachronic evolution of the concept of anger in German, as expressed through *Wut*, *Zorn* and *Ärger*. Figure 4 combines two types of information: The blue area represents the frequency of the three anger words per one million tokens (secondary y axis on the right) from the seventeenth to the close of the twentieth centuries. The coloured lines symbolize the evolution of the combined co-occurrence of *Wut*, *Zorn* and *Ärger* with expressions relative to each of the semantic foci, measured per 1000 occurrences of the anger words (primary y axis on the left).

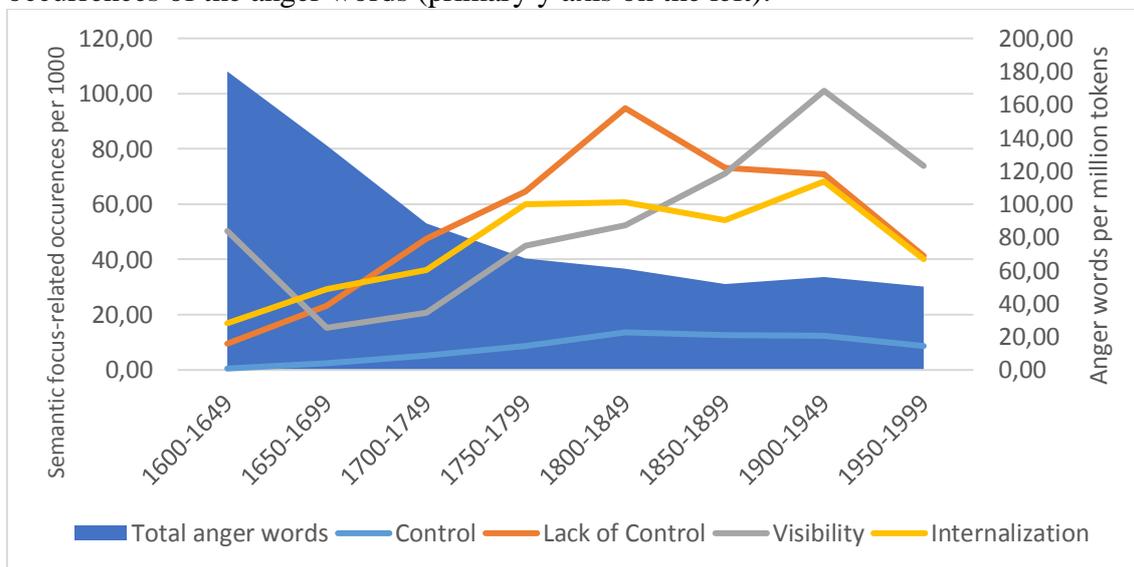


Fig. 4: Evolution of the four foci vs. total anger words

Figure 4 shows a marked downward tendency in the overall frequencies of usage of the three anger words over the course of the four centuries. A sharp decline in the seventeenth and eighteenth centuries contrasts with almost stable evolution from 1800 onwards. Figurative usages related to the four semantic foci, by contrast, steadily increase in

frequency until around 1850. From 1850-1950, Control remains almost stable while Lack of Control shows a marked decline. Visibility and, to a lesser extent, Internalization, on the other hand, continue to gain force. Finally, during the second half of the twentieth century, all four dimensions are less prevalent than before.

The data presented above includes two details which deserve special attention and which will be investigated further in the following section of the paper. The first is the evolution of *Wut*, above all with respect to Lack of Control, its most salient semantic focus both in terms of frequency and of the magnitude of its diachronic change. Section 5.2 demonstrated that Lack of Control characterizes 20th-century *Wut* more than it does the other two anger words. As the diachronic data shows, this is even more true of earlier centuries. Two very pronounced frequency peaks can be identified: one around 1700 and the other during the first half of the eighteenth century (Fig. 3). The other striking detail is the remarkable decrease in all four semantic foci in the last half of the twentieth century. This does not seem to be a question of corpus size. Small corpus size may have affected the rather small, earlier corpus sections, but the number of tokens is relatively high and remains stable throughout the twentieth century. However, given the unexpectedness of this trend, it seems advisable to back up these results with a more detailed, qualitative analysis.

7. Qualitative study: exploring the background to the changes

In this section, the “panoramic” quantitative diachronic study will be supplemented with a closer look at the evolution of the semantic focus Lack of Control for the anger word *Wut* during the periods exhibiting the most extreme values. This will be carried out in two stages, allowing us to zoom in on both the quantitative distribution and qualitative makeup of the data. First, the frequency information for co-occurrences related to Lack of Control will be broken down into ten-year intervals and rearranged using data-driven periodization, as described by Gries & Hilpert (2008, 2012), to obtain a more reliable and precise picture of the evolution. This periodization will then be used to help us focus on and compare periods of special interest. We will then examine the textual material itself, through a manual analysis of all the contexts in which *Wut* appears in the selected time segments. The aims of this procedure are a) to confirm the reliability of the previous, semi-automatic search process by establishing to what degree these ups and downs in frequency might be attributable to differences in the data structure and b) to find further evidence for changes in conceptualization through a closer examination of contexts.

