

# **EPILEPSY & COGNITION**

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# Factors Contributing to Cognitive Decline in Epilepsy

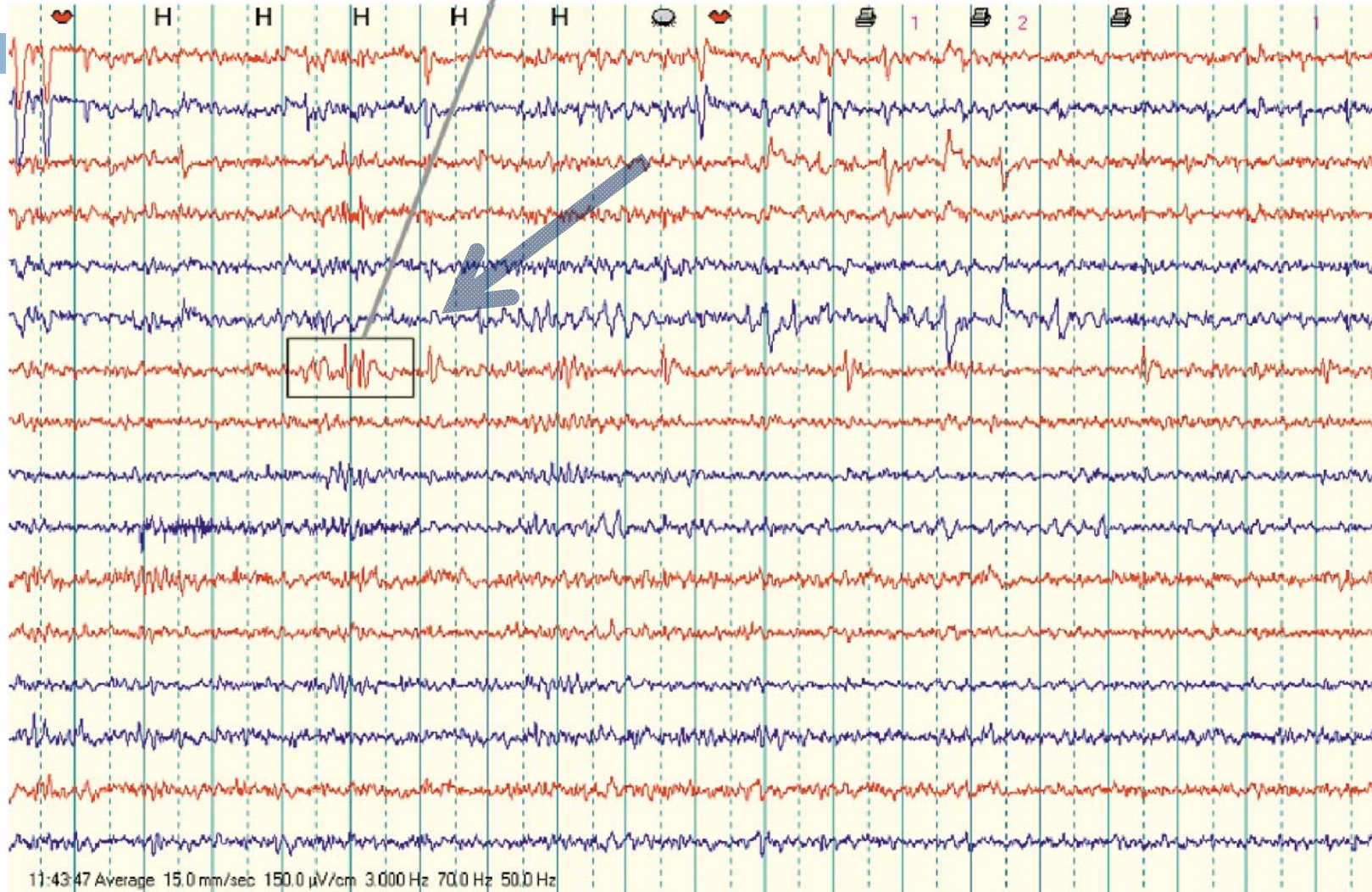


**IED????**

# The Concept of Transient Cognitive Impairment

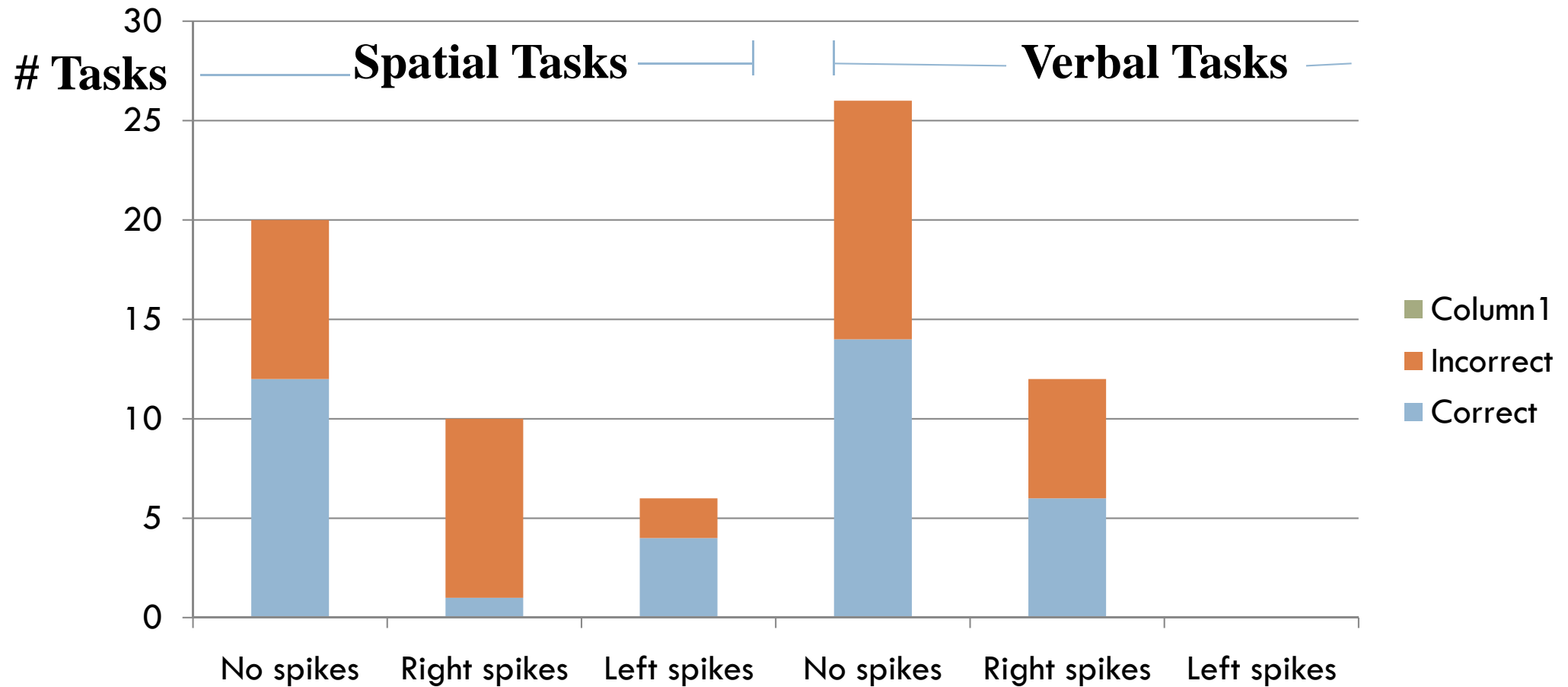
## [Aarts et al, 1984]

- Since 1939 Schwab first demonstrated that subclinical epileptic discharges may be accompanied by subtle impairment of attention by using a reaction time test during simultaneous EEG recording
- Binne et al, 1993 later demonstrated that TCI occurred during approximately 1/3 of discharges in epileptic patients



*TCI testing in 13-year-old boy with focal discharges in the right temporal region associated with errors on computerised spatial short-term memory task..*

*Interaction of discharges and different modalities of cognitive function in 13-year-old girl with benign childhood epilepsy and bilaterally independent Rolandic spikes.*



# Hippocampal Interictal Spikes Disrupt Cognition in Rats

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**Objective:** Cognitive impairment is common in epilepsy, particularly in memory function. Interictal spikes (IISs) are thought to disrupt cognition, but it is difficult to delineate their contribution from general impairments in memory produced by etiology and seizures. We investigated the transient impact of focal IISs on the hippocampus, a structure crucial for learning and memory and yet highly prone to IISs in temporal lobe epilepsy (TLE).

