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Effect of selective attention on recollection and familiarity in recognition memory tasks: differential characteristics in patients with temporal lobe epilepsy with and without a history of *déjà vu*

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1. ABSTRACT

The most widely accepted contemporary explanation to define the phenomenon of *déjà vu* revolves around the processes of familiarity and recognition. This theoretical model is based on characteristics that define this experience in healthy subjects and in patients with temporal lobe epilepsy.

Objective: The main objective of this work is to determine the relationship between phenomenon of familiarity and phenomenon of recall according to the presence or absence of a history of *déjà vu* in patients with TLE and determine its correlation with sustained attention scores.

Design: Observational, cross-sectional analytical study, which will be assessed the cognitive functions of attention and recognition in subjects TLE DV + and DV-, through the Ruff 2 & 7 Test and Remmember-Know Task instruments.

2. ABREVIATION

TLE: Temporal Lobe Epilepsy

SM: Sensorial Memory

STM: Short-Term Memory

LTM: Long-Term Memory

LTP: Long-Term Potentiation

WHO: World Health Organization

R-K Task: Remember-Know Task

CPT: Continuous Performance Test

DV+: Subjects who experience or have experienced the phenomenon of *déjà* vu

DV-: Subjects who have ever experienced the phenomenon of *déjà* vu

SPSs: Simple partial seizures

MLT: Medial temporal lobe

18FDG-PET: Fluorodesoxiglucosa Positron Emission Tomography

MRI: Magnetic Resonance Imaging

3. INTRODUCTION

3.1 *DÉJÀ* VU PHENOMENON

The term *déjà vu* was first introduced in 1876, no clear consensus was reached regarding its account until the mid twentieth century(1). The scientific nature of *déjà vu* phenomenon and the same causal mechanisms are still unknown. Throughout all these years many theories and explanatory models have been proposed to try to explain its psychopathogenesis.

The *déjà vu* phenomenon is a temporary mental state, based on the erroneous experience of a novel context already lived. This experience is located by the subject in an indefinite past time and is part of his nature the realization of the inability to duplicate it simultaneously. Metacognitive components involved in the phenomenon are the strong feelings of familiarity for a present experience, judgments of similarity and dissimilarity between the present and a recovered past experience, and control of the reality of this current experience (2). Its duration can last minutes, but usually limited to about 10-30 seconds (3–5).

The epidemiology and psychopathogenesis are sources of various discussions. Several studies claim that up to 60-67% of the population has experienced it at least once in their life, and that up to 34.6% of healthy individuals experience it from 2 to 4 times per year (6). The incidence has increased in recent studies, stating that until at least two thirds of the population will experience it at least once in their life (3,4). Its frequency decreases with age, with a maximum peak frequency in young adults and it also increases under stress, fatigue and alcohol intake (1,3,7,8). Various studies estimate a higher prevalence in patients with TLE, where the *déjà vu* means up to 10% of those experienced auras, being reported up to a third of this population (9). Adachi et al. showed that fewer TLE patients had some type of *déjà vu* (63.1%) compared with healthy controls (76.1%), attributing this overestimation in patients with TLE to reported cases (10). Authors suggest that the psychopathogenic origin could involve the same temporal structures in both

epileptic patients and healthy subjects, since that experience is described similarly in both populations (8,11). The fact that many patients with TLE present *déjà vu* as an aura gives us an optimal population sample to develop research projects and this is why most of the scientific literature dedicated to the explanation of this phenomenon comes from studies based on this population (10).

3.2 TEMPORAL LOBE EPILEPSY

An epileptic seizure is the clinical outcome involved in an abnormally abrupt discharge of a neuronal population with an intense and hypersynchronic character. The definition of chronic disease requires epileptic seizure recurrence (12,13). Factors such as diagnostic accuracy, case ascertainment and selection bias are responsible for inaccuracy in the figures of its epidemiology (14,15). Some reviews encrypt in developed countries estimated the general population with active epilepsy prevalence vacillates between 4-10 cases per 1000 inhabitants, and its incidence extends to 25-50 per 100,000 persons / year (13). Several authors consider that these data are probably underestimated (12,14).

The extension allows seizure classification in generalized or focal. Generalized seizures are characterized by the involvement of both cerebral hemispheres at par, so from the beginning the loss of consciousness is evident, and it is the main clinical manifestation. In focal or partial seizures exacerbated localized electrical activity in a limited area of the brain, the location of which will define the clinical manifestations associated with it.

Within focal seizures subtypes, TLE is the most prevalent (14,16,17). About 80% of patients with medial temporal lobe epilepsy experience an epileptic's aura (17). Aura features will be defined by the location of the compromised area of cortical activation (18). Temporary auras are the most

complex and involving a more difficult diagnosis (17). Within the auras of psychological characteristics is where the phenomenon we study, *déjà* vu is located, assuming up to 10% of total auras (17,19). The results of the studies confirm that *déjà* vu in these patients is a manifestation of their simple partial seizures (3,8,10).

Cognitive attention functions such as sustained attention and selective attention, among others, are frequently affected in epilepsy. Commitment in memory is also very prevalent. An adequate seizure control does not necessarily rectify these shortcomings, but they usually improve. The memory deficits could be secondary to attentional deficits; or primary, due to a possible direct injury to the anatomical structures involved in memory, as a consequence of hypersynchronous discharges portraying the crisis. The impairment of executive functions could also provide an important role in explaining the attentional problems (18).

Throughout history, many theories have been proposed in order to attempt an explanation of the nature of the phenomenon, ranging from mystical explanations until quite plausible scientific conclusions. In the late nineteenth century, memory dysfunction or paramnesias aroused great scientific interest and this marked the beginning of the study of *déjà* vu from this perspective (4,20). Difficulties in their recreation in experimental models, its fleeting nature and the means currently available for study, are responsible for the difficulty and limitations of their research and scientific knowledge.

There are simple surveys to assess quantitative aspects, such as its prevalence and more complex surveys. In 1983, Neppe, regarded as the father of the current line of *déjà* vu research, was the first scientist to develop a full screening questionnaire (1). This questionnaire has been updated for himself and redesigned in 1994 by Son et al., resulting in the questionnaire IDEA (Inventory of *Déjà* vu Experiences Assessment), (Appendix I), whose implementation allows to obtain quantitative and qualitative data relating to the phenomenon and is used as a tool in

current research (21,22). Uncertainty about the nature of déjà *vu* has generated multiple explanatory models that attempt to get us a little closer to its knowledge. Brown states that most of the scientific theories that exist nowadays can be divided into four categories: dual processing, neurological, memory and attention (3,4,11). These explanatory models have been instrumental in the wake of scientific interest in this complex phenomenon and has led to the initiation of multiple research to explain its psychopathology (1).

3.3 EXPLANATORY MODELS OF DEJÀ VU PHENOMENON

3.3.1 NEUROLOGICAL MODEL

Scientists have proposed an explanation of the phenomenon from the perspective of a temporary neurological dysfunction (3,7).

A small spontaneous convulsion in that brain area responsible for processing familiarity, parahippocampal gyrus may be causing a memory error that implies the experimentation of déjà *vu* phenomenon (10,20,23,24). Research with intracerebral electrodes in epileptic patients support this theory; showing that electrical stimulation of zones of the temporal area may result in the outcome of a *déjà* vu. The conclusions made by many electrophysiological studies whose methodology is based on neurostimulations in temporal regions have demonstrated the contribution of MLT structures in patients with TLE (23,25–28).