7.1 Data-driven periodization

The main criterion for establishing the data-driven periods will be the frequency of co-occurrences related to Lack of Control. However, another factor has to be taken into account: the size of subcorpora. As Figure 5 demonstrates, corpus size has direct consequences for the variability of results: with small corpora, the number of co-occurrences tends to be either very low or very high, while larger corpora produce more stable results.

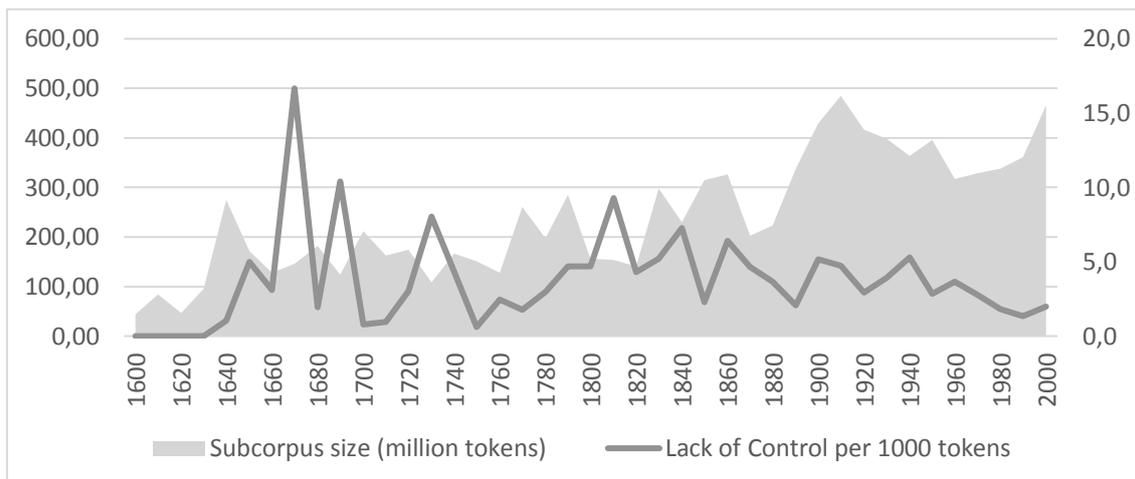


Fig. 5: Lack of Control for *Wut* in ten-year intervals in the light of subcorpus size

It is therefore helpful to first divide the timeline into subperiods that present a relatively stable subcorpus size and then perform data-driven periodization on each of them separately. Three periods stand out with regard to their subcorpus size. Subcorpora from the decades from 1600-1630 are much smaller (with an average of only 2.2 million tokens) than those of later decades. As a result, very few instances of *Wut* were found (an average of 1.5 occurrences per decade) and no co-occurrence at all expressing the semantic focus Lack of Control. This section of the corpus was therefore excluded. The rest of the corpus displays an appreciable difference between roughly the seventeenth to nineteenth centuries on the one hand and the twentieth century on the other. Application of Gries & Hilpert's (2008; 2012) variability-based neighbourhood clustering confirms this impression and suggests the following periodization: 1640-1889 (with an average subcorpus size of 6,736,793 tokens) and 1890-2009⁹ (with 12,880,670 tokens on average).

The same variability-based neighbourhood clustering procedure was then applied to both periods separately with respect to the relative frequency of Lack of Control related co-occurrences.¹⁰ Given the high variability of the first period, several outliers had to be corrected¹¹ before the procedure could be applied. As a result, three clusters were identified for each of the two periods. In Figure 6, each of these clusters forms a plateau that represents the average frequency values of the decades it encompasses. The most remarkable features of the diagram are the relatively low level from 1700 to 1789, the sharp increase around the end of the eighteenth century, sustained for approximately a hundred years and the gradual subsequent decline, accentuated during the last decades of the twentieth century. This will form the basis for the selection of time periods for the qualitative analysis.

