

# CNV: a neural correlate of stutter frequency and compensation strategies?

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## 1) Background

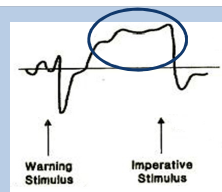
Neural hallmark of developmental stuttering      Neurophysiological substrate of motor programming

Abnormal **articulatory motor preparation**

**Contingent Negative Variation (CNV)**

Slow, negative brain potential occurring just before a movement is executed

Warning: "be ready"  
Imperative: "execute the movement"



Previous research: large interindividual variation: **caused by?**

## 2) Method

### Participant:

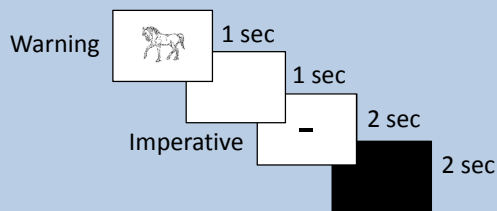
- 28-year-old woman
- Monolingual native speaker of Dutch
- Nearly blank medical history

### Medical report:

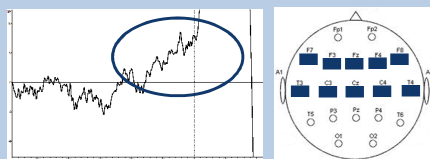
- Recurrent strokes in left superior temporal gyrus over 2,5 months due to arteriovenous malformation (AVM)
- Neurogenic stuttering appeared after the 3<sup>rd</sup> event
- AVM surgically removed after the 5<sup>th</sup> event

**Evaluations:** once pre-surgery and three times post-surgery (1 month, 3 months, 4 months)

### CNV task: picture naming task



Electro-encephalogram:  
mean amplitude of -500 to 0 msec



### Speech evaluation:

- Conversation and reading a text
- Percentage stuttered syllables (% SS)
- Stuttering Severity Instrument (SSI-4, Riley, 2008)

### Language evaluation:

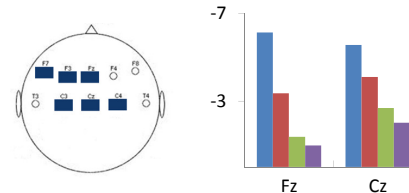
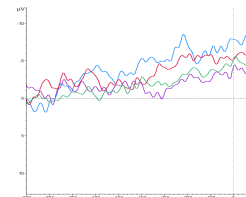
- Speech samples: screened for semantic and phonological paraphasias by 2 SLP's
- Token Test of Aachen Aphasia Test
- Auditory phoneme discrimination and word recognition
  - Neurophysiological evaluation
  - PALPA 1, 2, 5

## 3) Results and discussion

If % SS conversation ↑

CNV amplitude ↓

	% SS		SSI	
	Reading	Conversation	Raw Score	Severity
Pre-surgery	0	0,8	7	No stutt.
1m post-surgery	0,5	1,4	12	Very mild
3m post-surgery	0	7,3	16	Very mild
4m post-surgery	0	2,5	13	Very mild



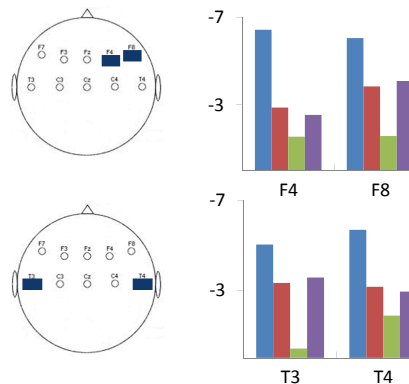
- Correspond to bilateral motor and left inferior frontal gyrus
- Core cortical regions for motor preparation and execution

→ **Stutter frequency is in accordance with the amount of dysfunction in premotor programming**

No stutters during task performance:  
Even without stuttered speech, motor preparation abnormalities are present

Motor preparation abnormalities are either not enough OR surmountable by compensation

### Another activity pattern:



- Correspond to right frontal areas
- Engaged in motor planning and control
- Most frequently reported right-sided overactivation in stuttering
- Related to **compensation strategies** to overcome the *left-sided primary deficit*

- T3: *left sided lesion site*
- T4: contralateral homologue of lesion site

→ **Right sided increase in CNV amplitude at the moment of most severe stuttering may be an attempt to deal with the increase in stutter frequency**