**Methods:** Bilateral hippocampal depth electrodes were implanted into 14 Sprague-Dawley rats, followed by intrahippocampal pilocarpine or saline infusion unilaterally. Rats that developed chronic spikes were trained in a hippocampal-dependent operant behavior task, delayed-match-to-sample. Depth-electroencephalogram (EEG) was recorded during 5,562 trials among five rats, and within-subject analyses evaluated the impact of hippocampal spikes on short-term memory operations.

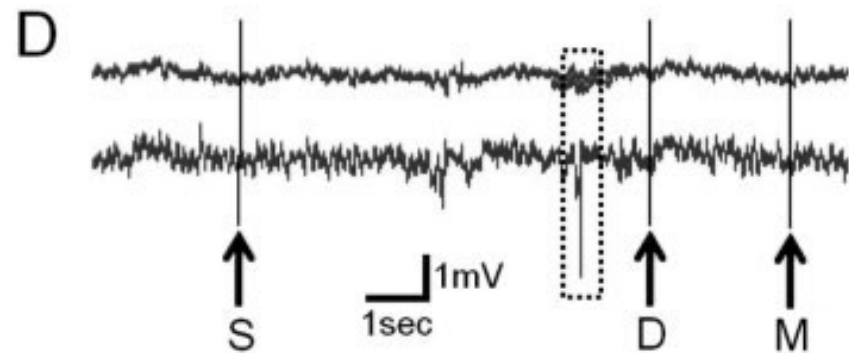
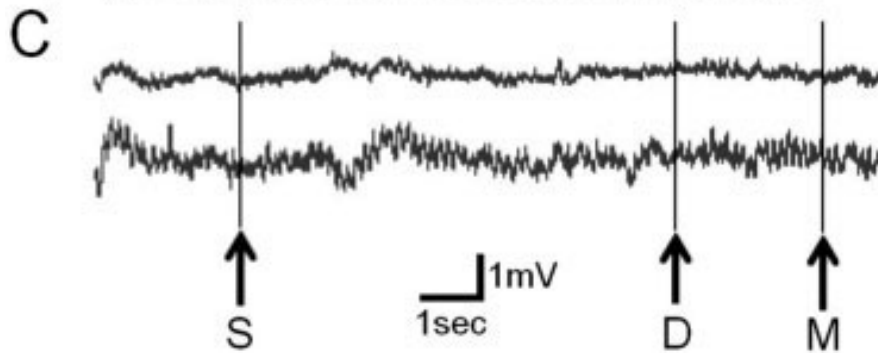
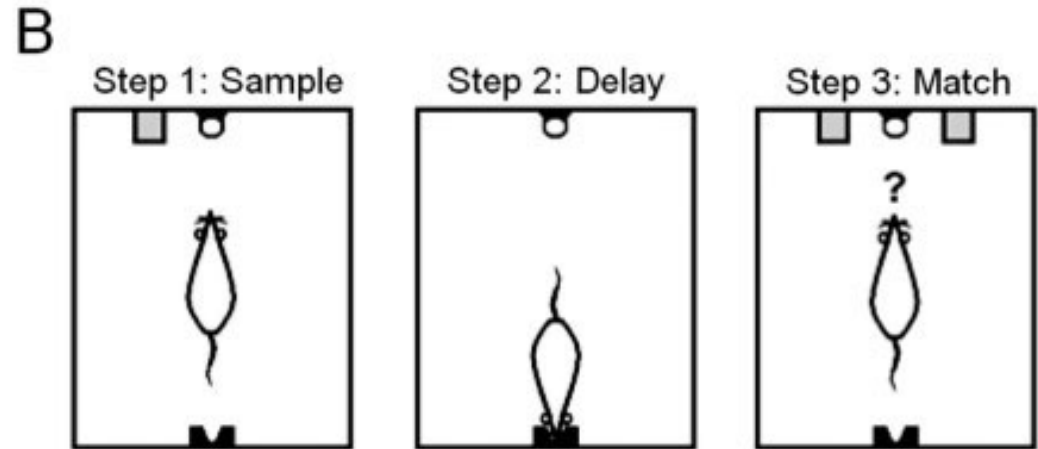
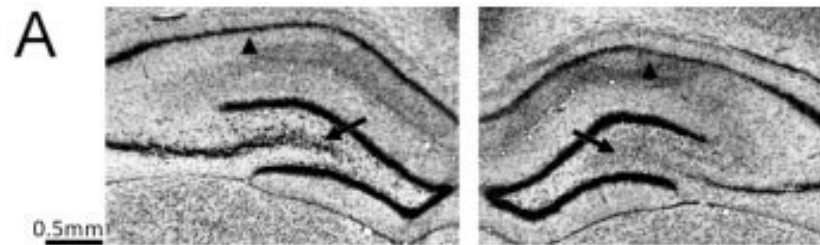
**Results:** Hippocampal spikes that occurred during memory retrieval strongly impaired performance ( $p < 0.001$ ). However, spikes that occurred during memory encoding or memory maintenance did not affect performance in those trials. Hippocampal spikes also affected response latency, adding approximately 0.48 seconds to the time taken to respond ( $p < 0.001$ ).