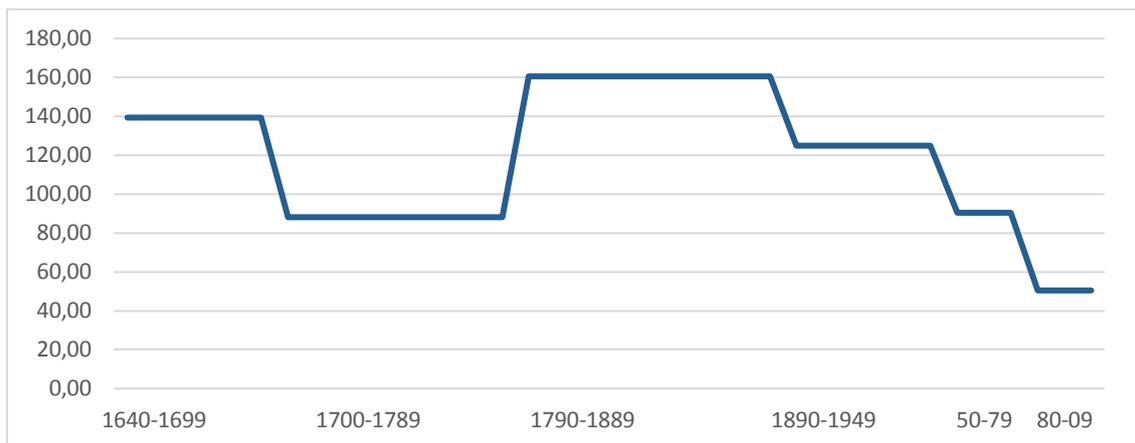


Fig. 6: Results of data-driven periodization

7.2 Qualitative contrast between selected time segments

7.2.1 Procedure

In accordance with the results of the data-driven periodization, three contrasting periods were selected: the 1790-1889 plateau and the two weakest periods, i.e. the immediately preceding period (1700-1789) and a combination of the last two periods in the timeline (1950-2009). A manual analysis of all the contexts in which *Wut* occurs was then carried out, to address three sets of questions.

- a) Comparison of 1700-1789 (period I) with 1790-1898 (period II). Does the manual search confirm the increase in Lack of Control in period II? Do specific conceptualizations become especially relevant?
- b) Comparison of 1790-1898 (period II) with 1950-2010 (period III). Does the manual search confirm the decrease in Lack of Control in period III? Are there specific conceptualizations that gain or lose relevance?
- c) Frequency evolution of the historical meaning variants described in the DWB (cf. section 3). According to the DWB, the Old High German meaning of *Wut* as a mental or physical disease pattern caused by demonic possession (variant A) was in decline by the Modern Age, with only a few traces remaining. Variant B (non-aggressive excitement), on the other hand, is specific to a period that stretches from the mid-eighteenth to the mid-nineteenth century. This raises two additional questions. Is there a noticeable decrease in usages A and B from period I to period II? Are traces of these conceptualizations still in contemporary usage (period III)?

To answer these questions, the contexts were processed in the following way. For questions a) and b), contexts expressing Lack of Control were identified; co-occurrences were classified according to the categories established in section 5 (for reasons of space, the results have been included in Appendix III); and finally, types and tokens of co-occurrences related to Lack of Control for each period were quantified (cf. Table 2).

For question c), all contexts were classified in terms of the following meaning variants:

- A. Mental or physical disease patterns or ecstatic states
 - A.1 Rabies in animals
 - A.2 Pathological states in humans
 - A.3 Ecstatic states (poetic, bacchanalian, prophetic, etc.)

These subtypes might appear rather different at first sight. However, they share a common trait: the experiencers of this type of *Wut* seem to act under the influence of a spirit or external force of some kind.

- B. Intense, passionate, purposeful but not aggressive/hostile state of excitement
 - B.1 Fervour, (over)enthusiasm
 - B.2 Sexual desire
- C. Prototypical anger
- D. Vehemence or violence of inanimate or abstract entities, such as natural forces (fire, wind, waves, etc.), war, disease, etc.¹²

7.2.2 Results

a) When we compare periods I and II, the results of the analysis confirm that, while the frequency of *Wut* per one million words is almost stable throughout all three periods, there is a considerable increase in the number of co-occurrences related to Lack of Control from the first to the second period (from 108.7 to 195.7), as expected (cf. Table 2).

	Period I: 1700-1789	Period II: 1790-1889	Period III: 1950-2009
Corpus size	61,561,581	88,902,660	73,512,748
Tokens of <i>Wut</i>	1159	1564	1244/648 ¹³
Relative frequency of <i>Wut</i> (per million words)	16.5	16.0	16.9
LC-related co-occurrences (tokens)	126	306	150
LC-tokens per 1000 tokens of <i>Wut</i>	108.7	195.7	231.5
LC-related co-occurrences (types)	61	90	101
LC-types per 100 LC-tokens	50.8	29.4	67.3

Table 2: Quantitative comparison of the three periods

Manual context analysis also revealed a series of shifts in the composition of the aspects contributing to this conceptualization (cf. Appendix III for details), which can be summed up as follows.