The ELT DV+ population who presents the phenomenon as SPSs experiences associates the experience with emotions of fear, pleasant feelings and even nostalgia (29). Van Paesschen et al. demonstrated an abnormal activation of the amygdala in TLE patients DV +by MRI (30). This activation was also supported by other studies (26,30).

In 1999, the first study of functional anatomy is performed on patients TLE DV + and DV-, where by 18FDG-PET a significative hypometabolism in MTL structures were demonstrated (31). Guedj et al. performed a similar study, which also included healthy subjects. The results proved hypometabolism in superior temporal gyrus and parahippocampal region in TLE subjects DV +, compared to TLE DV- and healthy controls (8). Previous studies have shown that regional interictal hypometabolism may be related to the neural pathways responsible for the initiation of a hypersynchronic discharge (32). Other neuroimaging studies with less scientific evidence are those that come from case reports where by SPECT and MRI means in patients with DV+ shows a hyperperfusion in MTL regions during *déjà vu*, providing evidence that the phenomenon may have its origin in an epileptic activity in the hippocampus (24). The results suggest that a spontaneous seizure in the brain area responsible for the familiarity mechanism could be responsible for the phenomenon (11,23).

Also accepted are those theories whose explanation is based on the involvement of an alteration in the speed of nerve transmission liable where the lack of coordination in the inputs could lead to an interpretation of the data as two independent perceptions (3,4,20,33). So in case a slight slowing of the impulse takes place in a single neural pathway, the late delivery of information may involve the misinterpretation of the second signals as a reminder. Similarly, in the case that the transmission speed of the pulse slightly accelerated is seen, the second message would be interpreted as old or already lived before (20). On the mechanism of double track something similar happens. Generally cortical areas are stimulated at slightly different times, but thanks to automatic adjustment print a single form. An interruption in the transmission speed in the secondary path could cause one of the elements of information to be delayed enough time as to provoke an integration error implying that the two sets of sensory information arrived at different times evoking the phenomenon (1). However, if a delay occurs in the arrival of the information provided by the main path, secondary path would have reported the information previously. In

case that this could happen, the secondary path could be interpreted as the initial perception. This theory could explain the prediction feeling that comes with the phenomenon, while the delay in the arrival of information explains the feeling of re-experiencing. These theories, which are based mainly on the delay in the visual pathway, are threatened by a case report of a subject born blind experiencing the phenomenon (34).

3.3.2 COGNITIVE MODEL: DUAL PROCESSING THEORY

This theory pretends to explain the déjà *vu* as the consequence of a lack of synchronization between two normal cognitive functions (3,27). Gloor, in 1990, suggested that *déjà* vu could be explained by a lack of coordination or independent activation between the functions of memory and familiarity, theorizing that activation of familiarity without their respective signal recognition could evoke *déjà vu* (4,11,20). Another explanation worthy of mention would be the one proposed by Nayer which is based on encoding and retrieval processes. These processes should have a strictly coordinated relationship without activating at the same time. The explanation of the phenomenon of *déjà vu* by this explanatory model would be based on the information in the encoding process is being recovered at the same time, interpreted as a recovery of memory (4,19,20).

There are other explicative models, less important included in this classification(20).

3.3.3 COGNITIVE MODEL: DEFICIT OF MEMORY AND FALSE MEMORIES

One of the most accepted theories is based on the subjective perception of *déjà* vu as a false memory (27). A possible explanation for this very subjective interpretation of false memory is actually one or some aspects of the experimental scene actually that have been seen in an earlier context, involving a failure recovery (5). So the sense of familiarity that gives some aspect of the

new situation is attributed to the whole situation in the wrong way due to failure in the evocation of memories (35,36).

The team of Dr. Tonegawa, McHugh et al. used a specific breed of mice to demonstrate the importance of the subregion of the dentate gyrus in the processes of recognition and familiarity, learning and memory. They concluded that silencing of the structures of the dentate gyrus may result in an inability to distinguish different environments that look very alike (37). The scientific evidence that medial temporal structures are responsible for the cognitive processes of familiarity and recognition gives us the view that neuronal theoretical models discussed in previous sections and the theoretical models that attempt to explain memory *déjà vu* can go hand in hand (38). Review articles support that sense of familiarity without recollection may explain *déjà vu* experiences. The research results strongly suggest that the hippocampus is involved in familiarity and experience *déjà vu* (10).

The *déjà vu* explained by this theory, would take place in the adaptation of various elements of the situation that is being experienced on characteristics of another situation stored in memory, but not recognized by the subject. A sense *déjà vu* of familiarity operation aroused by various elements in the absence of the identification of the experience that evokes it, could then be responsible for psychopathogenesis of (11). Dr. Tonegawa, molecular biologist, explains a personal experience of *déjà vu* that occurred in an airport: "This occurs because of the similarity of the modules-gates, chairs, ticket counters, that define the context of an airport. It is only by seeking out the specific airport can be identified."(39). This would be the most widely accepted explanation, but it could also be possible for a single element of the environment to be responsible for generating the feeling of familiarity (3).

The Gestalt psychology could also explain the evocation of a *déjà vu*. Here, the appearance of a *déjà vu* would be determined by the sense of familiarity that origins the setup of the elements of

the scene (3). A very similar elements composing of a previous scene provision could cause a sense of familiarity without recognition of the whole experience and this be misinterpreted as a reminder (1).

A study realized in 2012 by Cleary and Brown team showed that by representing different sceneries that meet the same only three-dimensional spatial distribution, a sense of familiarity was evoked without recognition in the stimulated subjects (40).

Spatt, in 2002, suggested that the phenomenon would be determined by a spontaneous epileptic isolated discharge in the brain area responsible for familiarity (11,23), and evidence in studies of functional anatomy and neuropsychology seem to support his theory (10).

The idea of developing valid methods for measuring the processes involved in recognition memory has been the key in the development of neuropsychological tests that nowadays we have to analyze in a reliable and valid way processes of familiarity and recognition that many authors argue, underlie the *déjà vu* experience. Jacob and Whithouse, in 1989; and Cleary, 2004, conducted an experiment on recognition tasks with word lists. The results showed that an unconscious perception can evoke an illusion of memory, and an overlap of features between stimulus can evoke conspiracies recognition, respectively (41–43).

Brown and Marsh, in 2008, stimulated some students with unknown scenes, showing that when there was familiarity with no recognition, many students reported the sensation of being in the place (35); and Moulin et al. concluded that those subjects who determine a stimulus as recognized, when it should evoke familiarity, individuals are predisposed to confabulate contextual details associated with recognition errors (44). This conclusion is supported by Funkhouser and Schredl study, which demonstrated that individuals who reported *déjà vu* are more imaginative people (6).

Brown reports that there is a positive relationship between the frequency of trips and the frequency of *déjà vu* in the studied subjects (3). This could result in feelings of familiarity in scenes not received previously and explain the emergence of the phenomenon from this theory. However, the relation shown between the situations of fatigue and the appearance of *déjà vu*, reminds us of the possibility that the frequency of trips could be a potential confusing factor in this relation. Similarly, the study of Funkhouser and Schredl reports that *déjà vu* is more common in creative people (6). Creative people have certain cognitive and affective characteristics that define them such as intellectual curiosity, imagination, a greater ability to relate and the attraction of novelty and complexity (45). These characteristics could awake in creative people a strong desire to travel.

Other less important explanations linked to disorders in memory exist (20).

3.3.3 COGNITIVE MODEL: ATTENTIONAL PROCEDURES

The attentional theories establish that different attentional mechanisms are responsible for short breaks in the perceptual processing. The extracted results of the study conducted by Artur Funkhouser and Michael Schredl support the theory by showing that those subjects with more engrossed personality traits are associated with a higher frequency of experiencing the phenomenon (6).