**Interpretation:** We found that focal IIS-related interference in cognition extends to structures in the limbic system, which required intrahippocampal recordings. Hippocampal spikes seem most harmful if they occur when hippocampal function is critical, extending human studies showing that cortical spikes are most disruptive during active cortical functioning. The cumulative effects of spikes could therefore impact general cognitive functioning. These results strengthen the argument that suppression of IISs may improve memory and cognitive performance in patients with epilepsy.



# Hippocampal Interictal Spikes Disrupt Cognition in Rat

Holmes et al, Ann neurol 2010



# Epilepsy and driving: attitudes and practices among patients attending a seizure clinic.

Dickey W, Morrow JI

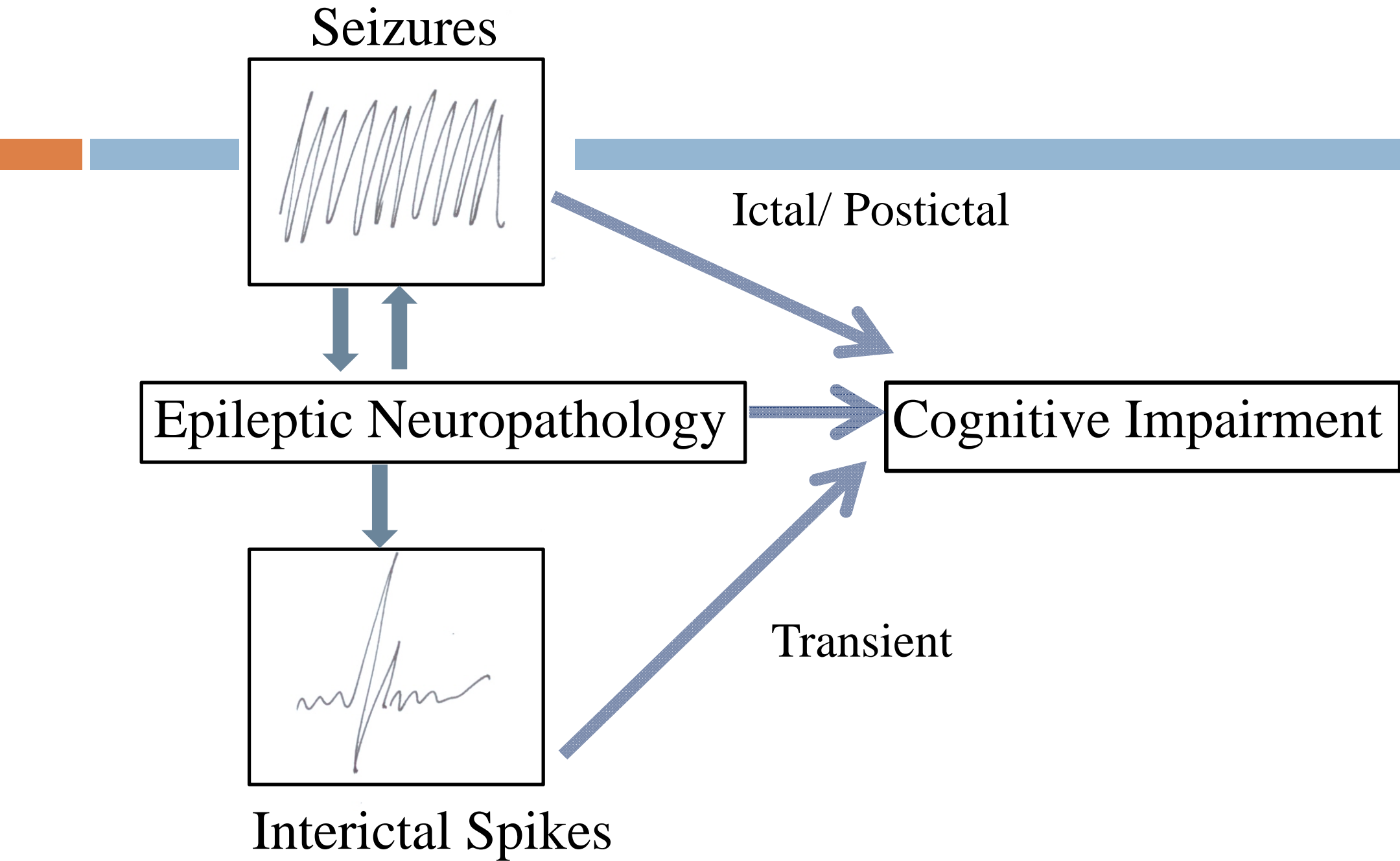
## □ Abstract

- Although the loss of freedom to drive is a serious consequence of the diagnosis of epilepsy, it is unclear how well current regulations are understood and adhered to by patients. Using questionnaires completed anonymously, we assessed attitudes and practices among 104 patients with epilepsy. Seventeen (16%) patients were driving, three illegally. In total, eight (8%) patients had at some stage driven illegally, even though seven admitted to having been warned not to do so. Even among the 14 patients currently driving and eligible to do so, only eight (57%) had informed the licensing authority and six (43%) their insurers. Only 34 (33%) patients showed satisfactory knowledge of current regulations, including seven (50%) of those currently driving and 21 (50%) of 42 patients who expressed a wish to drive in the future. Of these 34, only 14 (41%) expressed complete agreement with the regulations. Thus, a significant proportion of patients with epilepsy has driven illegally or has failed to inform the licensing authority or insurers. Understanding of regulations is poor. Less stringent restrictions have been shown to be safe in other countries and might improve compliance.



# Transient Cognitive Impairment

- Several positive experiences with treating IEDs in non-epileptic children whether generalized (Binnie and Colin, 1993; Gordon et al, 1996; Laporte et al, 2002) have been encouraging in the domain of attention/ hyperactivity disorders



