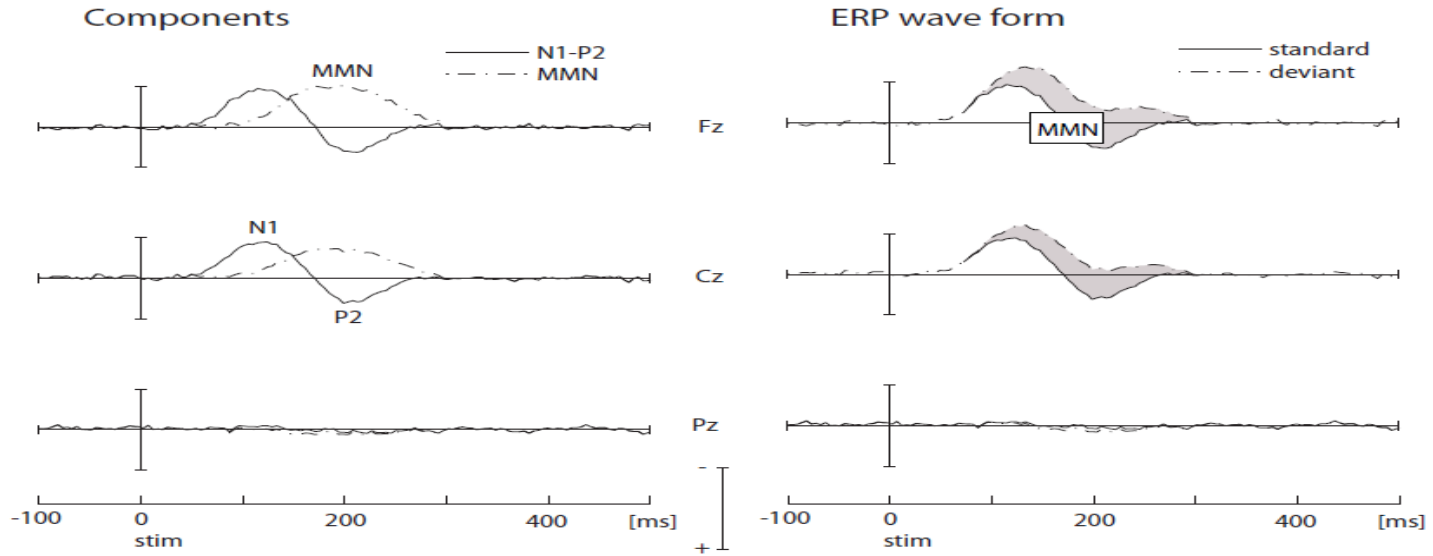
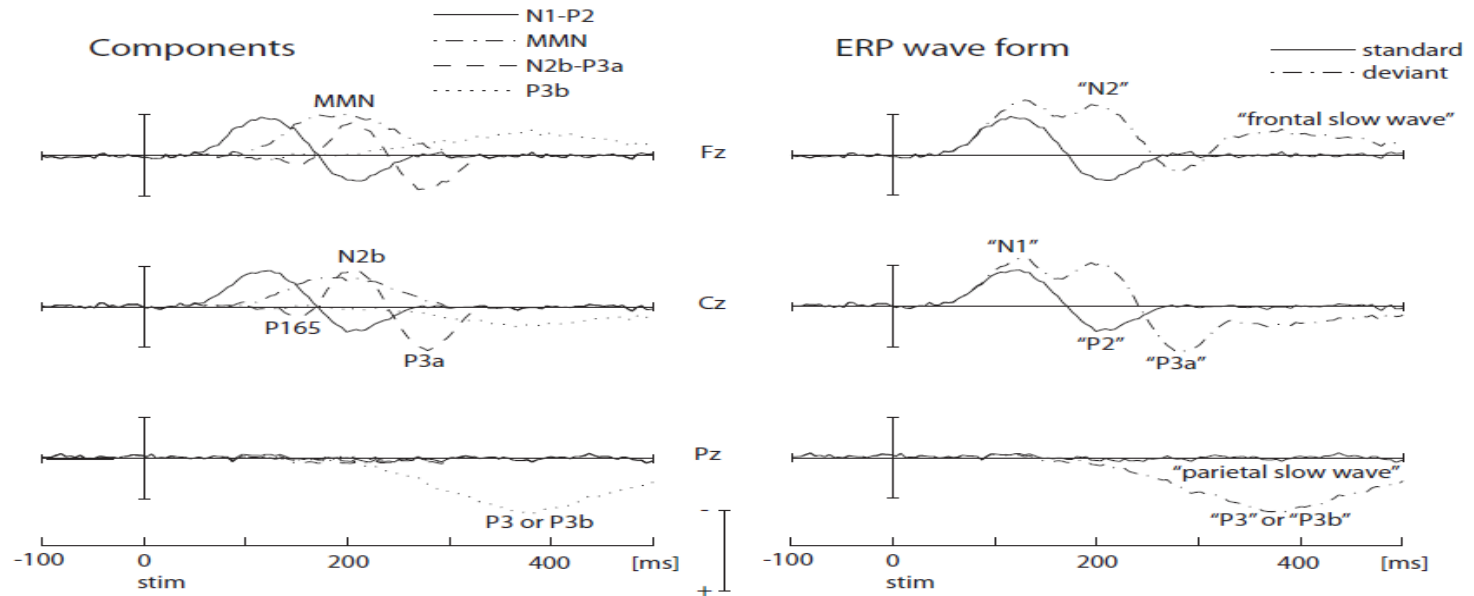


