

# Alteraciones cognitivas en la epilepsia

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**Residencia en neuropsicología clínica**

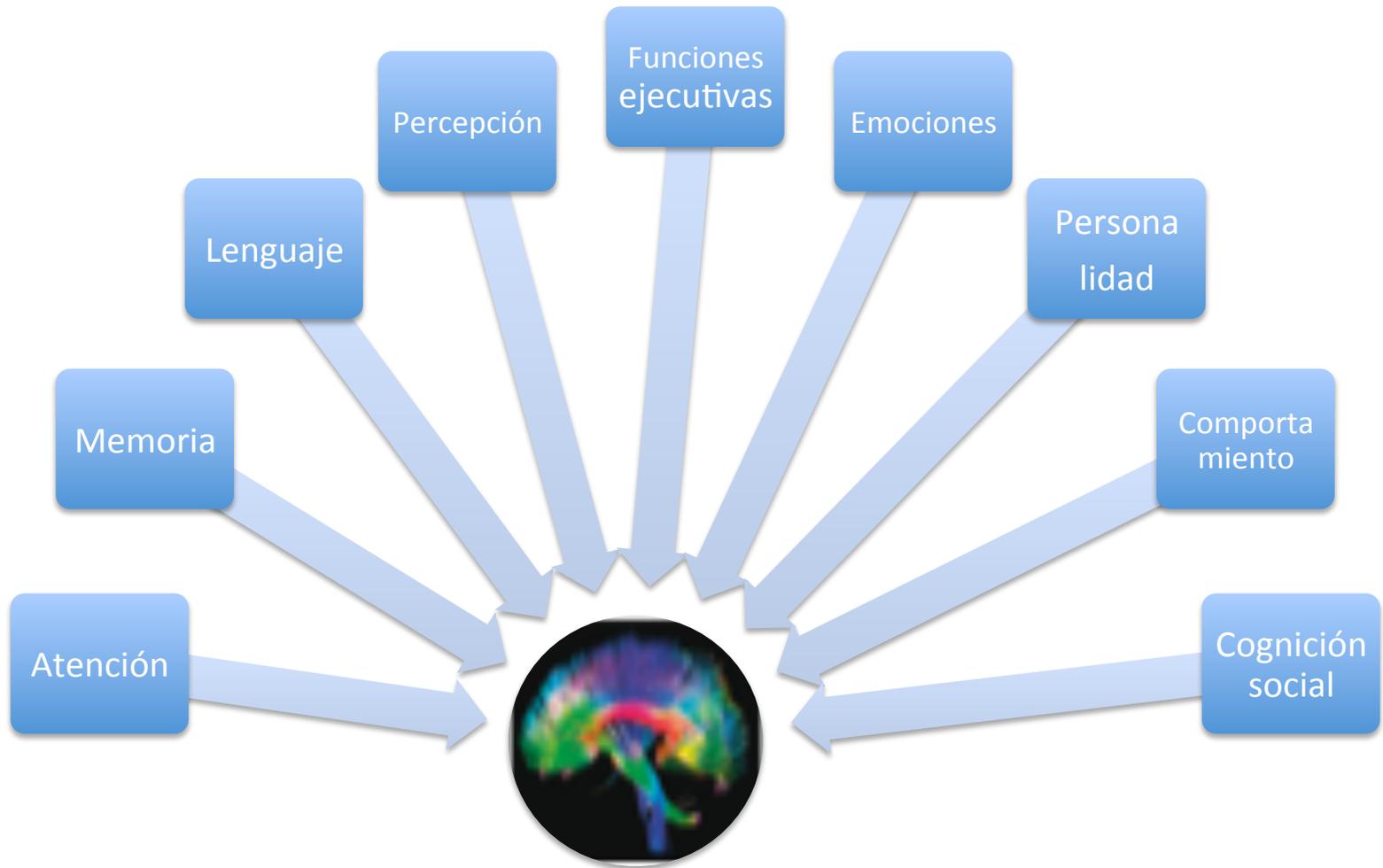
**Facultad de Estudios Superiores Zaragoza, UNAM**



# Concepto de epilepsia

- ☑ La epilepsia es un trastorno neurológico crónico que produce estallidos anormales de excitación eléctrica en grupos de neuronas que eventualmente pueden extenderse a todo el cerebro.
- ☑ Esta actividad eléctrica anormal puede tener efectos significativos sobre el funcionamiento cognoscitivo y conductual de las personas que la padecen.





syndromes (including mesial temporal lobe epilepsy), and efforts have been undertaken to identify the shared *versus* unique cognitive risks across epilepsy syndromes (Elger et al., 2004; Lasonde et al., 2000; Nolan et al., 2003). These approaches have provided insight into the influence of clinical seizure factors on cognition in epilepsy.

A yet untapped approach to understanding cognitive morbidity in epilepsy is taxonomic in nature. This involves addressing the question of whether empirically derived

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(Commission on Classification and Terminology of the International League Against Epilepsy (ILAE), 1981, 1989; Duchowny & Harvey, 1996; Fisher et al., 2005; Luders et al., 1998).