Many specialists believe that an initial occluded perception, so distractions such as misdirected attention, that follows from a second clear and immediate perception, could explain the occurrence of *déjà vu* by a subconscious prosecution (1,3,34,43). Here, both prosecutions would be identical. A blindness dysfunction could happen because the subject keeps his focus attention on another stimulus. This could cause the individual perceives another stimulus that involves only

a subconscious processing (43). If after this first subconscious processing, the subject turns his attentional focus, and conscious processing of the same is followed, the record of the first stimulus would evoke a sense of familiarity without recognition, being the first peripheral perceptual stimulus and the second focal (1,4).

We cannot argue that memory consolidation and retrieval are unquestionably dependent on the hippocampus. It also causes no doubt about the role of temporal neocortex in the perception of stimulus and their identification. The amygdala processes emotions. It is easy to conclude that the simultaneous activity of these areas translate the defining characteristics of *déjà vu* experiences reported by TLE patients.

3.4COGNITIVE PROCESSES INVOLVED IN ATTENTION AND MEMORY

Cognitive psychology seeks to understand the attention, memory and learning. To design consistent studies focusing on the cognitive processes involved in *déjà vu*, it is necessary to understand previously the nature of each of them and their theoretical relation with the phenomenon.

The close link between attention and memory processes is clear and undeniable. The subject directs attention and keeps it, in a more or less selective and intense way to relevant stimulus and ignores irrelevant ones as their motivation for learning.

Numerous studies have concluded attention as a set of neural networks that carry out specific operations in information processing(46). According to Posner, attention is realized in three sub-systems or networks anatomically and functionally interconnected areas. The previous attentional or executive control network detect/select targets on a voluntary form and it depends on the

attentional capacity. The network monitoring or warning is in charged of maintenance for that attention (47), and the subsequent network is linked to visuospatial orientation (48).

The cognitive attention process can not be considered as a single process (46). Thus, selective attention is responsible for the selection of information or on an active approach to a target (48,49). For its assessment instruments must assess reactive choice (43). On the other hand, sustained attention is based on the maintenance of such attentional selectivity in time (persistence attention) and it is usually measured by a execution test or CPT. The mechanisms of sustained attention and selective attention have a high involvement in the processes of perception, processing and learning.

Nor memory concept is simple. The finding of several studies have led to the consideration of memory as non-unitary cognitive process (50). To facilitate its understanding, it has been established that the memory consists of coding cognitive processes, storage and retrieval. The perceived stimulus will be transformed into a mental representation by the encoding process; storage is responsible for consolidating the experience; and the recovery process will take place through access to stored information that is spontaneous or voluntary way (43,50). As we see, each one immediately depends on its bottom; Therefore, an error in care attention could involve a perceptual deficit, and this alteration in conscious stimulus encoding with the corresponding failure in a recognition task (51).

Atkinson and Shiffrin propose the multi-store model theory, where the sense organs capture the information and it is immediately registered and with a temporal restriction in sensory memory (MS). Then, selective attention filters the MS and it is codify temporarily in short term memory (STM) which is responsible for analyzing and organizing information, favouring understanding of the environment (50). The long-term memory (LTM) is the result of the storage of information. The rank of consolidation of experiences in LTM will depend on storage efficiency (43). From this we

can conclude that both attention and trial selection will play an important role in reception and in turn learning (48).

Learning is the process by which skills, abilities, behaviours, skills, values and attitudes that presents an individual are acquired or modified through experience or interaction of the individual with the environment.

Relational learning involves spatial learning and episodic learning. Through episodic learning, the individual is able to remember sequences of events, and spatial learning is responsible for the spatial localization of these, as well as to establish the relationship between the various stimuli. According to Gestalt theory, one *déjà vu* would be determined by a configuration of the elements of the scene very similar to a previous experience (40).

Recognition is known as the capability to identify that a stimulus that was already stored in memory as being experienced previously. This recognition can be appreciated by the individual in two different ways which are the memories (recollection) and familiarity (51,52). In order to study and understand the characteristics of these mechanisms, identification tasks were designed. These are based on the evaluation of the ability to discriminate between stimulus presented to subjects in a previous phase and stimulus presented to the subjects in a second exposure share certain similarities (51). The analysis of the results obtained in the test to assess memories and familiarity reveal that humans have the ability to remember more than he can evoke (36).

The experiment further used to study both processes is the paradigm of "remember-know" or "RK" (53,54).

Following the analysis we conclude that perceiving, remembering and learning are actions that need attention. The attentional process is closely linked with learning, which makes it dependent on the processes of sustained attention and selective attention. Similarly, it is important to emphasize that the experience and learning will be largely responsible for the degree of

entrenchment of memory registers, and that success in the establishment and in the evocation of memories will also come translated by the degree of consolidation of these.

2. NEED FOR THE STUDY

Although the phenomenon of *déjà vu* is difficult to approach from a methodological perspective, research into this phenomenon could provide advances in cognitive science. The mechanism by which the phenomenon of *déjà vu* occurs is poorly understood and studied, despite being an experience that has up to 67% of the population lived in first person. It is worth mentioning that the interest is surfacing within the scientific community, with an increase in the number of research dedicated to their studies in investigation. Its fleeting nature, recreation and difficulty in experimental models are responsible for their difficult study.

A great opportunity to get closer to the scientific knowledge of nature is in patients with Temporal Lobe Epilepsy. Many of the patients suffering from this disease have *déjà vu* auras, and immerse ourselves in the study of this patient characteristics may be key in aligning understanding experience. Nowadays, most of studies designed in order to enter the neuronal mechanism of this phenomenon are focused on the characteristics of the population group.

Attention and memory are closely related. Attentional deficits may involve an imperfect consolidation or even the non-consolidation of experiences in memory. Improper storage of memories can be a failure in evoking them. Among the explanatory models exposed in order to conduct a scientific approach to the phenomenon of *déjà vu*, an error can be found in the processes of familiarity and recognition, which could involve the wrong evocation of a memory, located in an experimental context not previously experienced by the subject, and therefore impossible to be logged in memory.

The explanatory models that attempt to understand the possible alterations *déjà vu* from memory, attention, or epileptiform activity in the temporal lobe may be related.

The design of our study will give us the opportunity to determine the relation between the phenomenon of familiarity and recall according to the presence or absence of a background of *déjà* vu in patients with TLE, as well as the relationship between their selective attention capabilities and phenomenon recall and familiarity never determined above.

It seems important to report that our study findings could provide, so nowadays there are no publications that address the attention concepts valuations associated to the phenomenon.

Cross-cultural adaptation and validation of the questionnaire IDEA will grant the scientific community means available for conducting research studies related to the phenomenon of *déjà* vu in the Spanish population.

Most of the articles devoted to the review of the phenomenon of *déjà vu*, as essential development studies focused on understanding the cognitive processes involved in the development of the phenomenon of *déjà vu* (10,27,55)

3. HYPOTHESIS AND OBJECTIVES

a. HYPOTHESIS

H1: The score on a test of selective attention present a Pearson correlation coefficient equal to or greater than + 0.4 Familiarity with the score on an experimental task of Remember-Know only in patients with TLE and a history of *déjà vu*; the association with memory scores will be similar regardless of the presence or absence of history of *déjà vu* .