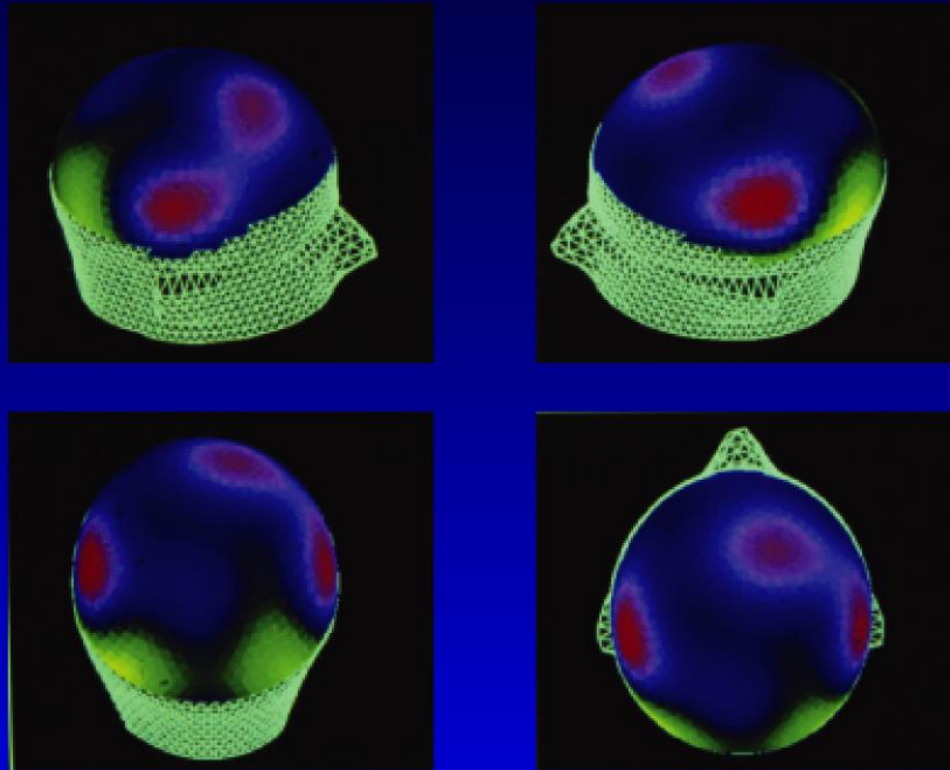
IGNORE CONDITION



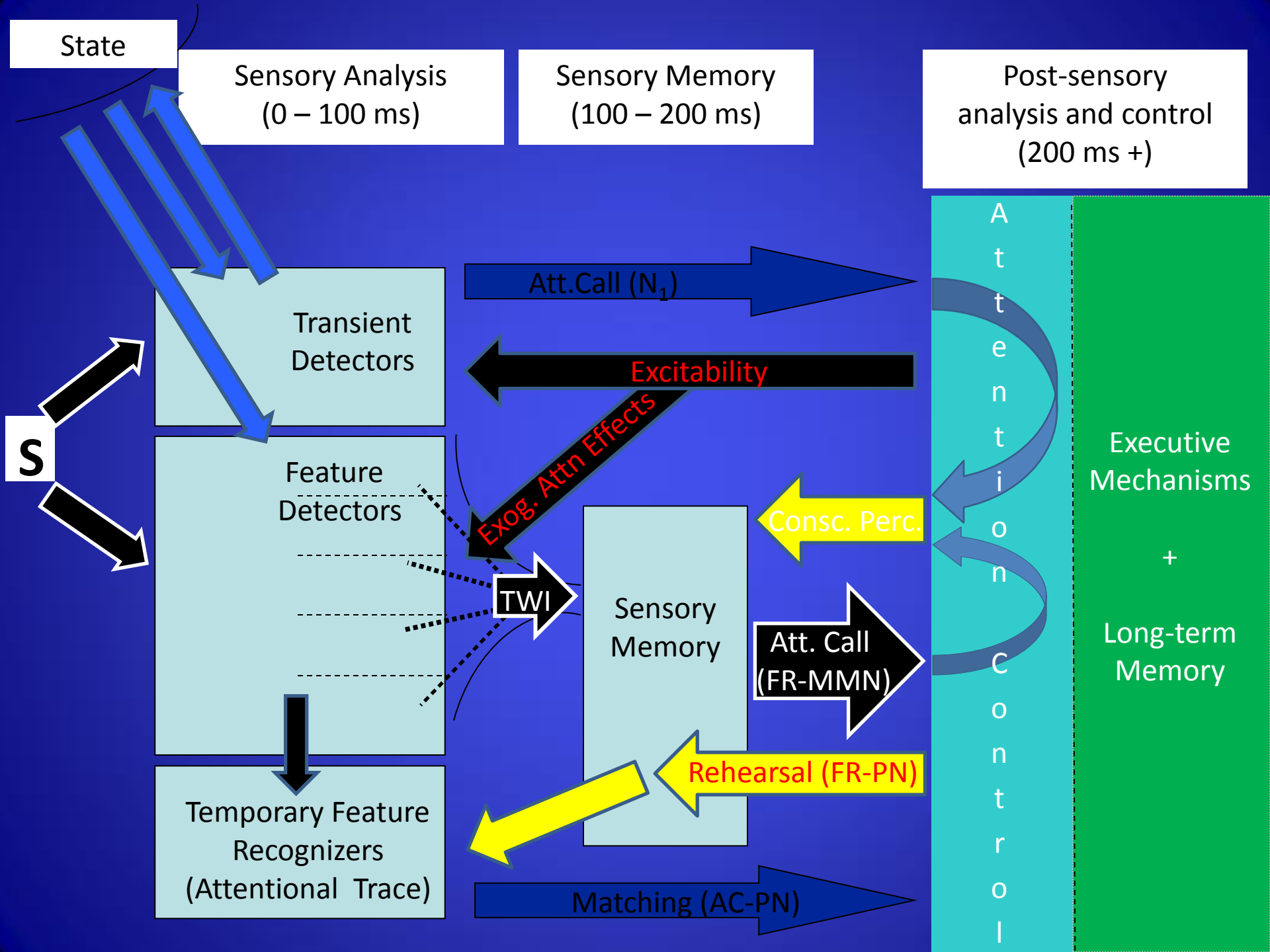
ATTEND CONDITION