To date, taxonomic approaches have rarely advanced understanding of the neurobehavioral consequences of the epilepsies (Paradiso et al., 1994). Instead, grouping patients based on clinical seizure characteristics (e.g., seizure frequency) and examining the relationships of individual clinical seizure characteristics to cognition, one derives a grouping of patients based on their pattern of performance across several domains. Such an approach would identify cognitive profile types, the relative proportion of patients in each profile type, and provide a basis for i

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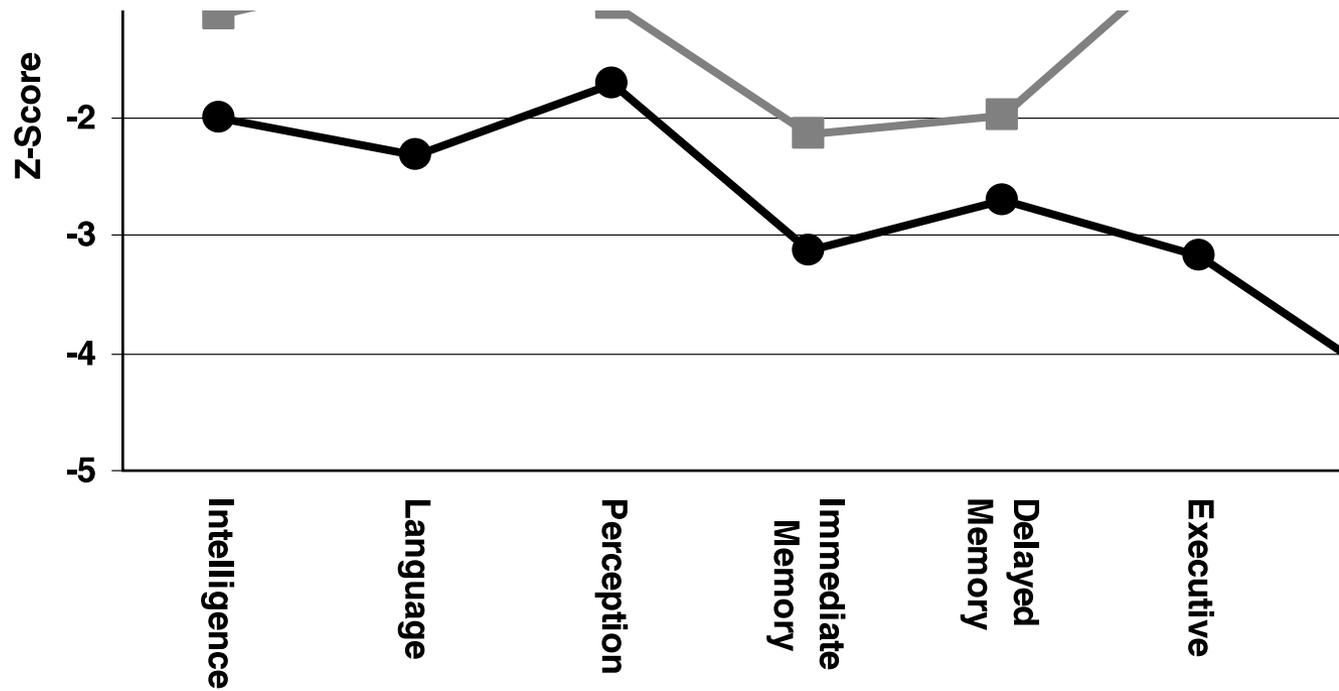


Fig. 1. Mean cluster performance across cognitive domains.

Cluster 1: Alteraciones mínimas

Cluster 2: Alteraciones de memoria

Cluster 3: Alteraciones de memoria, de FE y de velocidad de procesamiento

# Quejas de memoria

- Los déficits de la memoria son la preocupación clínica más importante de los pacientes con epilepsia y de sus familiares.
- Sin embargo rara vez se puede identificar una sola variable que explique los déficits de memoria y del aprendizaje.

# *Cuestionario multifactorial para evaluación de la memoria* (Troyer & Rich, 2002)

56 ítems escala Likert.

## **1. Satisfacción con la memoria (17)**

*Generalmente me siento contento con mi capacidad de memoria.*

## **2. Competencia (20)**

3. ¿Con qué frecuencia olvida pagar a tiempo una cuenta?

## **4. Estrategias (19)**

5. ¿Con qué frecuencia usa el reloj o una alarma para recordar que tiene que hacer algo?

participants. Strategy use was related to demographic factors in controls but not in group. Analysis of epilepsy related factors indicated that hemispheric lateralisation subgr not differ from one another on any subscale, nor did participants grouped according to t of one, several, or no anti-epileptic medications. Measures of chronicity including age and illness duration also failed to correlate with the MMQ subscales. Because objective performance is often impaired in more chronic and intractable cases, the lack of dii