H2: There will be a difference equal to or greater than 0.5 points in the score of familiarity in an experimental Remember-Know task between patients with TLE with and without a history of *déjà vu* and no differences in recall scores by presence or absence of a history of *déjà vu*.

b. OBJETIVES

Objective 1) To determine the relationship between the ability of selective attention to the phenomenon of memories and familiarity based on the presence or absence of a history of *déjà vu* in patients with TLE.

Objective 2) To determine the relationship of familiarity and memory phenomenon with the presence or absence of a history of *déjà vu* in patients with TLE.

4. STUDY DESIGN

Observational, cross-sectional analytical study.

5. STUDY POPULATION

The study population will be patients with a diagnosis of TLE.

6. SAMPLE

A consecutive sample of all patients diagnosed with TLE treated in outpatient clinics outside of neurology at University Hospital Dr. Josep Trueta in Girona and Santa Caterina Hospital in Salt will be used.

The sample selection is made according to the following criteria for participation:

Inclusion criteria

- Patients diagnosed with unilateral TLE.
- Ability to give informed consent.
- Aged between 18 and 50 years old.

Exclusion criteria

- Other neurological pathologies.
- Patients with a history of neurosurgery.
- Epilepsy in the context of a brain tumour.
- Primary psychiatric pathology.
- Subjects must not display reduction in their perception or visual, hemineglect, motor disorders, or any other affection that might imply bias in the results obtained from neuropsychological tests.

Sample size

According to the literature review, there are no previous studies that have specifically examined the relation between sustained attention and familiarity in an experimental task of Remember-Know. Studies on attention and memory were detected Pearson correlation coefficients equal to or greater than 0.4 in healthy subjects of different age groups [Dulas et al. Brain Res 2013; 15: 55/71]. Regarding the first objective, and get a 80.00% statistical power to detect differences in contrast H_0 null hypothesis: ρ = 0 by a test t -Student for bilateral Pearson correlation coefficient between two variables taking note that the confidence level of 95.0%, assuming that the correlation expected is 0.40, it will be necessary to include 44 patients with TLE in the study.

Regarding the second objective, for this size sample and assuming a prevalence of a history of *déjà vu* in patients with TLE 30% (n = 13) to detect a difference of 0.5 points in the score of familiarity in an experimental task of Remember-Know with a standard deviation of 1 point and a significance level of 95%, the statistical power in testing the null hypothesis H_0: $Mu_1 = Mu_2$ through a test t -Student for bilateral two independent samples would be 80%.

7. VARIABLES

a) Independent Variable

- Presence / absence of *déjà vu* determined by IDEA questionnaire.

Eligibility criteria for this variable will be determined by the answer to the key question: 'Have you ever had the feeling of sensation or having experienced a situation before in exactly the same way when in fact you are experiencing it for the first time?'.

Those subjects who answer "Yes", will be categorized as DV +. Those subjects who answer "NEVER" will be categorized as DV-.

b) Dependent Variables

- Familiarity: Experimental paradigm score at remember R-K (Continue Variable)
- Recollection: Experimental paradigm score at remember R-K (Continue Variable)
- Selective attention: Score at Ruff 2 & 7 Test (Continue Variable)

c) Covariables

- Years of schooling
- Age
- Gender

8. ASSESSMENT INSTRUMENTS

IDEA: Déjà vu Experiences Assessment

The IDEA is a 23-item self-administered questionnaire consisting of nine general section of questions, and qualitative section of 14 questions. Creators of the questionnaire have shown the clear validity of the instrument in a comprehensive evaluation with satisfactory good reliability and validity. The IDEA allows the study of quantitative and qualitative characteristics of *déjà vu* experiences. This questionnaire has been widely used in previous studies investigating the phenomenon of *déjà vu*.

The questionnaire is divided into two sections. Section A will allow a quantitative assessment of the phenomenon. This section consists of 9 questions that will capture the frequency with which the subject experiences the *déjà vu* and others related symptoms or experiences related to it. Each item is stated at nominal 5-point scale. The cutoff we use to define experimentation or non experimentation of the phenomenon of *déjà vu* is defined by the answer to the key question: 'Have you ever had the feeling of having experienced a sensation or situation before in exactly the same way when in fact you are experiencing it for the first time? '. Those subjects who answer "Yes" will be categorized as DV +. Those subjects who answer "NEVER" will be categorized as DV-.

Respondents will cover the B section, which is composed of 14 additional items that will capture qualitative data related to experiences.

The completion of the questionnaire should not be extended beyond 25 minutes (56).

Remember-Know task (RK)

This is an experimental paradigm developed by Tulving (1985) and based on a subjective evaluation of task nature of the experiences of recognition. The RK is designed to measure and evaluate the processes of recollection and familiarity involved in recognition memory. RK visual task will be developed by Martin et al. (2012) which consists of the following procedure: Each participant will be shown 80 pictures of rooms (bedrooms, living rooms and kitchens) in a controlled manner by a computer. Each image is exposed for 2,250 ms followed by a black screen and the participant is requested to perform a relative estimate of the wealth of the house into three categories (low, medium and high). Following the presentation of the images consistent distraction task is performed on a task of finding words in a text for 5 minutes. Here are presented in a combined 80 previous images combined with 80 new images with similar characteristics. Participants are requested to discriminate the images as they consider if they saw them earlier (old) or if they are different from the previous (new). For all images tagged as new, participants are asked to provide contextual information that have let them recover the memory (i.g. situational details of objects arranged in the room or other elements that have let them to recognize the image). In cases where the participant provides contextual information the answer as "memory" and cases in which the participant does not provide specific contextual information and simply looks familiar, is classified as "familiar". The ranking of the tasks in memory and familiarity RK paradigm is based on the theory of signal detection. Thus, the memory is calculated as the difference between true memories minus false recognitions divided by the total number of responses classified as "memory" and the higher the score, the greater memory capacity. Familiarity is based on the discrimination index d ' that provides an indication of the average separation between signal and noise from the standard deviation of the noise distribution. The d ' index is a dimensional indicator in which values close to 0 indicate a detection based on chance and that at higher values, greater capacity for discrimination. In the context of the paradigm RK

values close to 0 are indicative of distortion, i.e., the greater experience *déjà vu* experimentally induced.

Ruff 2 & 7 test performance

The Ruff 2 & 7 Test has aimed to measure two visual attention aspects: sustained attention (ability to maintain the level of performance), and selective attention (focusing attention on relevant stimulus). The test is divided into two parts: the first consists of 10 detection tests and 10 control trials. For each test, the examinee must perform a traverse line specifically in numbers 2 and 7, scoring those goals and ignoring those items that are distracting or irrelevant. The ruff attention test has demonstrated a high validity to differentiate between automatic processing and controlled processing.

This test has high validity for assessing both types of attention for people aged between 16 and 70 years and its administration time is not extended beyond 5 minutes. To perform the test, the test printed, a coloured pen or pencil and a stopwatch are needed. The test consists in a classical paper and pencil test. The basic format is an A4 sheet of paper where the stimulus will be presented randomly in columns or matrices. A series of 20 consecutive records which consists of a linear array of alpha-numeric characters will be presented. These series will be presented in 15-seconds intervals in which the subject will execute as many search tasks and possible visual cancellation. At 15 seconds, the test examiner must indicate the subject the passage to the next test. The test is done from left to right. The score is determined by counting errors (omissions and false alarms) and the runtime.

9. PROCEDURE

Before conducting the study, the cross-cultural adaptation of the questionnaire IDEA and subsequent psychometric validation will be performed. The goal is to have a Spanish cultural adaptation of the questionnaire IDEA in order to later use in other Spanish studies in the cultural field. Obtaining the Spanish version and the evaluation of its equivalence to the original instrument in English will allow its use as a tool to study research on the phenomenon of *déjà vu* in the Spanish population.