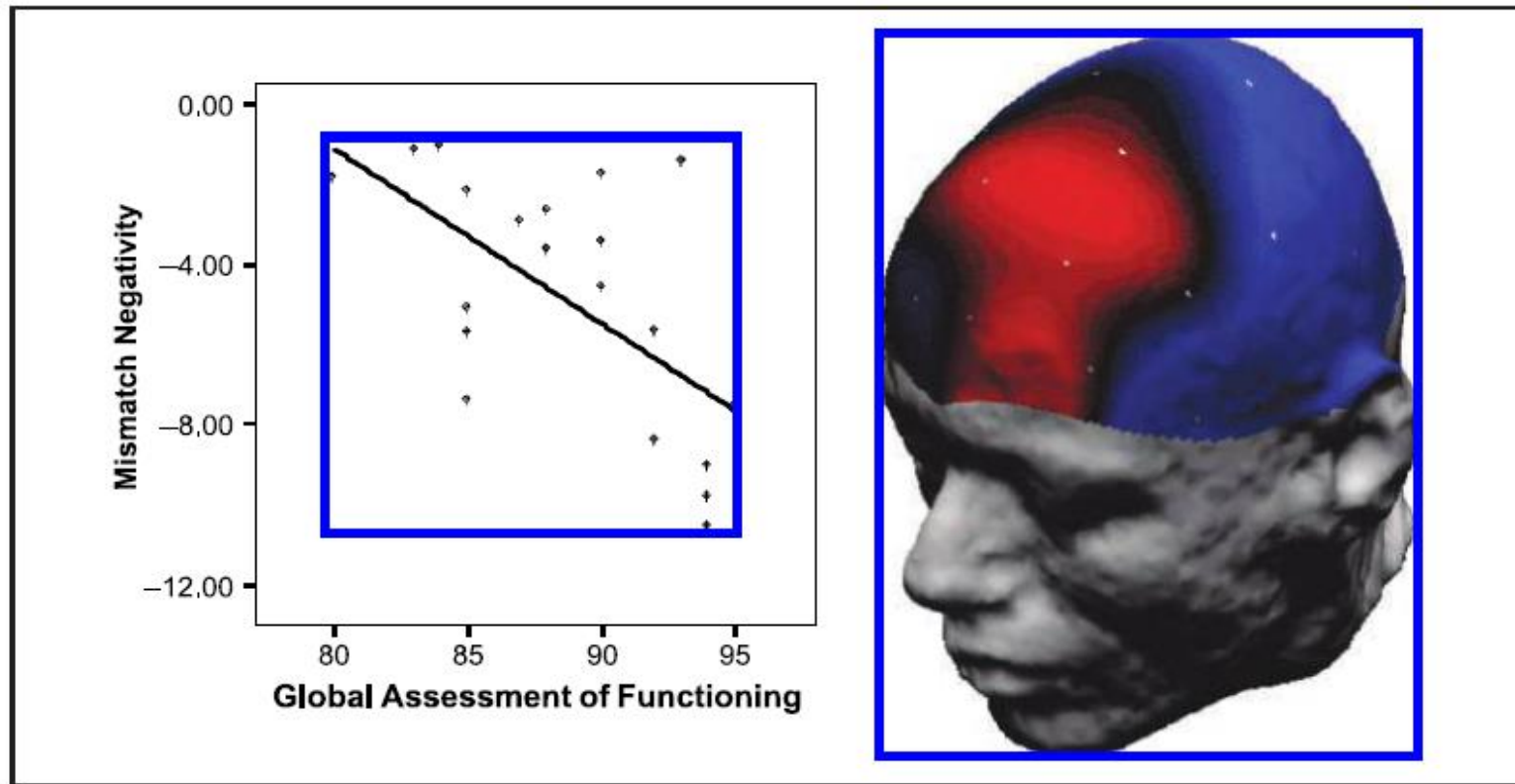
Frequency MMN generators reflected by scalp current density analysis