# Area of Predominant Epileptic Activity



Prefrontal  
Cognitive & Behavior

Opercular  
Oromotor speech

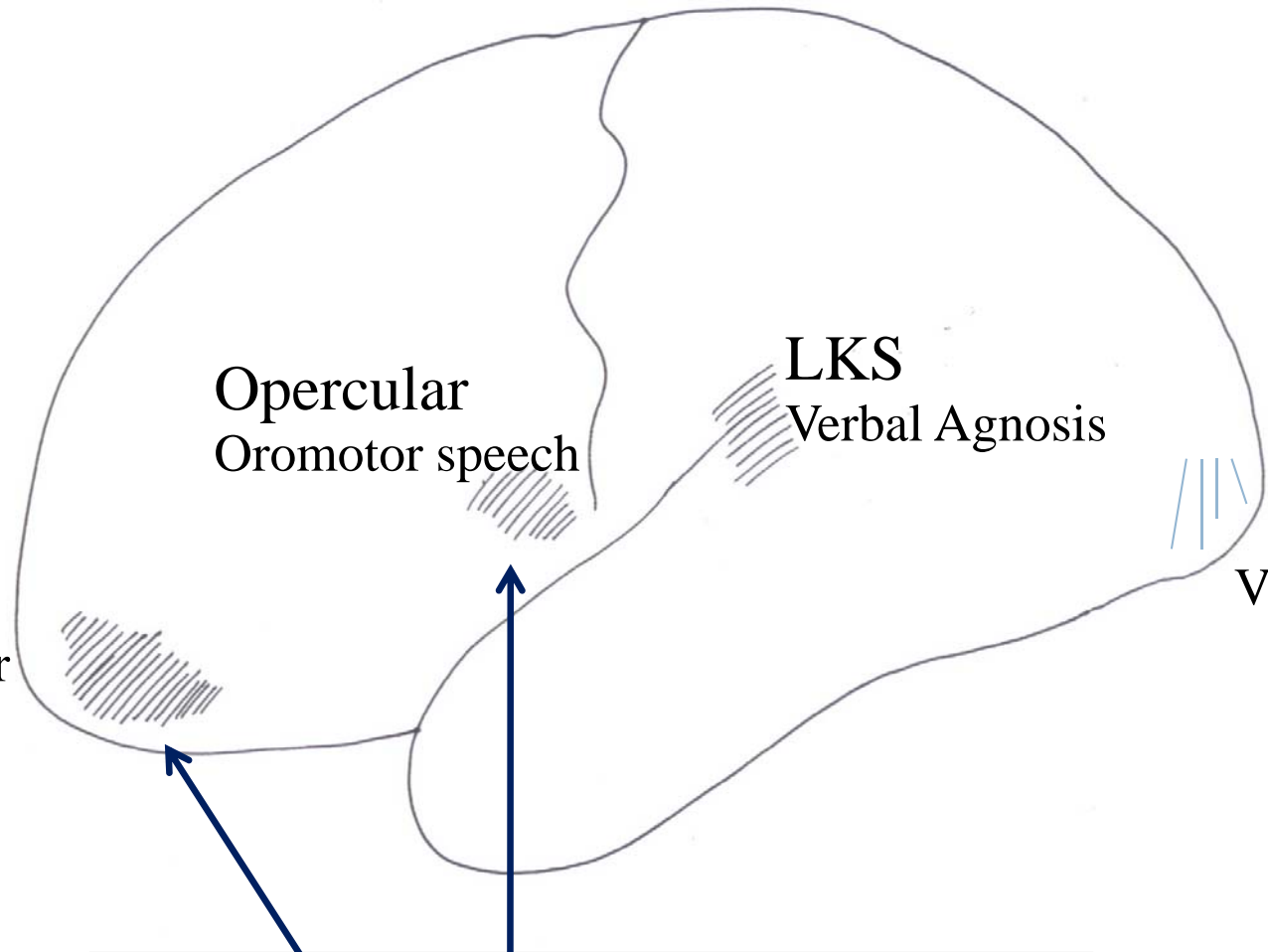
LKS  
Verbal Agnosia

Visual Agnosia

Duration of Active Epilepsy + **CSWS**

Age at Onset

Age at remission



# Cognitive Manifestations in Children with Partial Epilepsy (mainly Frontal) and ESES

## □ Main Deficits

Time orientation & memory organization

Reasoning, Thought formulation

Learning strategy