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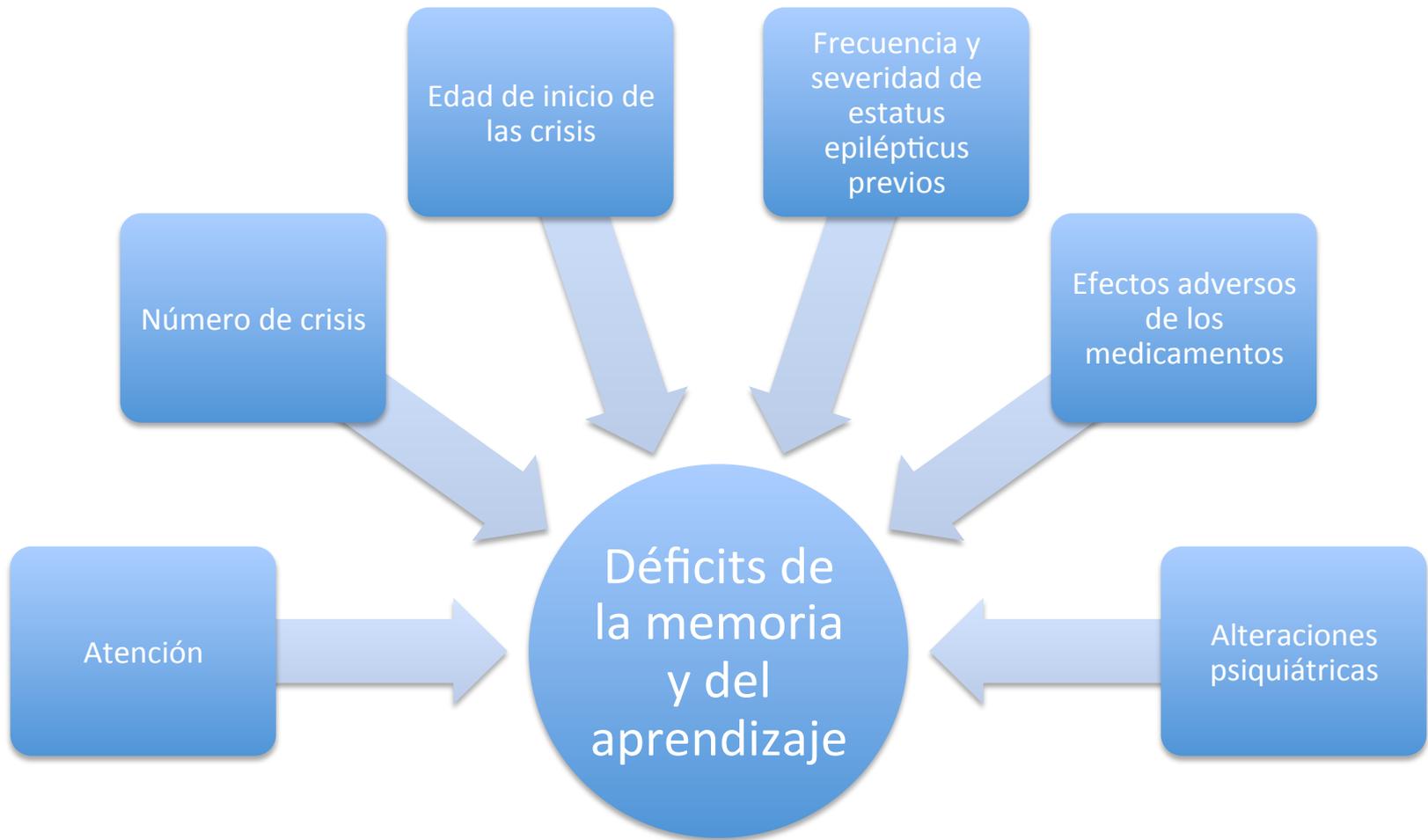
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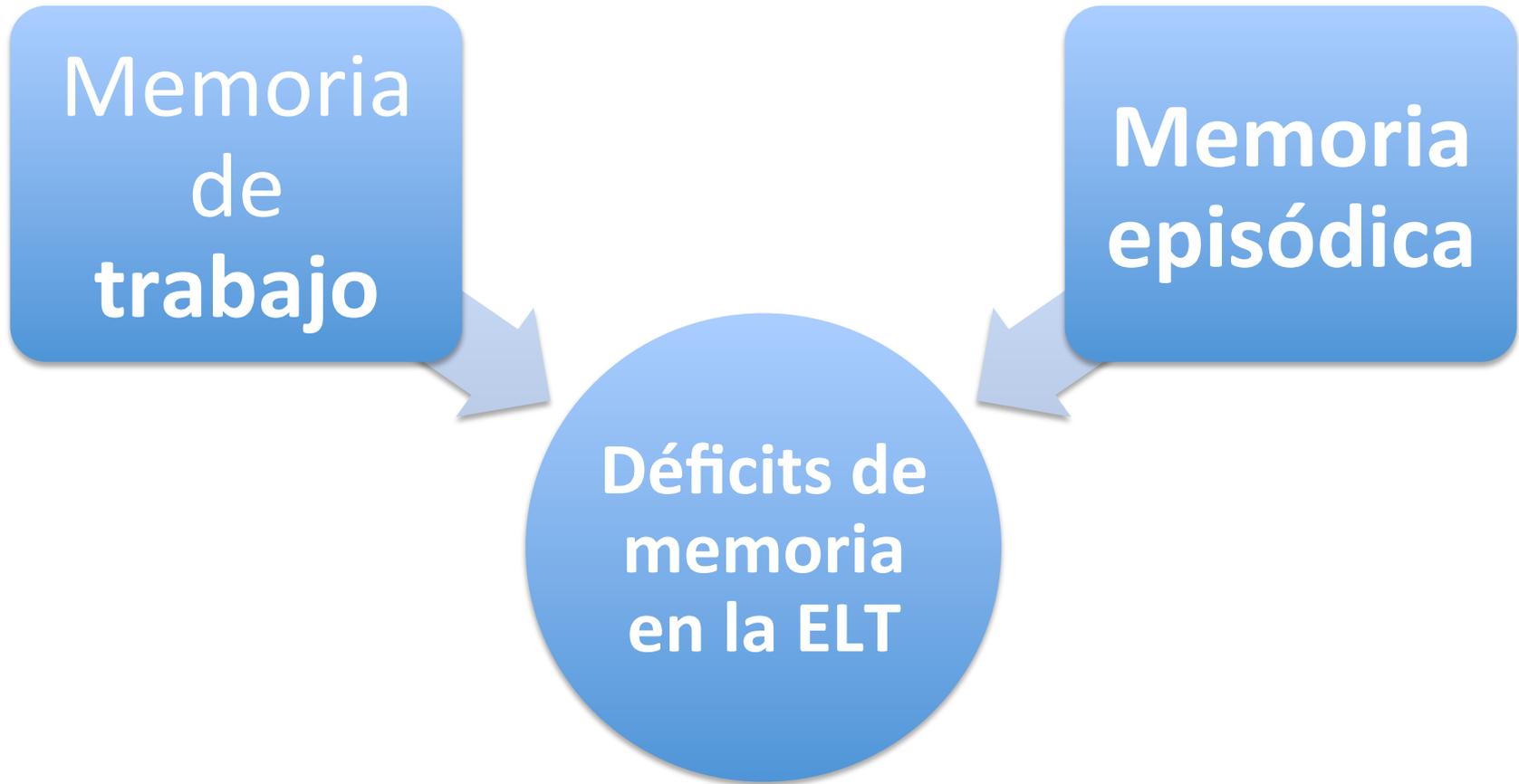
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- 80 personas con ELT comparadas con un grupo control de igual edad y escolaridad.
- El grupo con ELT reportó más preocupaciones con su memoria, más circunstancias de olvido y mayor uso de estrategias.
- No hubo correlación con:
  - lateralización de las crisis
  - uso de medicamentos
  - edad de inicio.