Compliment of Giard *et al.*, 1990

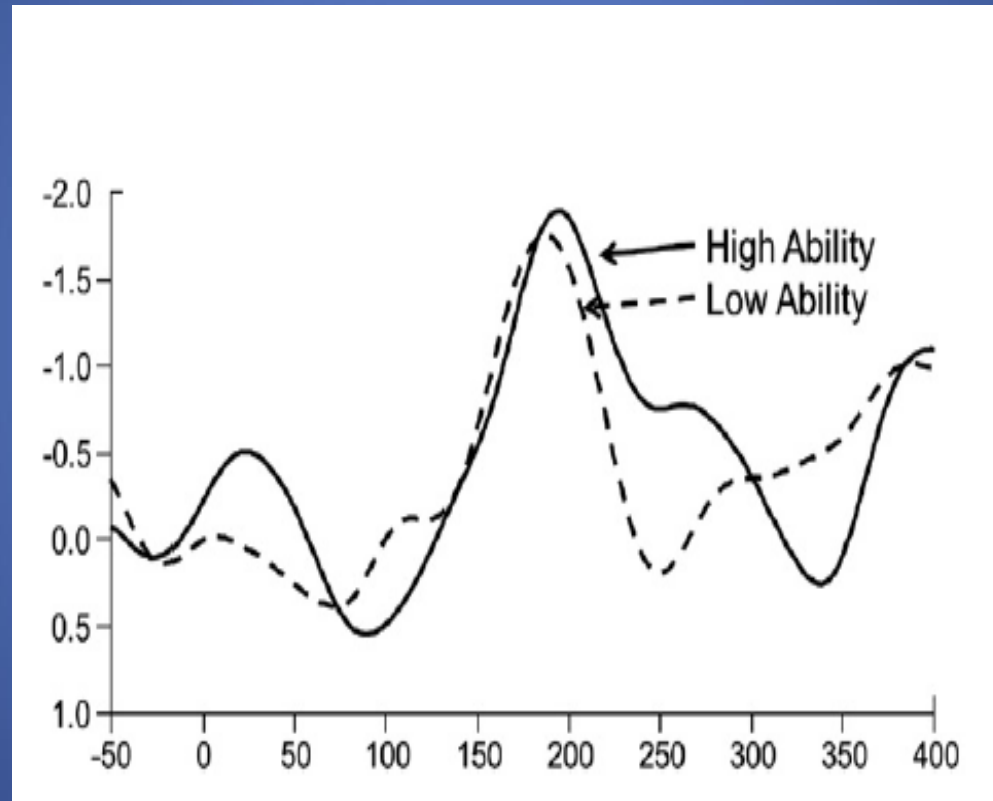


MMN predicts GAF in normal healthy subjects



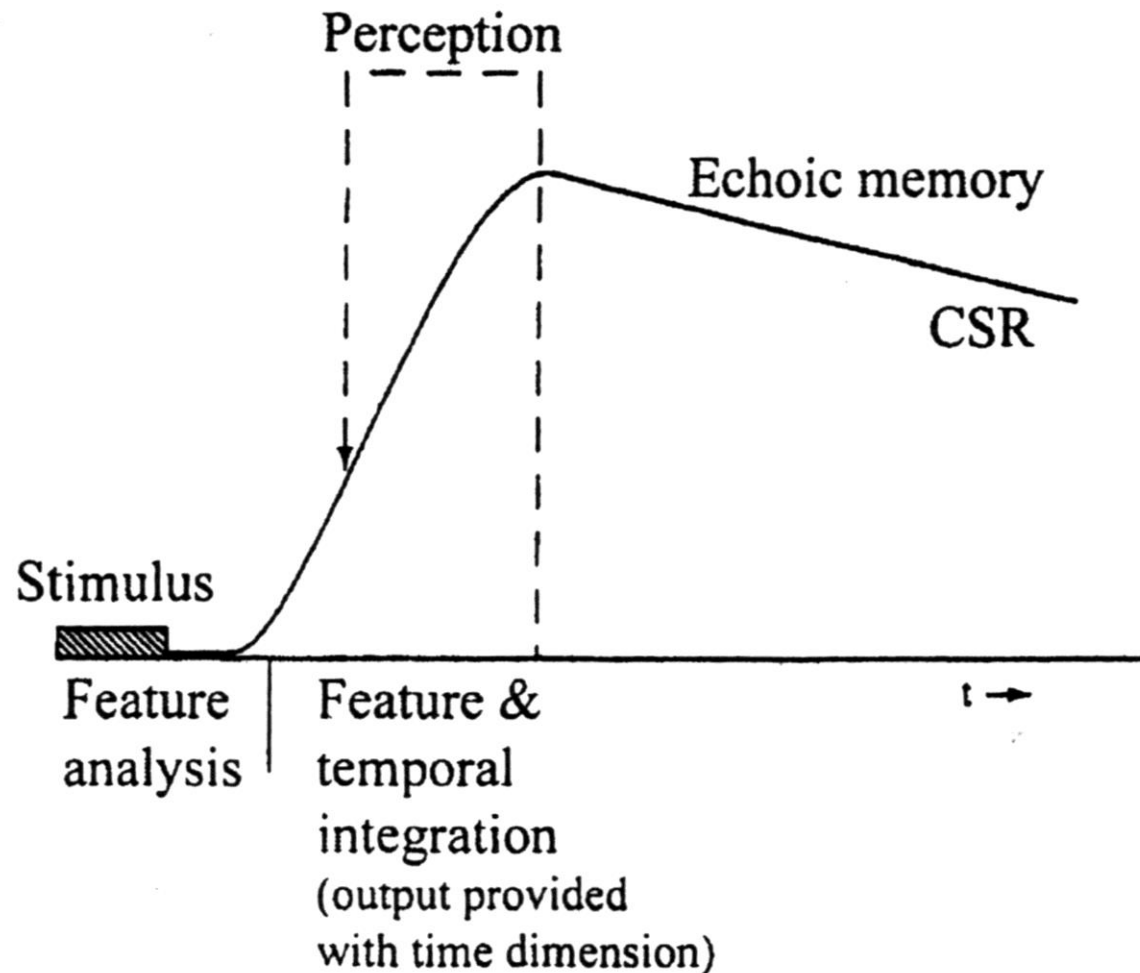
Light et al. 2007

MMN in “high-” and “low-ability” subjects for conjunction-rule violation