Cross-cultural adaptation of the questionnaire IDEA

The process of cross-cultural adaptation is implemented by a linguistic validation process which includes aspects such as translated/retrotranslated, conceptual evaluation, assessment of understanding, semantic analysis and development of a questionnaire by consensus of the expert panel.

The IDEA will be translated according to standard procedures. Linguistic validation meeting held consensus documents on key research methods ISPOR, the recommendations of the Institute MAPI (MAPI Research Institute), whose considerations have been widely used in validation studies (57,58).

This procedure includes the following steps:

a) Translated/retrotranslated

Translation will be held into Spanish by 3 bilinguals whose native language is Spanish and a version by consensus will be obtained. Later, this version was again translated into English and will be translated by three bilingual individuals whose native language is English. A version by

consensus will be obtained, and this version will be reviewed by the author of the questionnaire IDEA.

Corrections that the author consider appropriate will be discussed, reaching a new consensus that will be sent back to the author for the study. Finally a definitive translation will be achieved by consensus

b) Conceptual issues

In order to assess the conceptual equivalence of contents, consensus Spanish version will be referred to a team of five mental health professionals, psychologists and psychiatrists who will identify and evaluate those items that could be problematic.

c) Evaluation of the comprehension

Aspects such as clarity of language, the structure of writing and comprehension of the reconciled version will be evaluated. This assessment will be carried out by conducting the questionnaire by a sample of 10 volunteers whose mother tongue is Spanish. Volunteers will be interviewed in depth in order to conduct the comprehension assessment and the difficulties that arise in each item.

d) Evaluation of the semantic equivalence and experimental or cultural

A review committee will conduct an analysis of the writing in order to establish whether the meaning of various phrases included in the reconciled version is equivalent to the original version. The review of the committee that will study the semantic equivalence consists of a team of mental health professionals to assess whether the scale terminology is consistent with that used in our environment.

e) Corrections and final version

Spelling, grammar and visual appearance of the questionnaire will be reviewed. The IDEA final questionnaire will be given to ten volunteers and the time required for completion will be recorded.

Psychometric validation

To determine the reliability of the questionnaire IDEA a convenience sample of 30 healthy subjects who will be administered the questionnaire in its Spanish version and after 15 days will be given again be recruited.

The internal consistency of the two sections of the questionnaire (A and B) is determined by calculating the Cronbach coefficient (α) and a value equal to or greater than 0.7 as indicating an acceptable degree of homogeneity is accepted.

The test-retest reliability will be determined by calculating the intraclass correlation coefficient between scores in both sections at baseline and in 15 days administration and if will accept a value equal to or greater than 0.7.

Data Collection

During the care activity in outpatient neurology services at University Hospital Dr. Josep Trueta in Girona and Santa Caterinan Hospital in Salt neurologists study contributors will inform patients potentially candidates to participate on the purpose of the study and will request their participation. During this visit neurologists will answer all the doubts and questions that patients can make. All patients who agree to participate in the study will be required the signing informed consent. Then they will be scheduled for an outpatient visit to the lead researcher to conduct the data collection.

In the study visit they will be informed again the objectives of the study report during this meeting will inform the tasks to be carried out in a close way and avoid using jargon that make difficult its comprehension. The patient will be informed again about the use that will be given to information obtained and of their right to confidentiality of their data.

After that neuropsychological test will be performed. During the first part of the examination participants will be administered the questionnaire IDEA. The allotted time to complete the questionnaire is approximately 25 minutes. The tasks of Remember-Know paradigm using computerized presentation made by a computer. It is scheduled for approximately 15 minutes. Following this task, a 5-minute break will be held and then the Ruff 2 & 7 Test will be administered. Its time management will not be extended beyond 5 minutes.

10. STATISTICAL ANALYSIS

The neuropsychologists in charge will procedure the data registration once finished each test.

Descriptive analysis

It will be held for all study variables using techniques of analysis of quantitative data (measures of central tendency and dispersion) and qualitative (absolute and relative frequency measures), general and stratified information according to the presence or absence of a history of *déjà vu* will be presented.

Inferential analysis

H1: The Pearson correlation coefficient will be calculated between the score of selective attention Ruff 2 & 7 Tests and scores of memory and familiarity of experimental Remember-Know task for all participants and stratified according to the presence or absence of a history of *déjà vu*.

H2: Average comparisons will be conducted for two independent groups testing by Student t test or U Man–Whitney test according to the distribution of the dependent variables of familiarity and recognition among the patients according to the presence or absence of a history of *déjà vu*.

11. OPPORTUNITIES AND LIMITATIONS OF THE STUDY

The design of an observational, transversal and analytical research in this neuroscience study, the study will not involve limitations on establishing causal relations are waiting period and will represent minimal discomfort to the subjects involved.

Confounding factors that may arise in this type of design will be depleted by studying relevant covariates.

The possibility of obtaining an undeniable and firm conclusion as to the results of the associations studied will be an attraction for the scientific community promoting interest in the field for further research, and providing the genesis of new work hypotheses.

12. DISEMINATION PLAN

It is important that the findings of this research are disseminated. Dissemination strategies could include different publications in journals or articles.

In terms of bibliographic impact could be published at least three publications relating to each of the study objectives.

The scientific journals where we could publish these articles are: Neuropsychology, with an impact factor of 3.425, and Behavioural Brain Research, with an impact factor of 3.391.

13. ETHICAL ASPECTS / PROTECTING PARTICIPANTS SUBJECT

CONSIDERACIONES GENERALES

Prior to starting the study, we will have obtained a favourable written approval from the Ethics Committee, regarding the informed consent form and any other information provided to subjects.

Participants will be informed about the scans which will be submitted, and will be given an information document (Annex IV). Similarly, they will be asked their agreement reflected in the consent prior to inclusion (Annex V), which will contain written informed that the confidentiality rules set out in Article 5 of Organic Law 15/1999 Regulating the Automated Processing of the Personal Data will be respected at all times, as well as the rights they have in terms of consultation, modification or deletion of their personal data file.

The researchers will conduct the study in compliance, in all its practice, the principles of the Declaration of Helsinki. The study will be conducted in accordance with the protocol and standard operating procedures to ensure compliance with the standards of Good Clinical Practice.

This protocol will be assessed by an Ethical Committee for Clinical Research (CEIC) Reference and Research Committee for both the Institut d`Assistència Sanitària Girona.

BENEFIT-RISK ASSESSMENT

By the nature of this study, there is the possibility of referring to any risk to the subjects involved because they simply will undergo neuropsychological testing without involving any risk exposures.

INFORMATION SHEET AND CONSENT

The consent form includes all elements required by current regulatory standards, standards of Good Clinical Practice and the ethical principles that have their origin in the Declaration of Helsinki.

The informed consent form and any other information provided to the participating subjects possess a composition of a non-technical and easy to understand. This documentation will be reviewed and approved by the ethics committee favourably, prior to baseline. The record of such approval will be recorded in writing and will be retained by the research team.

The researchers will orally explain to the participants the nature and scope of the study.

PRIVACY POLICY

All information regarding the identity of the participants will be considered confidential for all purposes. The identity of participants will not be disclosed or released. The identity of participants will not appear in the notebooks of data collection and particulars identifying participants will always be kept strictly confidential. Dissociation procedure data will be conducted and participants will be identified by a code consisting of the initials of the name and case number. The researchers are committed to follow the provisions of Law 15/1999 of 13 December on the Protection of Personal Data.