Black et al. (2010). The effect of seizures on working memory and executive function performance. *Epilepsy & Behavior*, 17, 412-419

ELT n=207 Crisis psicogénicas no epilépticas n=216

Análisis de regresión múltiple VI= edad de inicio, duración (años) y lateralidad (D, I, B) buenos predictores del desempeño neuropsicológico

	(2.52)	(2.19)	(2.75)	(2.25)
Full Scale IQ	91.76	92.74	88.61	91.56
	(13.21)	(12.34)	(10.71)	(11.8)
AgeatOnset	20.12	18.38	19.69	28.99
	(14.76)	(13.58)	(16.12)	(12.8)
Duration (years)	16.95	18.69	21.19	7.67
	(13.34)	(12.43)	(15.77)	(9.91)
LifeFreq (No. of seizures)	3,238	3,953	3,368	5,594
	(9685)	(12,689)	(4687)	(33,9)

Note. Values are means (SD). LTLE, left temporal lobe epilepsy; RTLE, right temporal lobe epilepsy; BiTLE, bilateral temporal lobe epilepsy; PNES, psychogenic nonepileptic seizures.

WAIS-III



\*  $P < 0.05$ .

Immediate recall	9.9 (0.4) <sup>a</sup>	
30-min recall	9.6 (0.5) <sup>a</sup>	
CMS: Dot Location		
Immediate recall	10.4 (0.7) <sup>a</sup>	
30-min recall	9.8 (0.6) <sup>a</sup>	
Word Recall task		
2-min recall	86.6% (12.4%)	
30-min recall	85.3% (15.4%)	
7-day recall	58.1% (21.1%)	
Design Location task		
30-min recall	88.4% (21.9%)	n=23
7-day recall	39.5% (20.7%)	n=58

CMS, Children's Memory Scale; TLE, temporal lobe epilepsy, WRAML2, **Edad Prom= 12.5**