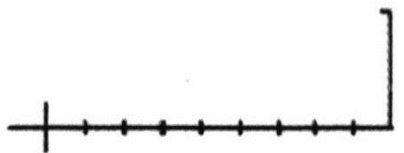
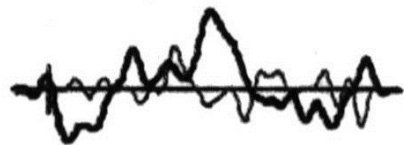
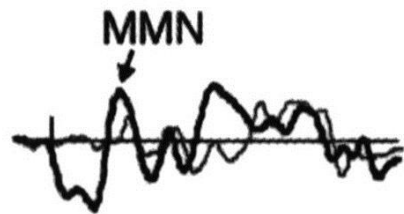
Houlihan & Stelmack 2012

Emergence of Central Sound Representation

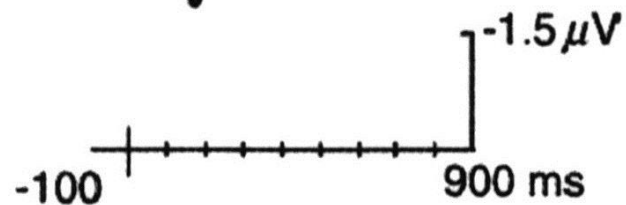
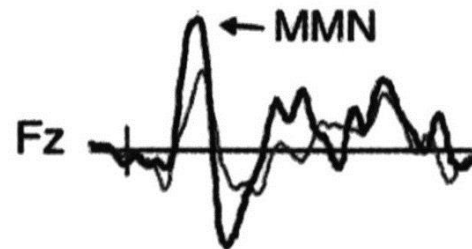


IGNORE

1 Semitone



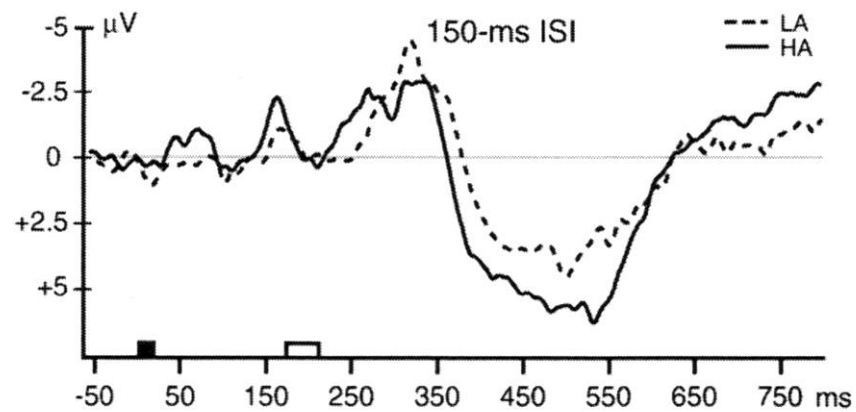
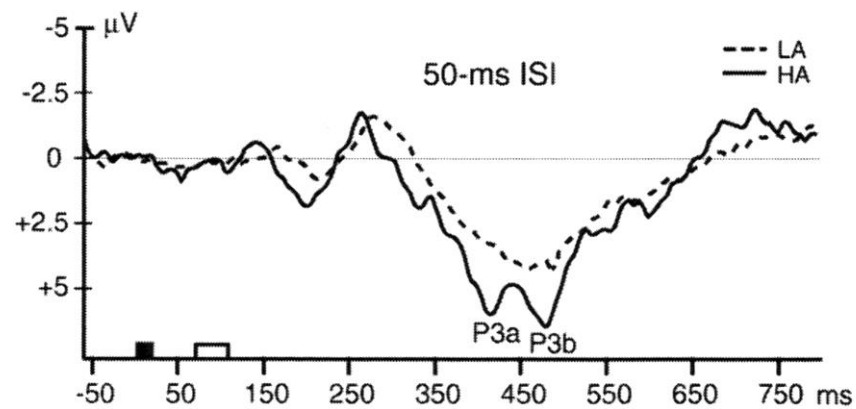
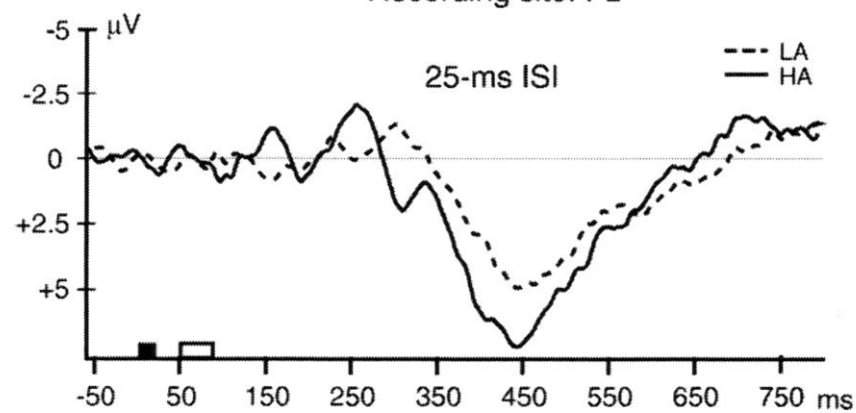
6 Semitones