16. WORK PLAN

The duration of this project is 1 year. The study is designed in the following phases:

PHASE 1: Cross-cultural adaptation and validation of the questionnaire IDEA (3 months)

- Coordination of activities: Translators and researchers

  A staff meeting where operator objectives for this first phase will be specified, and establish the coordinating of their activities to those responsible.

  Researchers explain translatorstheir tasks.

- Cross-cultural adaptation: Translators and researchers

  Those responsible translators execute the assigned tasks.

  Researchers are responsible for coordinating the activities set.

- Validation: Statistical Personal.

  It will take place statistical analysis necessary to certify the validation of the new version.

PHASE 2: Sample selection and neuropsychological assessments (3 months)

- Coordination with co-researchers: Researchers and co-researchers.

  The co-researchers Josep Trueta Hospital neurologists and Santa Caterina what their role in the recruitment of candidates will be explained.

- Recruitment and selection of sample: Co-researchers (2 months)

Patients were recruited from neurology by promoting participation in the study. The researchers delivered the news daughter and informed consent applicants.

- Neuropsychological Assessments: Trained neuropsychologist (2 weeks)

The head neuropsychologist deliver the revised questionnaire to the subject IDEA. After its completion shall be relevant cognitive appraisals. The results will be recorded in the database after each assessment.

PHASE 3: Statistical analysis and interpretation of results: (1 week)

- Statistical analysis: Statistical personal.

Statistical responsible proceed to the statistical analysis of the data.

- Interpretation of Results: Statistical and researchers.

A meeting with the statistical personal and the researchers behind the study will take place in order to analyzed results of the study.

PHASE 4: Dissemination of results: (6 months)

- Relevant articles will be written in order to achieve a publication in a scientific journal.

16.1 TIMELINE

		J	F	M	A	M	J	J	A	S	O	N	D
Cross-cultural adaptation and validation of the questionnaire IDEA	Coordination												
	Cross-cultural adaptation												
	Validation												
Sample selection and neuropsychological assessments	Coordination												
	Sample selection												
	Neuropsychological Assessments												
Statistical analysis and interpretation of results	Statistical analysis												
	Interpretation of Results												
Dissemination of results	Realization of the articles												
	Publication on magazines												

15. JUSTIFICATION OF EXECUTION COSTS AND TRAVEL EXPENSES

MEDIA AVAILABLE FOR COMPLETION OF THE PROJECT

Facilities:

The full development of the project will have to place at the premises of the Hospital Santa Caterina.

Staff:

Unit Staff for Research Institut d`Assitència Sanitària of Girona.

FACILITIES FOR THE COMPLETION OF THE PROJECT

It has been applied for a budget which is as follows:

	PERSONAL	FUNCTION		HOURS	€/HOUR	TOTAL
HUMAN RESOURCES	Translators	Cross-cultural adaptation of the questionnaire IDEA		144 hours	35€	5040€
	Neuropsychologist	Neuropsychological assessments		80 hours	23,85 €	1908 €
	Statistical	Statistical Analysis	Phase 1	40 hours	35 €	2800 €
			Phase 2	40 hours	35 €	
					SUBTOTAL: 9748€	

	INSTRUMENTS	€	
MATERIAL RESOURCES	R-K task	0€	
	Ruff	44 people	157,407€
			SUBTOTAL: 2157,407€

		€
DISSEMINATION OF RESULTS	National/ International magazines: 1500 €	1500 €
		SUBTOTAL:1500€

<u>TOTAL BUDGET</u>: 11.405, 407€

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15. ANEXOS:

Anexo I: Inventory for Déjà vu Experiences Assessment (IDEA)

Anexo II: Remmember-Know Task Example

Anexo III: Ruff 2 and 7 selective attention test Example

Anexo VI: Información para los pacientes

Anexo V: Consentimiento Informado

Anexo I: INVENTORY FOR DÉJÀ VU EXPERIENCES ASSESSMENT (IDEA)

INTRODUCTION:

This questionnaire is about a feeling of which we think most people are familiar with. Almost everyone of us at one time or another have had the feeling that we experienced some event, thought or feeling before in exactly the same way, even though in actual fact it is the first time. It seems as if we are recognizing something, even though we know this is impossible.

This feeling of 'recognition' is called '***déjà vu***experience'. '***Déjà vu***' literally means 'already seen'.

When you answer a question, the important thing is to give your first impression. There is no need to think about it for a long time! Be sure to read the INTRODUCTION before every new set of questions. Please do NOT skip any questions!

INTRODUCTION:

You can answer 'Yes' to more than one topic of the following questions. If you are not sure, answer 'No'. Please answer all the topics of the questions, including the ones you answer 'No' to.

A

1. Have you ever had the feeling of having experienced a sensation or situation before in exactly the same way when in fact you are experiencing it for the first time?

(Note: If you are not sure about it, please answer 'Never'!)

O Never

O Yes, very infrequently (less than once per year)

O Yes, sometimes (a few times per year)

O Yes, often (a few times a month)

O Yes, more frequently (at least weekly)

O Don't know.

2. **Have you ever had the feeling that it seems as if everything around is not real, as if it is not really happening?**

O Never

O Very infrequently (less than once per year)

O Sometimes (a few times a year)

O Often (a few times a month)

O More frequently (at least weekly)

O Don't know

3. *This question is about the opposite of the feeling of 'recognition'!* **Have you ever had the feeling that you had never experienced something before, when in fact you had experienced it before? For example: You see something or someone you know very well, but you feel as if you have never seen it or him before!**

O Never

O Very infrequently (less than once per year)

O Sometimes (a few times a year)

O Often (a few times a month)

O More frequently (at least weekly)

O Don't know

4. **Has it ever happened to you that you experienced something that had occurred before in a dream?**

O Never

O Very infrequently (less than once per year) O Sometimes (a few times a year)

O Often (a few times a month)

O More frequently (at least weekly)

O Don't know

5. **Have you ever had the feeling while something was happening to you that it was not happening to yourself, but to someone else, as if you were looking at yourself?**

O Never

O Very infrequently (less than once per year)

O Sometimes (a few times a year)

O Often (a few times a month)

O More frequently (at least weekly)

O Don't know.

6. **Do you consider yourself a person with paranormal qualities?**

('Paranormal qualities' includes clairvoyance, telepathic or psychic abilities and so forth.)

O No

O No, but I am not sure

O Yes, but I am not sure

O Yes

O Don't know

7. **How often can you remember a dream so well that you can tell someone about it?**

O Never

O Very infrequently (less than once per year)

O Sometimes (a few times a year)

O Often (a few times a month)

O More frequently (at least weekly)

O Don't know

8. **How many times a year do you travel a distance of about a hundred miles or more from your home locality?**

O Never

O Very infrequently (less than once per year)

O Sometimes (a few times a year)

O Often (a few times a month)

O More frequently (at least weekly)

O Don't know

9. **Do you ever experience daydreaming?**

O Never

O Very infrequently (less than once per year)

O Sometimes (a few times a year)

O Often (a few times a month)

O More frequently (at least weekly)

O Don't know.

Only answer the following questions if you answered 'Yes,...' to the first question on page 1. These questions are about the feeling of 'recognition'. ' Recognition' means the feeling that we have experienced something before in exactly the same way, although in fact it is now the first time it has ever happened to us.

INTRODUCTION:

If you answered 'Never' or 'Don't know' to the first question on page 1, there is no need for you to answer the following questions.

Please check to see whether you have answered all the questions.

Thank you very much for your co-operation!

If you answered 'Yes,..' to the first question on page 2, please continue to the next page.

