

# Resumen

Diversos estudios (Mélendez, Alfonso-Benlliure, y Mayordomo, 2017) y (Escobar y Gómez, 2006) han demostrado que las estrategias de afrontamiento ante los problemas, el estado de ánimo y la creatividad (dividida en pensamiento divergente y convergente), están íntimamente relacionados, lo que resulta interesante para el establecimiento de nuevas estrategias en el tratamiento de patologías diversas, como es el caso de la demencia. En esta enfermedad, los síntomas principales cursan con síntomas secundarios, como estrés y depresión, perjudicando los síntomas propios de la enfermedad (Palmeiro, Di Giacomo, y Passafiume, 2012). En esta línea, algunos autores, (Hill, Van Boxtel, Ponds, Houx, y Jolles, 2005), defienden que la relación entre el estado afectivo y la creatividad es bidireccional, de modo que el afecto positivo favorece el pensamiento divergente, y el pensamiento divergente a su vez favorece el afecto positivo. Del mismo modo, el afecto negativo favorece el pensamiento convergente, y viceversa. Por ello, en este estudio pretendemos dilucidar si la inducción de diferentes estados afectivos puede influir en la ejecución posterior en tareas de pensamiento divergente, así como evaluar la interferencia del deterioro cognitivo, propio del Alzheimer, en este proceso. Para ello, contamos con dos grupos de personas mayores, uno con residentes diagnosticados de enfermedad de Alzheimer del centro CRE Alzheimer de Salamanca y otro de personas mentalmente sanas, a los que se indujo diferentes estados afectivos (positivo, negativo y neutro) para observar las diferencias en la posterior realización del test de pensamiento divergente PIC-A. Dados los datos revisados, hipotetizamos 1) que el estado afectivo positivo conllevará una mejor ejecución en la tarea que el estado afectivo neutro, 2) que el estado afectivo negativo promoverá mayor perseveración, empeorando los resultados en comparación con la condición "neutro", y 3) que el deterioro cognitivo influirá negativamente en la ejecución con respecto al control.

# Extended Summary

## Introduction

Grow old healthily implies adapting to the demands of the environment in a efficient way, which means making use of the past to cope with the present, and establishing new objectives for the future. On this purpose, there are two coping strategies: rational and emotional ones (Mélendez, Alfonso-Benlliure, y Mayordomo, 2017), and the selected strategy is related to the type of emotion that we feel, the duration, and the intensity of it (Fancourt, Garnett, Spiro, West, y Müllensiefen, 2019), but it is also related to the creativity beneath the generation of new solutions (Mélendez, Alfonso-Benlliure, y Mayordomo, 2017). Creativity is defined as the brain capacity to associate, analyze and interpret knowledge in a way that allows us to generate new ideas (Escobar y Gómez, 2006). Furtherer, it is a construction which begins with previous knowledge, good memory, reasoning capacity, and a wide use of language (Escobar y Gómez, 2006). However, this functions are deteriorated in some pathologies, as dementia. The symptoms of Alzheimer's dementia can be divided in three groups: cognitives, behavioral-psychological, and functional (López, Sánchez, y Martín, 2020). On the one hand, cognitive symptoms include memory loss, difficulties in language and executive dysfunction, which worsen intellectual abilities and planification skills. On the other hand, behavioral-psychological symptoms are related to neuropsychiatric and behavioral disorders, as apathy and depression. Finally, functional symptoms have negative consequences on daily activities, so the person may become unable to do them (López, Sánchez, y Martín, 2020).

Creativity is conformed by two different processes: convergent thinking, which consists on giving one right answer to a given problem, and divergent thinking, which is, instead, referred to the ability to give as many answers as possible to a given problem (Palmeiro, Di Giacomo, y Passafiume, 2012). Jing, y Schacter (2016), compared the execution of adult and elderly healthy people. In their study, they trained the experimental groups on focusing on specific details while they watched a video of a cotidian scene, and they after tested their performance in the divergent thinking task. They found out the trained groups showed better results, but no differences were found by age. Other authors suggest that there is not a declination of divergent thinking by age, but more likely a stabilization (Palmiero, Nori y Piccardi, 2016), which would be consequence of the maintained crystallized memory (Adnan, Beaty, Silvia, Spreng & Turner, 2019). Palmeiro, Di Giacomo, y Passafiume (2012) studied creativity and divergent thinking in artists and non-artists participants with dementia. They found impairment creative abilities in both artists and not-artists patients with Alzheimer, giving as a result simpler productions. However, artists preserved some important abilities for creativity, though non-artists had more perseveration errors and lowered divergent thinking (Palmeiro, Di Giacomo y Passafiume, 2012). Other authors (Gilhooly, Fioratou, Anthony, y Wynn, 2007) studied the strategies underlying the divergent thinking process, finding out that the way they emerge is sequential. To begin with, the answers seem guided by the memory the participant has of that object from the past. When this

strategy is saturated, others more cognitive demanding come up, like property, broad use, or disassembly (Gilhooly, Fioratou, Anthony, y Wynn, 2007). The role of memory in divergent thinking has been studied by other authors, like Madore, Jing, y Schacter (2016), who compared the execution of adult and elderly healthy people. In their study, they trained the experimental groups on focusing on specific details while watching a video of a cotidian scene, to test afterwards their performance in the divergent thinking task. They found out the trained groups showed better results, but no differences were found by age.