- Several new categories arise in the eighteenth century (*Wut* as an EVIL FORCE, or as boundless).
- Other metaphor subtypes, such as ILLNESS, MADNESS, DESTRUCTIVE FORCE or REINLESS BEAST, are reinforced.
- The conceptualization of *Wut* as FIRE, on the other hand, becomes less widespread.
- The most important difference between Periods I and II, however, is that the latter witnesses the emergence of extremely frequent occurrences of stereotyped characterizations of *Wut*, such as *blind* (46), *wild* (27), *rasend* ('raging', 34) and *toll* ('mad', 11). All of these can be related to the idea of *Wut* as something irrational, which therefore becomes a characteristic trait of the conceptualization of *Wut* in this period (1790-1889).

b) Contrary to expectations, the study finds a very high number of expressions related to Lack of Control in the second half of the twentieth century (231.5 per 1000 tokens of *Wut*). Appendix III shows the consolidation of almost all uses (except *Wut* as EVIL FORCE and ILLNESS) and a remarkable increase in two aspects. First, LOSING

CONTROL IS THE SUBSTANCE GOING OUT OF THE CONTAINER is not only used far more frequently than in earlier centuries, but is also explored creatively, through additional facets and entailments of the metaphor. For example, loss of control over the emotion is represented by anger coming up (*aufsteigen, hochkriechen*), causing an explosion (*zerplatzen, explodieren*) or boiling over (*hochkochen, aufwallen*). Secondly, there is a large increase in the co-occurrence of acts of aggression or destruction as a consequence of *Wut*.

A closer look at the actual examples reveals that the relative frequency of acts of extreme violence in period III is almost double that of period II (34.0 vs. 19.8 per 1000 tokens of *Wut*, cf. Table 3). In addition, a new subcategory has appeared, which includes minor or even ridiculous acts of violence, adding a further 41.7 co-occurrences per 1000 tokens of *Wut*. These expressions are extremely varied: ranging from ‘trampling on a wedding cake’ (*Hochzeitskuchen zertrampeln*), ‘banging on a post box’ (*gegen Briefkasten hämmern*), ‘setting fire to empty offices’ (*leere Büros in Brand setzen*) to ‘cutting one’s finger’ (*sich in den Finger schneiden*). What they have in common is a certain irony in their descriptions and the emergence of another aspect of the contemporary conceptualization of *Wut*, namely the “inability to act” (cf. Oster 2014: p. 300). In many of these contexts, faced with the impossibility of acting against the real cause or causer of the anger, *Wut* expresses itself through compensatory aggression towards objects (*Fichtenholzkloben, Tomaten, Pflaumenbäume* → ‘spruce logs’, ‘tomatoes’, ‘plum trees’); unrelated groups used as scapegoats (*Juden, Militärpolizisten* → ‘Jews’, ‘military police’); or even towards the experiencer himself (*Selbsterstörung* → ‘self-destruction’). This is also confirmed by the extraordinary rise in frequency of co-occurrences like *ohnmächtig* and *hilflos* (‘powerless’, ‘helpless’), which reaches 38.6 per 1000 tokens of *Wut* in period III, after only 5.1 in period II. Table 3 illustrates the emergence of this duality of *Wut*, defined here as aggressive anger vs. helpless anger.

		Period II: 1790-1889	Period III: 1950-2009
Aggressive anger	Acts of extreme violence	19.8	34.0
	Feelings of aggressiveness and revenge	3.8	10.8
Helpless anger	Minor or ridiculous acts of violence	-	41.7
	<i>hilflos, ohnmächtig</i> (‘helpless’, ‘powerless’)	5.1	10.8

Table 3: Frequency per 1000 tokens of *Wut* of markers of aggressive vs. helpless anger

c) As predicted in the DWB, the analysis shows that variant C is the predominant meaning in the time segments analysed here (cf. Table 4). Furthermore, there is a steady decline in meanings other than the prototypical one. During the eighteenth century, almost 15% of occurrences belong to variants A, B or D, but, by the nineteenth century, this proportion has already decreased to 5.8%. Variant D (vehemence of an abstract entity), however, is quite popular in period I (7.2%) and almost non-existent in period II (1.7%). The same is true of the use of *Wut* to designate the disease of rabies (4.6 and 0.8%). Finally, as described in the DWB, variant B.1 (non-aggressive fervour) is characteristic of the period from the mid-eighteenth to mid-nineteenth centuries. Accordingly, a higher incidence was found in period II (1.6%), with the first occurrences attested in 1774 and the last in 1869.

In contemporary German, the only remaining meaning variant is that of *Wut* expressing the emotion of anger. However, the alternative meanings have not disappeared altogether. A.1 (rabies) has come to be designated by the more specific term *Tollwut* (attested in the DTA from 1850 onwards). Nonetheless, one of the most common symptoms of rabies, foaming at the mouth, persists in several metaphorical expressions (*schäumen*, *Geifer*). In addition, the early demonic and ecstatic interpretations have left their traces in expressions like *außer sich* ('beside oneself') and *Rausch*, *berauscht* ('inebriation', 'inebriated'). Finally, B.1 (fervour, (over)enthusiasm) is still present in a very productive pattern of nominal compounding "activity + *Wut*", such as *Arbeitswut* ('working'), *Zerstörungswut* ('destroying'), *Bauwut* ('building'), *Sparwut* ('saving money') among many others.