B

1. A person can have a feeling of *'recognition'* in many different ways. It can have to do with a specific place, a situation, an activity, an event, meeting someone, a conversation, a thought, reading a book or a newspaper...

Have you ever had this feeling of *'recognition'* in one or more of the following ways?

(Note: You can answer 'Yes' to more than one topic of this question. Please answer all the topics, including the ones you answer 'No' to. If you are *not sure* whether something is applicable to you, answer "No.")

a. In a certain situation ……	☐ Yes ☐ No
b. When meeting someone ……..	☐ Yes ☐ No
c. While telling someone about something ……	☐ Yes ☐ No
d. While listening to a conversation, music, or statement……..	☐ Yes ☐ No
e. While having a certain thought ……	☐ Yes ☐ No
f. While reading something……..	☐ Yes ☐ No
g. In some other way than in question a – i……	☐ Yes ☐ No

2. While you have this feeling of *'recognition'*, can you remember exactly where and when you had the same experience or feeling before?

O No

O I vaguely remember

O Yes, I can remember exactly

O Don't know

3. When did this feeling of *'recognition'* occur for the last time?

O More than 5 years ago

O 1 to 5 years ago

O 6 months to 1 year ago

O 2 to 6 months ago

O 1 to 2 months ago

O Last month

O Don't know

4. How long does this feeling of *'recognition'* usually last?

O One second or less

O A few seconds

O One minute or a couple of minutes

O Half an hour to one hour

O A few hours

O More than a few hours

O Don't know

5. **Is the feeling of *'recognition'* usually related to some part of an experience or situation, or to the whole thing?**

O Total

O Some part of it

O It depends

O Don't know

6. **Do you usually have this feeling of *'recognition'* at a certain time of day?**

O No

O In the morning shortly after awakening

O In the Daytime

O When it gets dark

O In the evening (with the lights on)

O Just before or after going to bed

O Don't know

7. **While having this feeling of *'recognition',* did you ever have the idea you could predict what was going to happen in the next few minutes?**

O Never

O Very infrequently (less than once per year)

O Sometimes (a few times a year)

O Often (a few times a month)

O More frequently (at least weekly)

O Don't know

8. **While having this feeling of *'recognition'*, did you ever have the feeling it was not happening to you but to someone else, as if you were looking at yourself?**

O No

O Vague feeling it was not happening to me

O Clear feeling it was not happening to me

O Vague feeling I was looking at myself

O Clear feeling I was looking at myself

O Don't know.

9. **Does this feeling of *'recognition'* usually pertain to an exact repetition of the past or to approximately the same thing?**

O Exactly the same

O Almost exactly the same

O The same

O Approximately the same

O Vaguely the same

O Don't know.

10.**While having this feeling of *'recognition'* have you also ever felt that it looked as if everything around you was not real, as if it was not really happening?**

O Never

O Yes, a little unreal

O Yes, vaguely unreal

O Yes, unreal

O Yes, totally unreal

O Don't know

11. In general, how does this feeling of *'recognition'* affect you?(check all that apply)

a. It leaves me indifferent……	□ Yes □ No
b. It frightens me……..	□ Yes □ No
c. It is reassuring……..	□ Yes □ No
d. It is nice and pleasant……	□ Yes □ No
e. It is uncomfortable or oppresive……	□ Yes □ No
f. It is surprising, amazing….	□ Yes □ No
g. It interrupts whatever I am doing……	□ Yes □ No

12. What do you feel is the main explanation of this feeling of *'recognition'*?

a. Anxiety or tension……	☐ Yes ☐ No
b. Poor memory……..	☐Yes ☐No
c. Unconscious memories ……..	☐Yes☐No
d. Reincarnation……..	☐ Yes ☐No
e. Concentration problems……	☐ Yes ☐No
f. Paranormal qualities……	☐ Yes ☐No
g. Desire to escape from reality……..	☐Yes☐No

13. How do you usually feel before you have this feeling of *'recognition'*? (check all that apply)

a. Mentally fatigued……	☐ Yes ☐ No
b. Gloomy or depressed……	☐ Yes ☐ No
c. Nervous or under stres……	☐ Yes ☐ No
d. Physically fatigued……..	☐ Yes ☐ No
e. Cheerful an happy ……..	☐ Yes ☐ No
f. Confused or abstent-mind.ed……..	☐ Yes ☐ No
g. Relaxed……..	☐ Yes ☐ No
h. Agry……..	☐ Yes ☐ No
i. Frightend……..	☐ Yes ☐ No
j. Drowsy……..	☐ Yes ☐ No
k. Physically ill……..	☐ Yes ☐ No

14.Have you ever had this feeling of *'recognition'* in one of the following conditions? (check all that apply)

a. Headache……	☐ Yes ☐ No
b. 'Black out'……	☐ Yes ☐ No
c. Epilectic seizure……	☐ Yes ☐ No
d. Concentrated activity……	☐ Yes ☐ No
e. Drinking alcohol……	☐ Yes ☐ No

Question 14 was the last question.

Would you please **check** and see whether you have ansewered all the questions?

Thank you for your co-operantion!

Anexo II: REMMEMBER-KNOW TASK EXAMPLE

La prueba constará de 160 imágenes como estas.

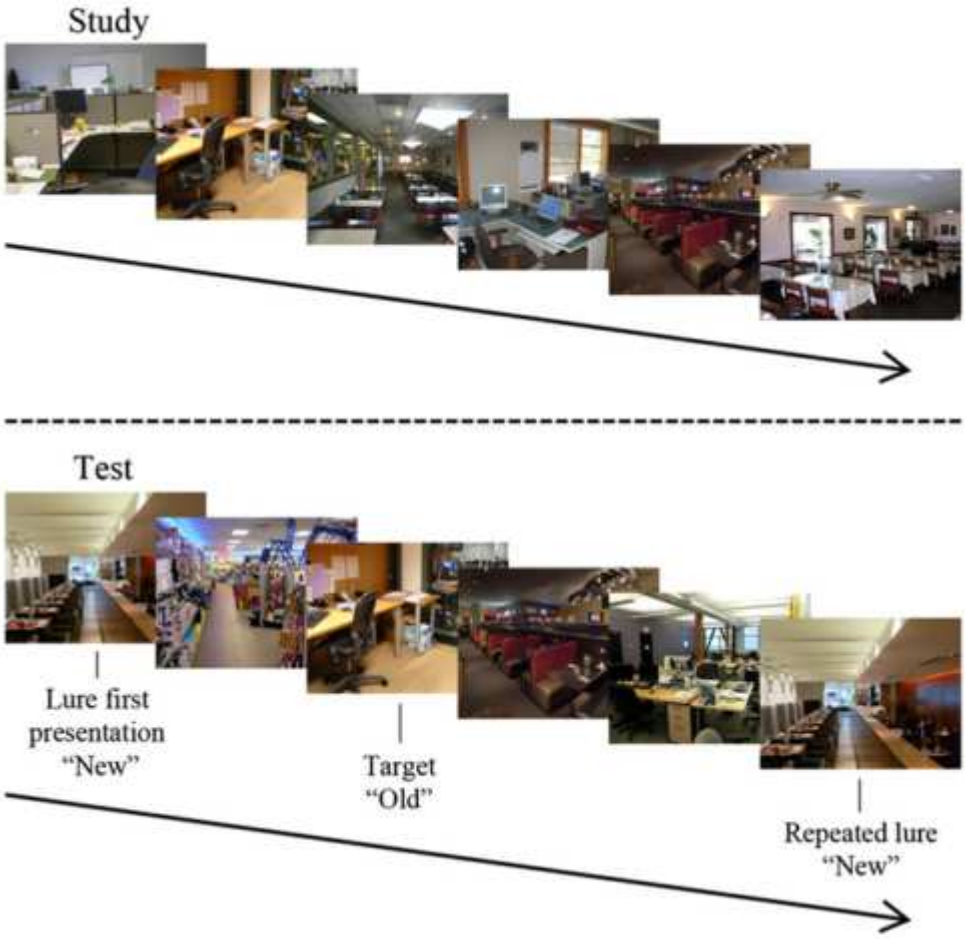

Imagen obtenida del experimento de R-K visual desarrollada por Martin et al. (5).