Low Ability

High Ability

Recording site: Pz



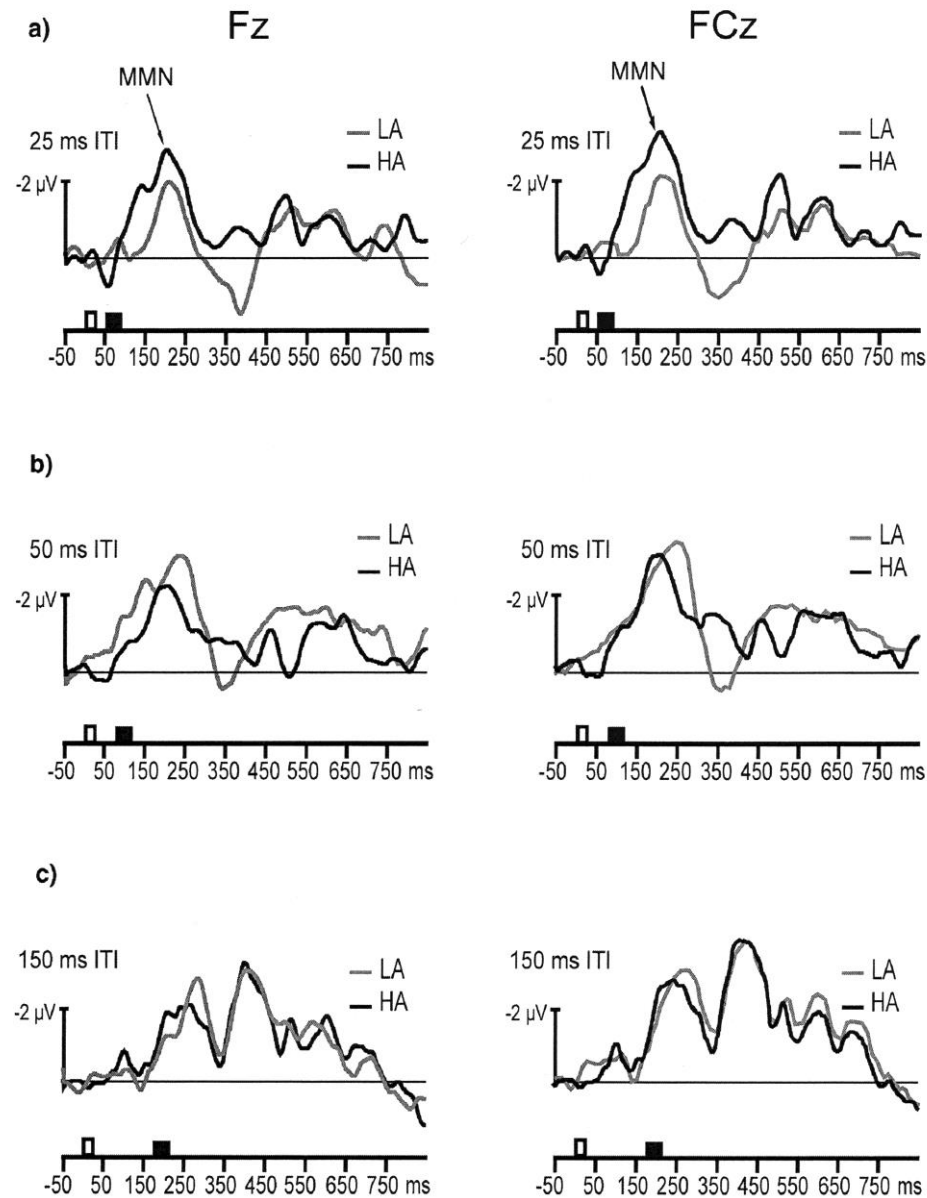


Figure 2. Stimulus-locked difference wave at frontal sites Fz and FCz (deviant minus standard) for higher ability (HA) and lower ability (LA) groups during a passive ignore condition with (a) 25-ms, (b) 50-ms, and (c) 150-ms intertone intervals (ITIs).

COGNITION – MMN RELATIONSHIP: why?

NMDA-receptor dysfunction:

- MMN ↓
- Memory-Trace Formation at all Levels of Memory ↓

MMN is a (non-invasive) Index of NMDA receptor Functioning

Therefore: MMN ↓ central auditory processing ↓
MMN ↓ cognition ↓

Animal Studies: NMDA-receptor ↓ MMN ↓

Monkey (Javitt et al. 1996)

Rat (Tikhonravov et al. 2008)

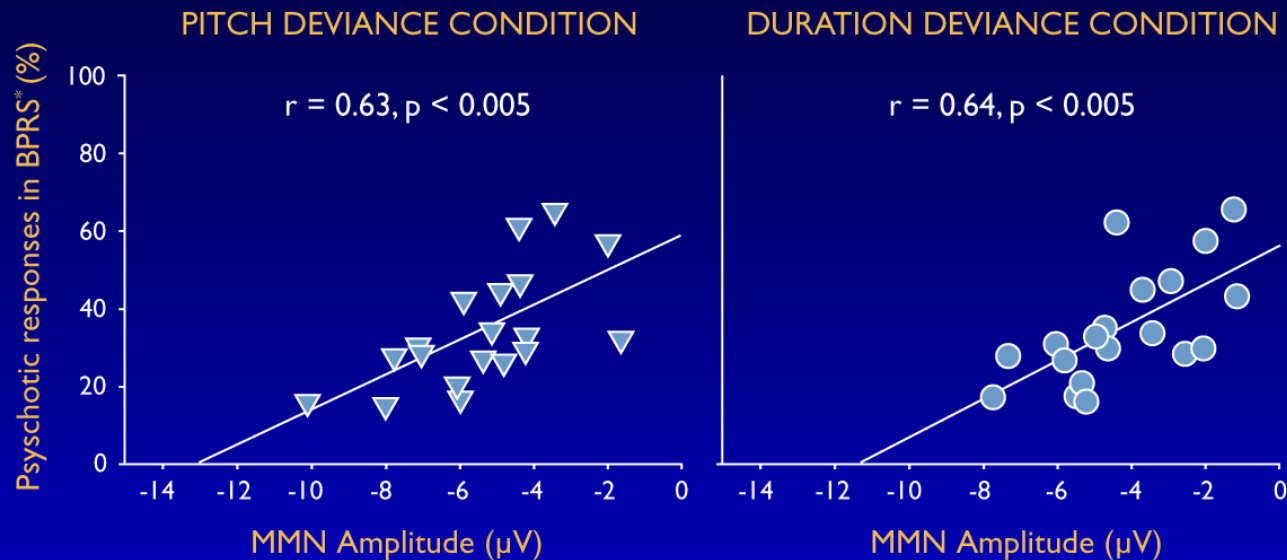
Mouse (Ehrlichman et al. 2008)

Human Studies:

Umbricht et al. (2000, 2002)

Kreitschmann-Andermahr et al. (2001)

MMN as an index of the functional condition of the NMDA-receptor system



*Brief Psychiatric Rating Scale (BPRS)

Umbricht *et al.*, 2001

MMNs elicited by sensory/cognitive violations at different levels of central auditory processing

EXECUTIVE CONTROL			
Representations		Violation → MMN	
<u>Higher-Order Representations</u> →		- Semantic MMN	
<u>Complex Sensory Presentations</u> Abstract Rules →	Parallel →	- Feature-Conjunction MMN → - Speech-Sound MMN →	Rule-Violation MMN
	Sequential →	- Sequential-Rule MMN → - Syntactic MMN → - Phonotactic MMN →	
<u>Simple Sensory Representations</u> →		- Feature MMN	