Apart from the cognitive processes mentioned before, creativity also relies on other extra-cognitive processes, such as motivation and emotions, which is why it is considered that creativity can regulate the emotional state (Palmeiro, Di Giacomo, y Passafiume, 2012). This is a useful tool in diseases asvdementia, that can benefit by reducing the stress that worsen the symptoms, but also allowing to elucidate the diagnosis and orientate the rehabilitation (Palmeiro, Di Giacomo, y Passafiume, 2012). Thus, the relation between coping strategies and divergent thinking seems mediated by the emotional state (Meléndez, Alfonso-Benlliure, y Mayordomo, 2017), which can influence cognitive processes, as attention (Jun, Ashley, Scolaro, Kira, and Antao, 2011). Related to this, it has been shown that Major Depression can promote divergent thinking in artists, in a way that melancholy drives a process of “creative incubation”, where ideas may be more negative, obsessive and autodestructive. However, in general population, stress and anxiety compromise the adaptation process, judgement, result seeking, and problem solving, what means a loss of cognitive flexibility and reiterative thinking (Meléndez, Alfonso-Benlliure, y Mayordomo, 2017). Meanwhile, positive affect is related to an open cognitive organization, flexible and complex, as well as to the ability to integrate different types of information (Isen, 2000). That way, divergent thinking strategies allow us to enhance our ability to solve problems, being more flexible, fluid and original. Indeed, a better understanding of the relation between coping strategies, divergent thinking and emotional states in elderly people can bring closer more ambitious programmes (Meléndez, Alfonso-Benlliure, y Mayordomo, 2017).

Several investigations have demonstrated the cooperation between cognitive and emotion processes. Akbari y Hommel (2012) concluded that positive affect is connected to associations, semantic priming, and recall of happy memories (Hill, Van Boxtel, Ponds, Houx, y Jolles, 2005); while negative affect narrows the attention focus, facilitates analytic process, causal reasoning, and forgetting memories. The relationship between both factors seem bidirectional: positive affect facilitates divergent thinking and divergent thinking facilitates positive affect. Likewise, negative affect has a bidirectional relationship with convergent thinking (Akbari y Hommel, 2012).

Taking into account the revised bibliography, it is clear that coping strategies can benefit from divergent thinking and positive affect in dementia. Therefore, the aim of this study is to investigate if the induction of different emotional states (positive, negative and neutral) could benefit or prejudice divergent thinking in elderly people, but also if Alzheimer’s dementia could influenciate this process. Our hypothesis refer to the following aspects:

- 1) The induction of positive affect will improve the performance in the PIC-A divergent thinking test, compared to the neutral condition.

- 2) The induction of negative affect will worsen the performance in PIC-A test, compared to the neutral condition.
- 3) Cognitive impairment will worsen the performance in all emotional states.

## Method

### Participants

In this study we will count with the participation thirty people, fifteen residents from CRE Alzheimer center in Salamanca, and fifteen patients of the Healthy Elderly Unit of Salamanca's University.

### Instruments

- Three validated videos with songs and images to induce emotional states (positive, negative, neutral), drawn from Meilán, Carro, Guerrero, Carpi, Gómez & Palmero (2012).
- PIC-A test, which consists of four exercises.

Exercise 1: The subject must write everything that a presented image suggests. This exercise allows us to evaluate fluency, divergent production, flexibility thinking, and fantasy.

Exercise 2: The participant is told to name an object and say any use he can think of, which evaluates fluency, flexibility and originality.

Exercise 3: There is a given improbable situation, and the participant is asked to enumerate as many consequences of it as he can. This activity evaluates fluency, flexibility and originality.

Exercise 4: There is a graphic imagination test, in which the participant must complete a drawing starting from some given uncompleted drawings. They are encouraged to elaborate their ideas, giving as many things as they need to create an interesting story. This way, we evaluate graphic originality, spatial detail production, and elaboration capacity.

### Procedure

First of all, we agreed the participation of all the participants. On the one hand, fifteen patients of the Healthy Elderly Center in Salamanca's Unit, without cognitive impairment, nor Depression were selected. On the other hand, we solicited the possibility to work with the intern patients of the CRE Alzheimer Center, and we gathered a group of fifteen people with Alzheimer diagnosis and without Depression. For this reason, the selection of participants was not random, but based on a convenience sampling, in which the level of cognitive impairment and the Depression diagnosis were the inclusion/exclusion variables.