	1700-1789	%	1790-1889	%	1950-2009	%
A.1	53	4,6	13	0,8	0	0,0
A.2	2	0,2	9	0,6	0	0,0
A.3	9	0,8	13	0,8	0	0,0
B.1	6	0,5	25	1,6	0	0,0
B.2	12	1,0	5	0,3	0	0,0
C	994	85,8	1473	94,2	648	100
D	83	7,2	26	1,7	0	0,0
Total	1159		1564		648	

Table 4: Distribution of meaning variants

The manual analysis thus confirms the increase in Lack of Control in period II (question a), but not its decrease in period III (question b). In both cases, the qualitative analysis provides interesting insights into the changing ways of conceptualizing *Wut*.

Before concluding this paper, I would like to formulate several caveats to bear in mind when undertaking this kind of corpus-based analysis of emotion words. These caveats reflect some of the methodological difficulties mentioned in section 2 and provide possible explanations for the partial discrepancy between the results of the semi-automatic search and the manual analysis.

First and foremost, this comparison has demonstrated that there is great variability in how the semantic foci are expressed. The quantitative analysis included queries for specific, previously established co-occurrences. It is only natural that other ways of expressing the semantic foci should arise once a qualitative, exhaustive analysis has been added. However, it is worth noting that the number of additional expressions that have been found through manual analysis is extremely high. Only about one in every four of the foci-related co-occurrences identified in phase three can also be found in the initial list (23% in period I, 21% in period II and 27% in period III). This is directly related to the fact that a significant proportion of the expressions only appear once (64% in periods I and II and up to 80% in period III) and gives us an idea of the immense variability in the expression of different semantic aspects of an emotion.

On the other hand, an analysis of bare co-occurrences alone, which does not take context into consideration, can be misleading. Not only can the presence of a modifier or negation

completely change the interpretation of a co-occurring item (for example *bezwingen* – ‘to overcome’ → Control vs. *nicht bezwingen können* – ‘being unable to overcome’ → Lack of Control), but they can also be used in an ironic way or, as in some of the examples from the category “consequences of the emotion”, refer to wishful thinking, i.e. things the experiencer would like to do, but cannot.

Finally, as discussed in section 6.1, emotion words like *Wut* tend to cluster: if they appear at all, they usually do so several times in the same work. In addition, the use of *Wut* seems to be rather idiosyncratic. Authors tend to specialize in a specific type: in some works “helpless anger”, in others, “aggressive anger”. These factors make it more difficult to draw reliable quantitative conclusions, since the inclusion of specific works can have an unexpected impact on overall figures.

8. Conclusions

In accordance with the twofold objective of this paper—to provide an in-depth description of the evolution of three German anger words *and* outline the challenges and possibilities of a corpus-based approach—the conclusions we can draw are located on two different planes. There are a number of noteworthy results regarding the diachronic description of the German concept of anger as represented by the emotion words *Wut*, *Zorn* and *Ärger*. After examining the combined diachronic data for all three (cf. Fig. 4), the main conclusions can be summed up as a decreasing presence of anger words in written German and an overall tendency towards an increasing frequency of all four semantic foci until the nineteenth century, followed by a striking decline in the second half of the twentieth. As for the distribution of the semantic foci, the most remarkable result is the constant growth of Visibility, while expressions denoting Lack of Control, which predominated until 1850, have become less frequent since then. On the other hand, the granular semantic analysis revealed that *Wut*, *Zorn* and *Ärger* clearly differ in the semantic aspects of Regulation and Expression of the emotion. *Wut* is the most expressive of the three and has historically been characterized primarily by Lack of Control. The evolution of *Zorn* exhibits a more regular pattern, with a gradual increase in all four foci until the middle of the nineteenth century, when Visibility becomes the dominant aspect.

The quantitative results were then used as a starting point for a qualitative study, to collect further evidence to confirm or refute the previous results. The manual analysis confirmed one part of the results of the quantitative phase: i.e. the considerable increase in Lack of Control related co-occurrences of *Wut* during the eighteenth century. However, it refuted the claim that this conceptualization has been losing strength during recent decades. In addition, the confrontation of the resulting data with historical accounts of *Wut* demonstrated that, despite the gradual narrowing of this anger word to only one prototypical meaning, the earlier, now extinct alternative meaning variants have left traces on its contemporary conceptualization.