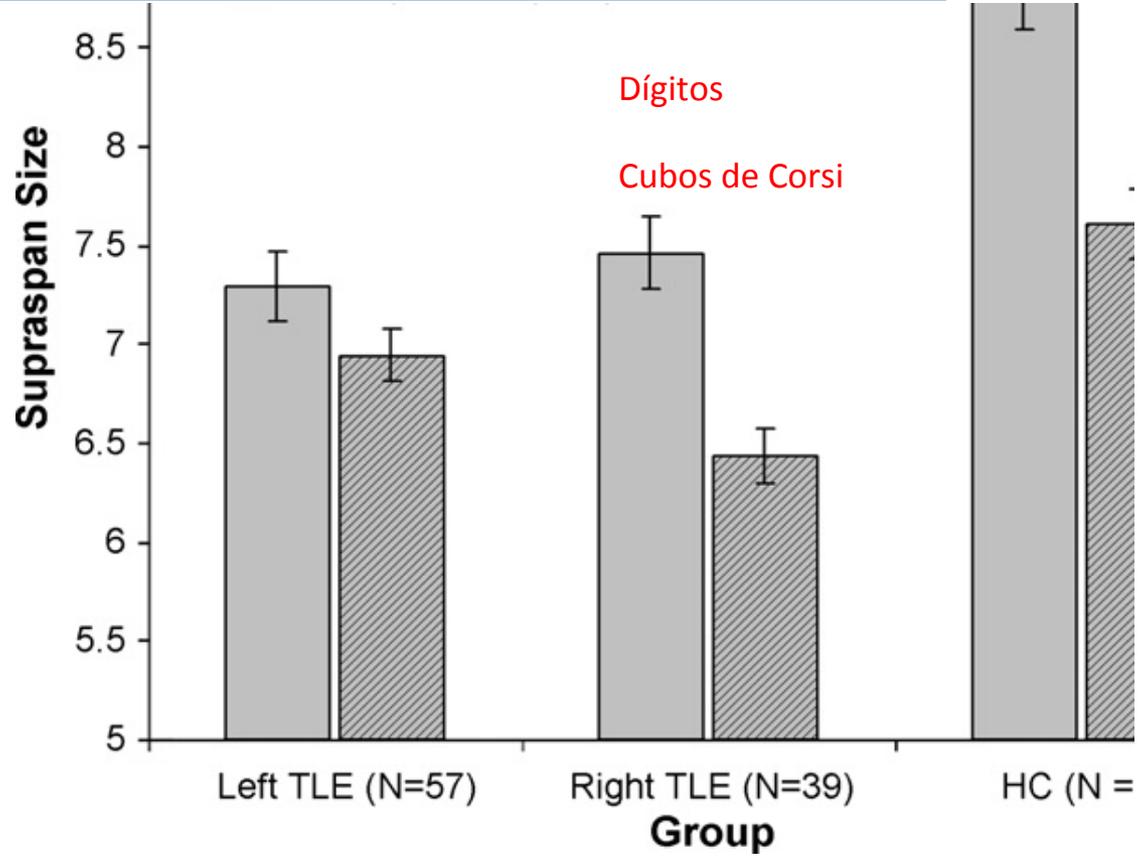
<sup>a</sup> Adjusted mean with standard error in parentheses.

#### 1. Introduction

Studies of adults with temporal lobe epilepsy (TLE) have found evidence of anterograde memory deficits, as shown by poor learning and/or recall of materials after short (20- to 30-minute) delays (i.e. Bell, 2006; Bell, Fine, Dow, Seidenberg, & Hermann,

2005; Frisk & Milner, 1990; Helmstaedter, Hauff, & Elge Hermann, Wylter, Richey, & Rea, 1987; Jones-Gottman et al. Scoville & Milner, 1957). Furthermore, the memory deficits be material-specific (Milner, 1968), related to the side of c focus. While dominant (typically left hemisphere) TLE is associated with impaired verbal memory (Helmstaedter, 1998; Helmstaedter, Grunwald, Lehmertz, Gleitsner, & Elge Hermann, Seidenberg, Schoenfeld, & Davies, 1997; Sass 1995), non-dominant TLE has been linked (albeit less consi with impaired visual memory (Barr, 1997; Baxendale, Thor Paesschen, 1998; Breier et al., 1996; Helmstaedter, Pohl, H

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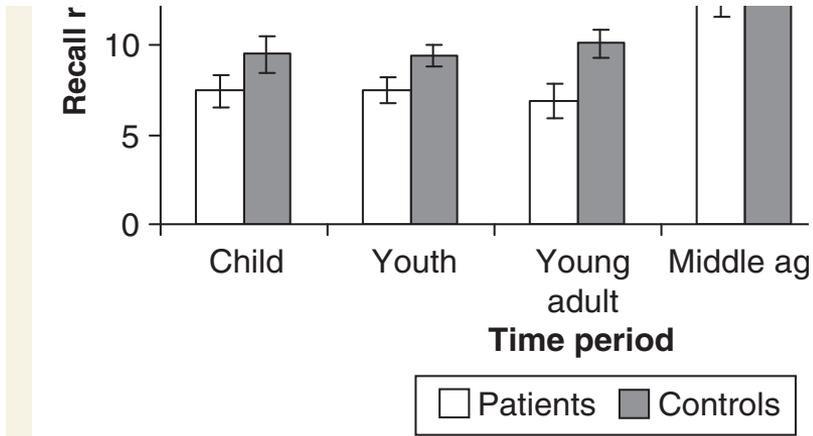
**Fig. 2.** Performance on verbal and visuospatial supraspan tasks as a function of group. Left and right TLE groups are comprised of both unoperated and operated patients. Error bars indicate standard error of the mean.