Anexo III: RUFF 2 AND 7 SELECTIVE ATTENTION TEST EXPAMPLE

2 G O X C 7 M J 7 H Z R N G A S 2 Y W Q 2 L H B Z G J N V 7 E T 2 P R V M J
H S T Q 2 C 7 K L W C 7 X M T 7 K T R 2 A V P I W O C 2 G J 7 L S 2 B N V W
7 T Q X R 2 P H 7 F D A B M 2 W H K A S T 2 O P H W E D 2 T R N E Q X 2 P K

3 1 0 7 8 9 4 4 7 0 5 3 7 6 3 8 1 5 2 3 6 5 6 9 7 0 8 9 1 5 7 8 4 3 6 2 8 6
3 2 8 6 1 5 4 2 8 0 9 1 2 9 1 8 9 2 8 1 3 7 6 4 5 3 7 8 0 4 6 7 9 6 2 9 1 2
8 3 9 1 8 3 7 8 9 4 6 5 9 1 4 7 0 8 6 7 1 3 0 3 9 1 0 2 3 3 8 9 4 1 2 6 5 5

Sample blocks of targets are embeded in either letters or digits.

Este ejemplo fue extraído del estudio “The Ruff 2 and 7 selective attention test: A neuropshychological application” (59).

Anexo IV: INFORMACION PARA LOS PACIENTES

Efecto de la atención selectiva sobre el recuerdo y la familiaridad en tareas de memoria de reconocimiento: características diferenciales en pacientes con epilepsia del lóbulo temporal con y sin antecedentes de *déjà vu*.

Estimado/a Sr/Sra……..

Le invitamos a participar en un estudio de investigación. Le agradecemos su atención.

Antes de decidir si quiere participar o no, es importante que entienda las principales características del estudio, por qué se realiza y los posibles beneficios e incomodidades que le puede comportar.

El investigador:…….le informará de las características del estudio y podrá hacerle todas las preguntas que usted considere oportunas. Tómese el tiempo que considere necesario para leer con detenimiento esta información que le facilitamos por escrito y para pensárselo.

Es importante que entienda que su participación en este estudio es absolutamente voluntaria. Por tanto, puede decidir libremente no participar, y puede retirarse del estudio en cualquier momento si usted lo considera oportuno. Su abandono no afectará de ningún modo en su relación con el sistema sanitario.

A continuación le explicamos y definimos las características del estudio:

1. Finalidad del estudio:

El *déjà vu*es un fenómeno muy frecuente en la población general, pero poco conocido.
En los pacientes con epilepsia del lóbulo temporal es destacable la prevalencia de la experimentación del *déjà vu* asociado a sus crisis. Por ello, esta patología nos otorga una muestra poblacional óptima para desarrollar estudios de investigación.
Existen muchos modelos explicativos y su investigación es compleja.
Para acercarnos a su conocimiento es necesario el desarrollo de estudios de investigación diseñados para comprender su naturaleza científica.
El objetivo de este estudio consiste en evaluar los procesos de atención y memoria en los participantes, y observar las diferencias existentes entre las personas que experimentan el fenómeno y aquellas que no lo experimentan.

2. ¿En qué consiste el estudio?:

El objetivo de nuestro estudio se basa en analizar las diferencias obtenidas en las evaluaciones de la memoria y la atención entre los participantes que experimentan o no experimentan el *déjà vu*.

3. ¿En qué consistirá su participación en el estudio?:

Si usted acepta participar en nuestro estudio, se le programará una única visita en el Hospital Santa Caterina de Girona, donde usted realizará unos test muy simples, que nos servirán para saber si experimenta el fenómeno del *déjà vu*, y para determinar su atención y su memoria.

4. Beneficios potenciales y posibles incomodidades:

Su participación en el estudio supondrá una ayuda en la evolución del conocimiento y comprensión del fenómeno del *déjà vu*.
La realización de los test es muy simple, y no supondrá incomodidades importantes para usted, ni para su salud.

5. ¿Cuáles son sus derechos como participante:

Voluntariedad:
Su participación en este estudio es totalmente voluntaria.

Secreto profesional y confidencialidad:
Le garantizamos que su participación en el estudio será totalmente confidencial y anónima. Todos los datos del estudio serán estrictamente confidenciales, y sólo tendrán acceso los investigadores y el personal autorizado para garantizar la calidad y el análisis de los datos, tal como obliga la Ley Orgánica 15/1999 de Protección de Datos de Carácter Personal. Su nombre y datos personales no aparecerán en las entrevistas, sus datos personales sólo constarán en un listado de participantes, y sólo tendrán acceso los investigadores y personal autorizado. Esta lista será destruida una vez finalizado el estudio. Las autoridades sanitarias pueden acceder a los datos para realizar una inspección.

6. Publicación:

Publicaremos los resultados del estudio tal y como señala el art. 38.1 RD 223/2004.
Así mismo, si usted lo desea, le haremos llegar una copia de los resultados una vez publicados.

7. Duración:

Esta investigación tiene un año de duración.

8. ¿A quién le puedo pedir más información?

Si usted tuviese alguna pregunta que deseara resolver, los responsables de este proyecto de investigación se encuentran a su disposición.
No dude en consultar en cualquier momento que usted considere necesario

9. Aprobación del estudio:

Este protocolo de investigación ha sido aprobado por el Comité Ético de Investigación Clínica (CEIC) de referencia y por un Comité de Investigación, ambos del Institut d`Assistència Sanitària de Girona.

10. Agradecimientos:

Le agradecemos su participación en nuestro estudio sobre el fenómeno del *déjà vu*.
Recuerde que es usted libre de preguntar todo lo que estime conveniente a los médicos y personal sanitario responsable del estudio, así como de decidir renunciar a su participación.

Atentamente,……

Anexo VI: CONSENTIMIENTO INFORMADO

Efecto de la atención selectiva sobre el recuerdo y la familiaridad en tareas de memoria de reconocimiento: características diferenciales en pacientes con epilepsia del lóbulo temporal con y sin antecedentes de *déjà vu*.

Declaración del participante:

YO (Nombre y apellidos)……

He sido informado por el profesional de salud citado a continuación de las finalidades e implicaciones del estudio, sobre el proceso de obtención, almacenaje y procesamiento de mis datos personales.

Nombre del investigador……..

De igual modo, soy consciente de que los datos obtenidos en la realización de este estudio tienen como objetivo la investigación científica; que la participación es totalmente voluntaria y que mi derecho a la retirada me permite abandonar el estudio en cualquier momento.

También fui informado de que puedo solicitar la eliminación de mis datos personales sin ninguna repercusión en la atención sanitaria que recibiré posteriormente.

He podido hacer todas las preguntas que he considerado oportunas.

Por otro lado, acepto que el personal del estudio se ponga en contacto conmigo si lo considera necesario.

Doy mi conformidad para participar en estudio:

Firma del paciente: Firma del investigador:

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Girona, ……..de……..del 20….