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Creativity, Planning,

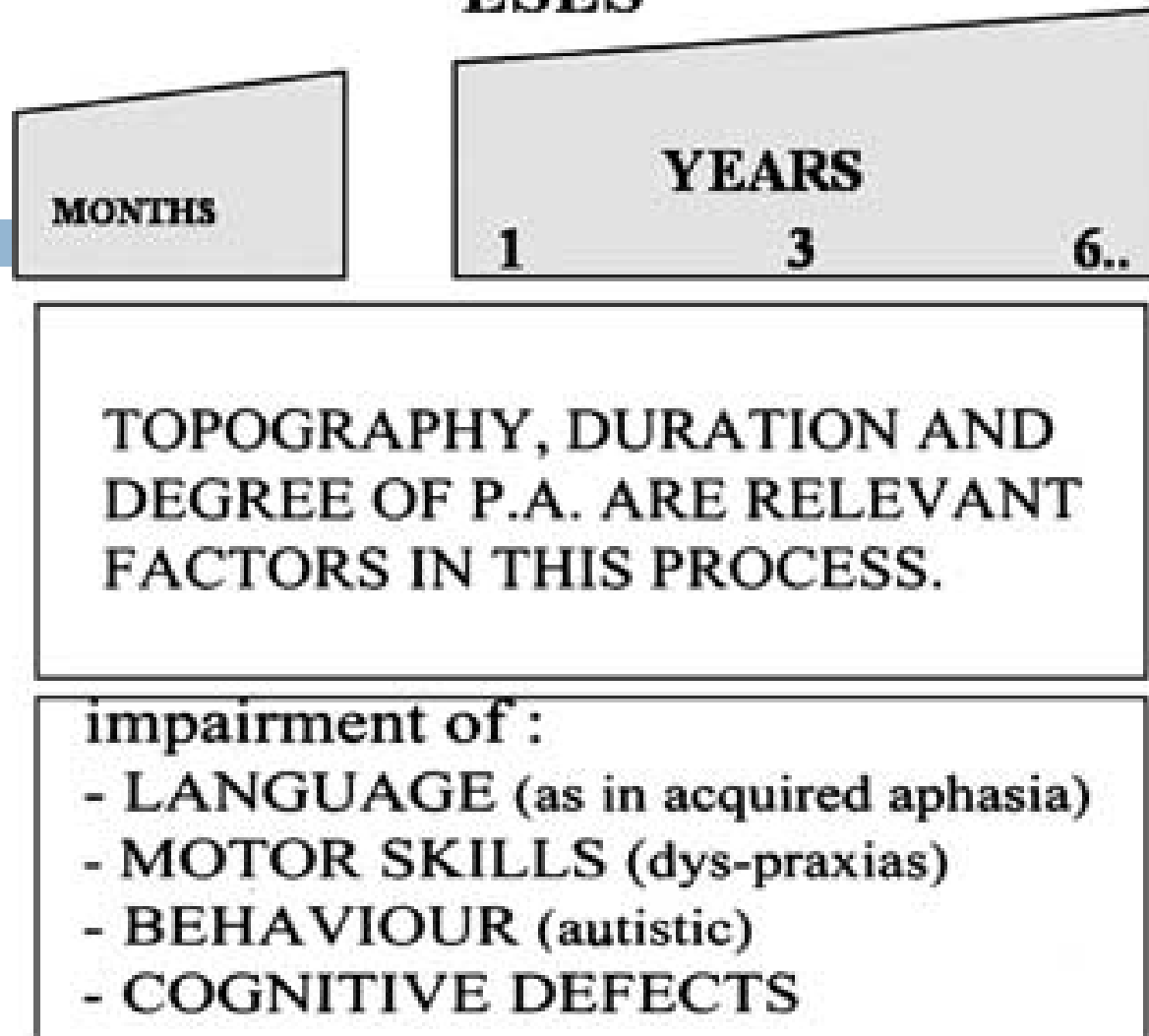
capacity of initiation

Mental flexibility

**Executive Functions**

**In all instances: learning disorder and +/-  
cognitive deficiency**

# ESES



**FIG. 2. Duration of ESES and topography of interictal paroxysmal activity (P.A.) play a major role in influencing the degree and type of cognitive dysfunction.**



# **Should We Treat It All ??**

**Is it justified to treat interictal spikes??**