Controles sanos

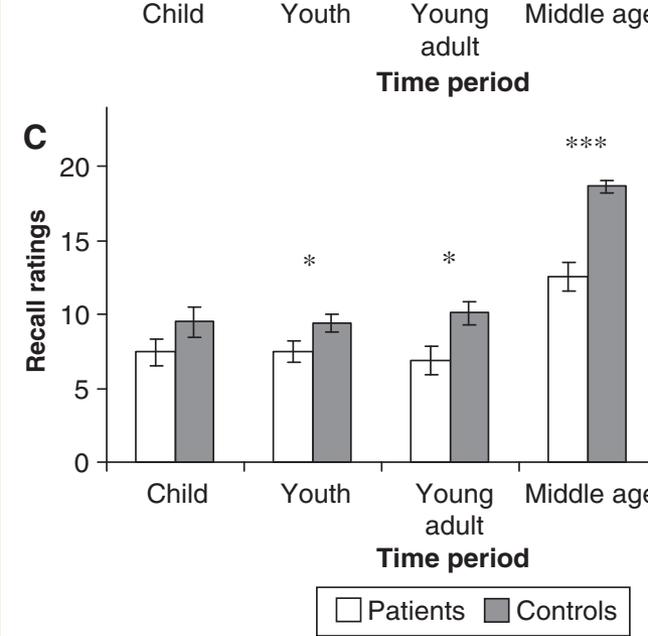
temporal lobe epilepsy in which key structures involved in processing memories, including the hippocampus, are directly involved by seizure activity (Butler and Zeman, 2008a). However, whilst there is extensive evidence for anterograde memory deficits in temporal lobe epilepsy, relatively few studies have investigated remote memory (Noulhiane *et al.*, 2007; Butler and Zeman, 2008a). Nevertheless, remote memory deficits can have considerable

were encoded in the relatively distant past, arbitrarily over one year ago (Kapur, 1999; Butler and Zeman). Remote memory has episodic and semantic components. Episodic memory is typically autobiographical, involving recollection of personally experienced events and allowing 'travel' into the past, or 'autonoetic awareness' (Tulving). Semantic memory enables the recollection of declarative

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**Figure 1** (A) Mean number of internal details recalled for each time period at recall; (B) mean number of external details recalled for each time period at recall; (C) mean rating for each time period at recall. \* $P < 0.05$ ; \*\*\* $P < 0.001$



**Figure 1** (A) Mean number of internal details recalled for each time period at recall; (B) mean number of external details recalled for each time period at recall; (C) mean rating for each time period at recall. \* $P < 0.05$ ; \*\*\* $P < 0.001$

### Déficits en todos los contextos:

- Evento
- Tiempo
- Lugar
- Perceptivo
- Pensamiento/emoción

impairment and intellectual disability (IQ > 70).<sup>5,6</sup> Cognitive difficulties can also be specific, affecting particular aspects of cognitive functioning in the absence of, or of a greater magnitude than, the global difficulties. One of the areas of cognition where specific difficulties have frequently been noted is memory. Memory is a crucial part of cognitive functioning, allowing

as well as lasting changes in neural circuits affecting the ability to process and store information. These impairments can become permanent if seizures or epileptiform activity are frequent. How changes in neural circuitry contribute to memory impairment and other cognitive processes is not clear. It is also not clear if different aetiologies, different types of seizures or different medications affect cognitive processes in a different manner.

Impairments in memory can have a detrimental impact on the quality of life in childhood epilepsy<sup>10</sup> and memory impairment are associated with difficulties in academic achievement.

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- En 78% de los estudios revisados, los niños con epilepsia tienen un peor desempeño en pruebas de memoria que los controles.
- Después de la cirugía mejoran en pruebas de memoria el 50%
- Predictores de la ejecución en memoria:
  - Antiepilépticos
  - Menor edad de inicio de la epilepsia
  - Mayor número de crisis, frecuencia y duración

**Rai et al. (2015).** Memory, executive function and language function are similarly impaired in both temporal and extra temporal refractory epilepsy—A prospective study. *Epilepsy Research*, **109**, 72-80.

- 102 pacientes con epilepsia refractaria. 59 ELT y 43 EexLT

Edad promedio de  $23.04 \pm 8.3$  años

⌘ Pruebas de memoria

⌘ Función ejecutiva (TMT, Stroop, Fluidez verbal, símbolos y dígitos)

⌘ Lenguaje. WAB (Denominación)

- 82% déficit en más de uno de estos dominios
- 21% déficit en los tres dominios evaluados

Seizure frequency;  
Duration

of clinical parameters that modulate memory functions. Age at onset of epilepsy duration and seizure frequency in a large cohort of patients.

*Methods:* We studied 53 patients with unilateral TLE and hippocampal sclerosis (2 participants performed a functional magnetic resonance imaging memory encoding of faces and words. A continuous regression analysis was used to investigate the effect of onset of epilepsy, epilepsy duration and seizure frequency on the activation pattern of memory encoding network.

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- <sup>1</sup> Data acquisition, interpretation and revision for intellectual content.
- <sup>2</sup> Data quality, MR Physics support.
- <sup>3</sup> Revision for intellectual content.
- <sup>4</sup> Supervision and interpretation.
- <sup>5</sup> Study concept, supervision and revision for intellectual content.

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53 pacientes con ELT y esclerosis del hipocampo [29 izq 24 der ]

RMf mientras realizaban una tarea de codificación de palabras o caras

Estudiaron los efectos de la edad de inicio de la epilepsia, la duración y frecuencia de las crisis en los patrones de codificación de memoria.