As for the paper’s second, methodological aim, it has become clear that there are still many practical issues to be addressed in diachronic corpus-based research. One of the most important of these is the comparability of subcorpora. Choosing small, controlled corpora may provide one remedy, as exemplified in Enrique-Arias (2012) or Glynn (2015). However, in the case of studies like the semantic analysis of low-frequency lexical items, there is no way around the use of large, general corpora. The problem was therefore

addressed here by applying a combination of quantitative (data-driven periodization and extensive, semi-automatic searches) and qualitative procedures (manual analysis of selected time periods and aspects). The quantitative procedures, as Hilpert & Gries (2016: 31) have pointed out, have proven useful for visualizing pronounced or unexpected trends and thus highlighting areas and periods of interest for further investigation. The manual analysis of co-occurrences in their contexts, on the other hand, helped to corroborate or refute the preliminary findings, to identify distorting effects on the data and, most importantly, provided detailed additional insights into the ways in which the conceptualization of *Wut* has changed over the centuries. The manual analysis also demonstrated that a quantitative analysis based on mere co-occurrences could be misleading (cf. the discussion in 7.2.2). In this study, at least, careful manual analysis of contexts proved indispensable.

¹ This study was supported by research projects FFI2015-68867-P, funded by the Spanish Ministry for the Economy and Competition and P1-1B2013-44, funded by Universitat Jaume I. I would also like to thank two anonymous reviewers for their insightful comments.

² Presumably this means “not until the eighteenth century”, since letter A of the dictionary was finished during the nineteenth century.

³ Note the similarity with Diller’s (1994) distinction between Middle English *anger* (prototypically experienced by persons of lower rank) and *wrath* (high rank and power), which has recently been confirmed by Geeraerts, Gevaert & Speelman (2012).

⁴ CCDB is accessible at <http://corpora.ids-mannheim.de/ccdb/>, DWDS at <http://www.dwds.de/>. The older “retro” version of this corpus has been used for its access to lists of co-occurrences in addition to concordance lines.

⁵ The complete classification of co-occurrences for *Wut* and *Zorn* can be found at https://www.academia.edu/8710448/Appendices_of_the_paper_Emotions_between_physicality_and_acceptability_A_Contrast_of_the_German_Anger_Words_Wut_and_Zorn_.Onom%C3%A1zein_2014.

⁶ Accessible at <http://www.deutschestextarchiv.de/>.

⁷ Oster (submitted) provides additional examples of foci-related expressions regarding several emotions in different languages. Cf. also Ogarkova & Soriano (2014) for anger in English, Spanish and Russian.

⁸ *Blinde Wut* has been classified in this group because of its similarity to the previous examples. However, it is admittedly more complex, since it includes multiple metonymical (the blindness is transferred from the experienter to the emotion) and metaphorical processes (RATIONAL THINKING IS VISUAL PERCEPTION).

⁹ During this qualitative phase, additional searches were carried out in the Kernkorpus 21, which has recently been added to the DWDS and covers the first decade of the 21st century, but which cannot be accessed through the DTA. This additional effort was worthwhile since it enabled me to find supporting evidence for these tendencies in the last decades of the century.

¹⁰ Standard deviation was determined for every sequential pair of values. In an iterative process, the two neighbouring periods with the smallest standard deviation were merged into a cluster and its combined relative frequency of Lack of Control related co-occurrences was calculated, so that the next iteration could take place.

¹¹ Outliers were also detected using Gries & Hilpert’s (2012: 142-143) procedure. However, since these extreme values are not due to erroneous measures but to a high variability as a result of data sparseness, the values were not removed from the data set, but each of the corresponding decades was merged with its most similar neighbour before the start of the clustering process.

¹² From a cognitive linguistic point of view, this is nothing but a metaphorical use of variant C, i.e. VEHEMENCE OF A NATURAL FORCE IS VEHEMENCE OF AN ANGRY PERSON, which leaves room for further mappings, endowing the natural force with intentionality or emotion.

¹³ Unfortunately, for copyright reasons, only 648 of the 1244 contexts are displayed. The manual analysis is therefore exclusively based on those examples.