Secondly, after informing every participant the purpose of the study we obtained the signed informed consent of both the participants and closest familiar/carer of the patients with Alzheimer. Indeed, they were all informed of the number of sessions, what they were going to do in them, the duration of the intervention, and the possibility of leaving the experiment at any moment.

The fifteen participants of each group would be divided in another three groups, so we could random the experimental condition, in a way that the order of the emotion induction (positive, negative and neutral) was different for each group. At each of the three sessions, the participants would watch the video of the respective emotion state, and they would answer the PIC-A test.

## Statistical analysis

The statistical analysis would be calculated by ANOVA of two factors for independent samples, so we obtain the effect of the induction of the emotional state (positive, negative and neutral), the effect of the presence/absence of Alzheimer, and the interaction between both factors, as well as the error variance.

The objective is to observe if there is a significant correlation between the emotional state and the presence/absence of Alzheimer, but also which factor is determined by the dependance, through Bonferroni correction. By doing this, we contrast, on the one hand, the differences of the emotion states in the Alzheimer condition and, on the other hand, the differences between the Non-Alzheimer condition and the different levels of emotion state, when alpha is 0,05. If we obtained significant effects, we would have compared the means of each emotion state through Tukey's range test.



# Influencia del Estado Emocional en el Pensamiento Divergente en Alzheimer

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## ABSTRACT

Diversos estudios han demostrado que las estrategias de afrontamiento, la creatividad y el estado de ánimo están íntimamente relacionados, lo que resulta interesante para el establecimiento de nuevas estrategias en el tratamiento de patologías diversas, como es el caso de la demencia. En esta enfermedad, se han observado síntomas de estrés y depresión que perjudican negativamente a los síntomas propios de la enfermedad. Por ello, en este estudio pretendemos dilucidar si la inducción de diferentes estados afectivos puede influir en la ejecución posterior en tareas de pensamiento divergente, y cómo afecta el deterioro cognitivo a este proceso.

## INTRODUCCIÓN

Envejecer saludablemente significa adaptarse a las demandas del entorno y establecer nuevos objetivos. Este proceso se puede producir mediante dos tipos de estrategias, cognitivas y emocionales, que se relacionan con la creatividad (Mélendez, Alfonso-Benlliure, y Mayordomo, 2017).

La creatividad es la capacidad cerebral para asociar, analizar e interpretar conocimientos adquiridos previamente, de forma que permita generar nuevas ideas (Escobar y Gómez, 2006). Se distinguen en ella dos procesos: el pensamiento convergente (dar una única respuesta correcta a un problema planteado) y el pensamiento divergente (capacidad de aportar la máxima cantidad de soluciones posibles).

No obstante, las funciones cerebrales requeridas en la creatividad se pueden encontrar dañadas en Alzheimer. En esta enfermedad, según López, Sánchez y Martín (2020), existen tres tipos de síntomas:

- **Cognitivos:** pérdida de memoria, disfunción ejecutiva y dificultades en el lenguaje.
- **Funcionales:** dificultades en la realización de las actividades de la vida diaria.
- **Psicológicos/conductuales:** manifestaciones psiquiátricas y desórdenes comportamentales

## OBJETIVOS

Observar si la inducción de estados emocionales (positivo, negativo y neutro) favorece o perjudica el pensamiento divergente en personas mayores, y si la demencia tipo Alzheimer condiciona este proceso.



## HIPÓTESIS

- H1: Inducir estados afectivos positivos mejorará la ejecución en la tarea de pensamiento divergente.  
H2: La inducción de un estado afectivo negativo empeorará más la ejecución que la condición neutra.  
H3: El deterioro cognitivo dificultará dicha ejecución, viéndose interrumpido por intrusiones.

## MÉTODO

**Participantes:** 30 personas mayores, 15 residentes del centro CREA de Salamanca diagnosticados con Alzheimer, y 15 pacientes de la Unidad de Envejecimiento Saludable de la Universidad de Salamanca, sin deterioro cognitivo ni depresión.

### Instrumentos

- Tres vídeos validados con diferentes canciones e imágenes para inducir el estado de ánimo (alegre/triste/neutro), extraídos de Meilán, Carro, Guerrero, Carpi, Gómez y Palmero (2012).
- Test PIC-A: Prueba de Imaginación Creativa para Adultos.

**Procedimiento:** Los 15 participantes de cada grupo son divididos en tres subgrupos, aleatorizando las condiciones experimentales en tres sesiones, en las que se presenta el vídeo de inducción de estado de ánimo correspondiente, con la posterior realización del test PIC-A.

### Análisis estadístico

1. ANOVA de dos factores para muestras independientes
2. Corrección de Bonferroni
3. Si obtenemos efectos significativos mediante el método Bonferroni, realizaremos la prueba de Tukey.

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