### Menor edad de inicio

Hipocampo post izq  
LT post medial  
bilateral

and bilateral posterior middle temporal gyri. Older onset was associated with left anterior fusiform gyrus activations (Fig. 1, Suppl. Table 1). No significant correlation between age at onset was seen in RHS patients during word or *Face encoding*. Neither LHS nor RHS patients show significant correlation between face encoding and age of epilepsy.

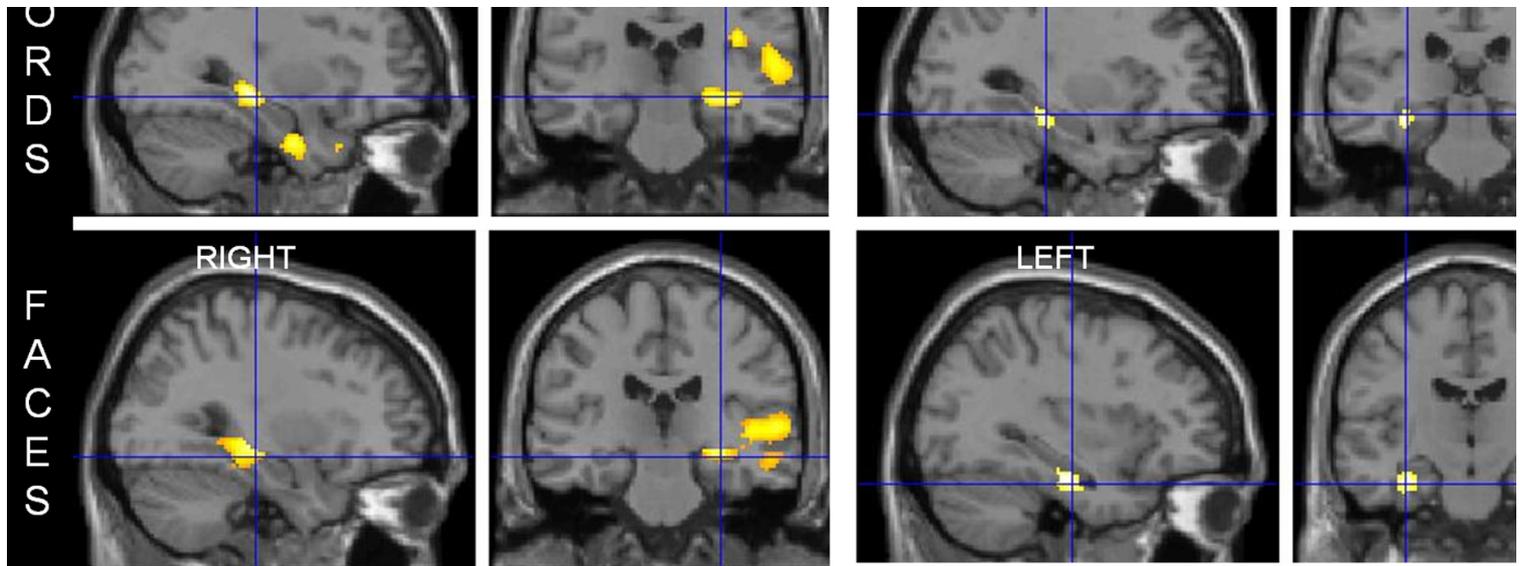
### Duration of epilepsy

*Word encoding*. In LHS patients, longer duration correlated significantly with right hemispheric activations within pre-central gyrus, middle frontal gyrus and supramarginal gyrus. Shorter duration correlated predominantly with left hemispheric activations in hippocampus, middle occipital gyri (MTG), postcentral gyrus, medial orbital gyrus (OFG) and inferior frontal gyri (IFG). Significant parahippocampal gyrus (PHG) correlation was also seen in RHS patients (Suppl. Table 2). No significant correlation was seen in RHS patients during *Face encoding*.

### Mayor edad de inicio

Giro fusiforme ant izq

*Face encoding*. In LHS patients, shorter duration of epilepsy correlated significantly with right amygdala activations.



**Fig. 4** Correlation of lower seizure frequency with word (upper panel) and face encoding (lower panel) in LHS and R. Predominantly right medial and lateral temporal lobe activations associated with a lower seizure frequency in LHS patients during word encoding and face encoding. Conversely, predominantly left medial temporal lobe activations associated with lower seizure frequency in RHS patients during word and face encoding.

- La duración de la epilepsia y la frecuencia de las crisis influyen positivamente las redes de codificación de la memoria verbal y visual tanto en pacientes con esclerosis del hipocampo izquierda como derecha.
- La duración menor de la epilepsia y la menor frecuencia de las crisis se asocia con activaciones de redes de memoria implicadas en formaciones exitosas de memoria, en cambio la mayor duración y frecuencia de las crisis se socia con redes extra temporales que no contribuyen al éxito de la memoria.
- Los hallazgos tienen relevancia para la cirugía de epilepsia y para programas de rehabilitación de la memoria.

interpretation of a neuropsychological test battery, neuropsychologists have a primary role in the design and interpretation of intracarotid anesthetic procedures and functional neuroimaging or cortical mapping paradigms as alternative methods of assessing the integrity of brain structures and networks. The integration of neuropsychologists in comprehensive epilepsy programs has also led to their involvement in assessing the cognitive side effects of antiepileptic drugs and in the psychosocial aspects unique to this

an international league against epilepsy subcommission. This collaboration led to the current production of this paper aimed at providing basic information that can be applied in various settings and geographical locations.