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Appendix I

- **Control:** unterdrücken, verhalten, zügeln, Zaum, zähmen, bändigen, kanalisieren, herunterschlucken, hinunterschlucken, hineinfressen, bremsen, zurückhalten, besiegen, bekämpfen, bezwingen, runterschlucken, hinunterspülen, beherrschen
- **Lack of Control:** hochsteigen, aufsteigen, hochkommen, schäumen, aufwallen, überschäumen, hochkochen, platzen, zerplatzen, Ausbruch, Ausbrechen, zerspringen, hervorbrechen, packen, überkommen, übermannen, schütteln, erfassen, geschüttelt, ergreifen, bemächtigen, entfesseln, wild, zügellos, unbeherrschbar, ungezügelt, unbändig, wild, ungebändigt, rasend, toben, branden, entflammen, eruptiv, lodern, aufflammen, auflodern, trunken, blind, sinnlos, wahnsinnig, heillos, irrsinnig, irrational, unreflektiert, blind, Anfall, ausleben, austoben, herausbrechen, Welle, branden, entgegenschlagen, schüren, entfachen, entbrannt, Feuerkopf, anfachen, aufflackern, flammend, Flamme, entzünden, auflodern, schäumend, unkontrolliert, unbezähmbar, hemmungslos, besinnungslos, auslassen, explodieren, überfallen, austoben, Woge, Wucht, entzwei, Gewalttätigkeit, schmetter, zustechen, zerknüllen, Brandlegung, einstechen, zerbeißen, zerschmettern, dreschen, zertrampeln, schmeißen, zerstechen, zerstampfen, Aggression, Aggressivität, Rachegefühle, Rachegefühl, Rachegedanke, Angriffslust, Raserei, Rachedurst, Rachsucht
- **Visibility:** herausschreien, rausschreien, hinausschreien, zittern, beben, knirschen, stampfen, trommeln, Zähneknirschen, stapfen, trampeln, verzerren, ballen, Träne, weinen, heulen, brüllen, Schrei, Schreien, Aufschrei, Gebrüll, aufheulen, aufschreien, jaulen, anschreien, heiser, Stimme, schnauben, schnaufen, Gesicht, Augen, Blick, funkeln, blitzen, rot, puterrot, röten, gerötet, hochrot, erröten, dunkel, schwarz, hochrot, heiß, kochen, köcheln, Siedepunkt, glühen, weißglühend, aufheizen, brodeln, abreagieren, spiegeln, äußern, ausdrücken, Ausdruck, Ventil, anlaufen, aufheulen, unverhüllt
- **Internalization:** sprachlos, stumm, blass, bleich, weiß, erblassen, zischen, sprachlos, stumm, voll, voller, erfüllen, innerlich, angefüllt, Leib, Bauch, Herz, Seele, verzerren, ballen, Stirnfalte, rumoren, Hehl, uneingestanden, verhehlen, verbergen, tief, runterschlucken

Appendix II: Frequency table

	1600-1649	1650-1699	1700-1749	1750-1799	1800-1849	1850-1899	1900-1949	1950-1999	Total
Frequency									
Zorn	1728	3077	1810	1241	1063	1268	1844	939	12970
Wut	38	123	484	873	626	736	1412	1090	5382
Ärger	126	75	22	88	222	305	644	886	2368
Total	1892	3275	2316	2202	1911	2309	3900	2915	20720
Subcorpus size (million)	10,5	24,2	26,2	32,7	31,3	44,4	69,7	58,1	
per million tokens	180,04	135,37	88,43	67,31	61,12	52,01	55,96	50,17	
Semantic foci									
Control									
Zorn	1	8	5	11	12	17	24	7	85
Wut	0	0	7	7	14	11	16	12	67
Ärger	0	0	0	1	0	1	8	6	16
Total	1,00	8,00	12,00	19,00	26,00	29,00	48,00	25,00	168
per 1000 instances of Wut, Zorn, Ärger	0,53	2,44	5,18	8,63	13,61	12,56	12,31	8,58	8,11
Lack of Control									
Zorn	17	56	45	59	61	66	106	38	448
Wut	1	20	65	83	120	94	162	70	615
Ärger	0	0	0	0	0	9	8	12	29
Total	18	76	110	142	181	169	276	120	1092
per 1000 instances of Wut, Zorn, Ärger	9,51	23,21	47,50	64,49	94,71	73,19	70,77	41,17	52,70
Visibility									
Zorn	94	49	37	61	54	92	190	65	642
Wut	0	0	11	37	42	60	181	130	461
Ärger	1	1	0	1	4	12	23	20	62
Total	95	50	48	99	100	164	394	215	1165
per 1000 instances of Wut, Zorn, Ärger	50,21	15,27	20,73	44,96	52,33	71,03	101,03	73,76	56,23
Internalization									
Zorn	32	86	62	68	77	77	119	35	556
Wut	0	6	22	58	26	39	119	63	333
Ärger	0	4	0	6	13	9	28	19	79
Total	32	96	84	132	116	125	266	117	968
per 1000 instances of Wut, Zorn, Ärger	16,91	29,31	36,27	59,95	60,70	54,14	68,21	40,14	46,72