Neuropsychological data have long been shown to correlate focal areas of brain dysfunction in patients with epilepsy [1–12] and predict cognitive outcome following epilepsy surgery, particularly when combined with other variables such as structural brain pathology, time of seizure onset, language lateralization or unilateral memory impairment during intracarotid anesthetic procedures [13–21]. The contribution of neuropsychology is unique in that cognitive assessment describes and quantifies behavioral abilities and disabilities, v

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7-4-6-8-9-3-1-2

8

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

9

3-7-1-5-4-2-8-6

8

## OBSERVACIONES:

Atención auditiva  
(dígitos)

Atención visual  
(cubos de Corsi)

Memoria verbal  
(textos)

Fluidez verbal  
(animales y  
palabras con 'p')

Figura de Rey  
(Praxias, hab  
visoespaciales,  
planeación,  
memoria visual)

Token Test  
(comprensión del  
lenguaje)

WCST (flexibilidad)

Claves (FE,  
velocidad de  
procesamiento)

# Propósito de la rehabilitación neuropsicológica

1

- Reducir los déficits cognitivos

2

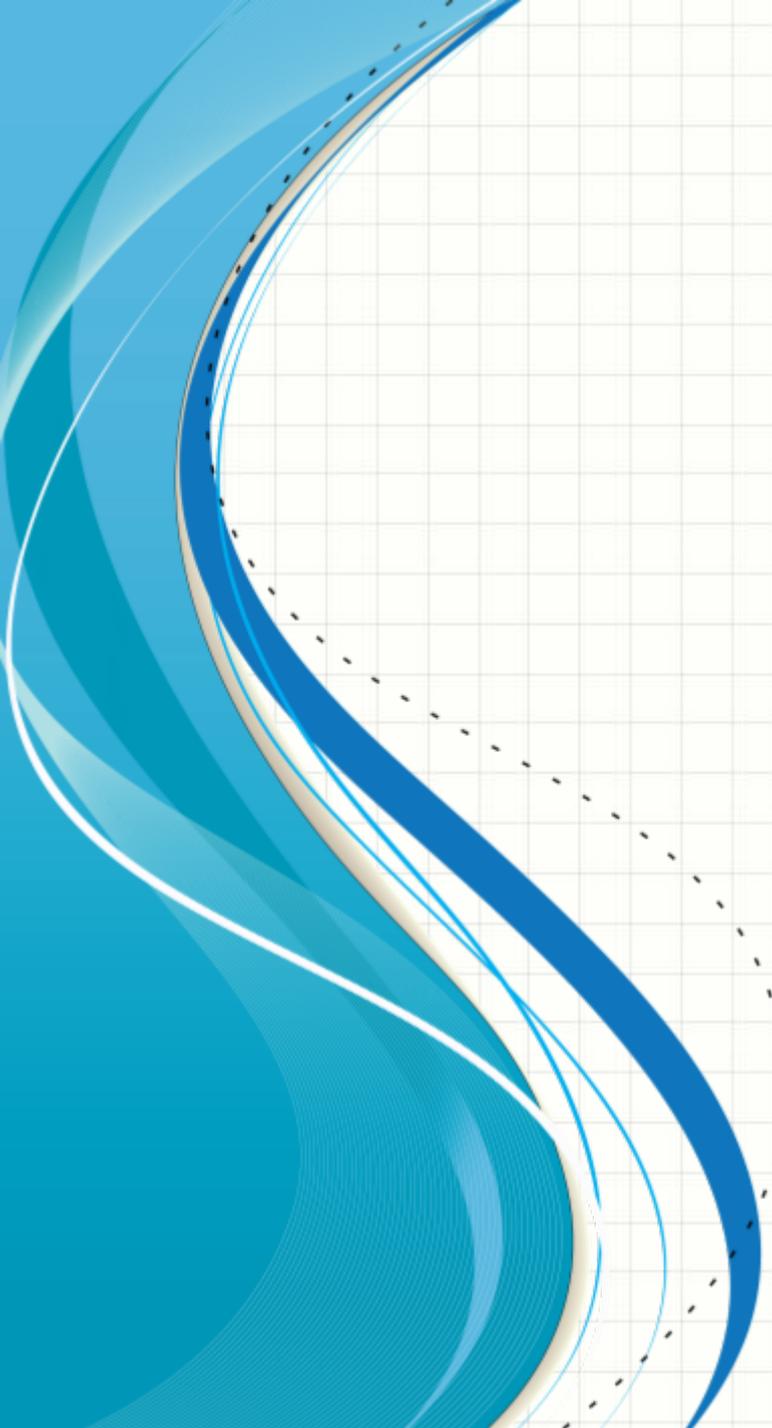
- Reducir los efectos adversos de los déficits

3

- Mejorar la conciencia del déficit para que puedan afrontar mejor los retos de la vida diaria

4

- Incidir sobre otras áreas no directamente tratadas: depresión, ansiedad, fatiga, cambios de personalidad, calidad de vida



# GRACIAS

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