Appendix III

	1700-1779	1790-1889	1980-2010
THE EMOTION IS AN ENTITY IN A CONTAINER (THE BODY)			
Losing control is the substance going out of the container a. 'to let it out' b. 'outbreak' c. 'to come up' d. 'to burst' A strong emotion is a boiling substance (intensity is heat) e. 'to boil over'	a. ausbrechen b. Ausbruch	a. auslassen an (4), Auslassung b. Ausbruch (6), ausbrechen (6) c. – d. – e. aufkochen	a. auslassen an (7), ausleben (2), rauslassen b. Ausbruch (2), herausbrechen, durchbrechen c. hochsteigen (7), aufsteigen (4), hochschießen (2), raufsteigen, hochkriechen, in die Birne steigen, aufschießen d. explodieren (2), zerplatzen, platzen, Explosion e. hochkochen, aufwallen
THE EMOTION IS AN OPPONENT			
An attacker or something that dominates a. 'to attack' b. 'to dominate'	a. übermannen (2) b. getrieben von (2), tyrannisch (3), überhand nehmen, beherrschen	a. ergreifen (2), überfallen, befallen, erfassen, übermannen, überkommen, überwältigen b. hinreißen (2), tyrannisch (2), nicht Meister sein, unaufhaltsam, fortreißen, despotisch, unwiderstehlich	a. packen (5), überkommen (2), übermannen, ergreifen
THE EMOTION IS AN AUTONOMOUS FORCE			
A destructive force 'raging'	rasend (8)	rasend (38), Rasender (2), toben, tobend	rasend (7), Toben
A natural force: water: 'to surge'		tosend, Katarakt	Wogen
A natural force: wind: 'stormy'	stürmisch (3), stürmerisch (2)		
A natural force: fire 'to go up in flames'	entbrennen (4), entflammen (3), brennen (2), Feuer (2), aufglimmen, brennend, Fackel, feuerrot, feurig, Flamme, glühend, Glut	entflammen (8), entbrannt, hitzig, brennen	entzünden, glühend, brennend
An evil force		satanisch (2), teuflisch	
A beast which is out of control a. 'fierce' b. 'reinless'	a. tigerisch, wild (9) b. unbändig (3), ungestüm (2)	a. thierisch, wild (30), ungestüm, b. entfesselt (2), unbändig (2), unbezähmbar (2), losbrechen, ungehemmt, unlenksam, unzähmbar	b. hemmungslos (2), freien Lauf lassen, losgelassene, unkontrolliert, unbändig, durchgehen
THE EMOTION IS A PHYSICAL OR MENTAL DISEASE			
Disease	unheilsam	fieberhaft, Paroxysmen	
Madness a. 'mad', 'madness' b. 'to foam'	a. toll (4) b. schäumen (6)	a. toll (11), Anfall (10), wahnsinnig (5), Wahnsinn (2), verrückt, Delirium	a. wahnsinnig, irrsinnig b. schäumen (3), Geifer c. außer sich

c. 'beside oneself', 'ecstatic'		b. schäumen (11), schäumend (8), Schaum, aufgeifernd c. außer sich (2), sich vergessen, mädisch	
Drunkenness 'drunk'	trunken	trunken	Rausch (2), berauscht
Consequences of the emotion			
Acts of aggression or destruction a. 'acts of great violence' b. 'minor or even ridiculous acts of violence'	a. grausam (4), zerstörerisch (2), aller- grausamste, durchrennen, erwürgen, gewaltsam, herausreißen, Mord, verschlingen, Verwüstung, mörderisch, schlachten, tödlich, Tod, würgen, zerbeißen, zerreißen, zerschlagen, Zerstörer	a. zerstörerisch (5), Opfer (3), grausam (2), zerschlagen (2), mörderisch, brutal, Mordversuch, rächend, selbstzerstörerisch, zerfleischend, zerstören, erwürgen, angreifen, beißen, erdrosseln, hieb um sich, morden, stürmen, totschlagen, überfallen, verwüsten, schleudern, weltenvernichtend	a. um sich schlagen (3), tödlich (2), zerstörerisch (2), brutal, Hiebe austeilen, blutig, Gewalt, zustoßen, geballte Faust, Tritt versetzen, rächen, einschlagen, eintreten auf, hineinprügeln, zu Boden boxen, herfallen über, stürzen auf, entzweischlagen b. gegen etwas treten (2), (Blätter) ausreißen, (Stift) schleudern, (sich in den Finger) schneiden, (Hörer) abreißen, (leere Büros) in Brand setzen, (Gabel ins Bein) stechen, (Venusstatue) zerschlagen, (gegen Briefkasten) hämmern, Schlüssellocher zusprühen, (anderes Ich) zerreißen, (Hochzeitskuchen, Herzen) zertrampeln, in die Rüben hacken, (Kochlöffel) zerbrechen, (Reitpeitsche) ins Gesicht, (ins Kopfkissen) beißen, (eine Welt) zerschlagen, mit Spazierstock ausholen, Selbstzerstörung, abreagieren, (Wohnung) ramponieren, (artig) erstechen, stampfen, aufstampfen, trampeln,
Conceptual proximity: other feelings, states or attitudes			
Feelings of aggressiveness and revenge	Rache (9), Raserei (6), Rasen, Gewalthätigkeit, mordsüchtig, Rachbegierde, Rachgier, rachsüchtig	Rache (4), Raserei, Todeshass	Rache, Aggressivität, rachsüchtig, Aggressionen, Angriffslust, aggressiv, Brutalität
Description of the emotion			
'irrational', 'blind'	blind (7), unsinnig (3), sinnlos	blind (50), sinnlos (5), unsinnig	blind (9), sinnlos (2), unsinnig
'disproportionate', 'boundless'		grenzenlos (6), maßlos (2), ungeheuer, unmaßig, ungemessen, keine Grenzen kennen	grenzenlos (2), maßlos