FACULTY OF MEDICINE AND HEALTH SCIENCES

THE EFFECT OF TABLET BASED LOGOPEDIC THERAPY IN PATIENTS WITH STROKE-RELATED APHASIA

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Background

A left hemispheric stroke leads to aphasia in more than one third of stroke survivors. In about 30–43% of these individuals aphasia remains chronic[1]. However, speech-language therapy (SLT) can contribute to significant language recovery[2].

BUT

COVID-19? | Mobility? | Access to SLT?

⇨ Online therapy in addition to traditional SLT

✓ Continued therapy in the chronic phase
✓ Language stimulation at home/ at a distance
✓ Increased autonomy

The effectiveness of therapy can be evaluated with:

✓ Standardized language batteries: e.g. CAT-NL, PALPA
✓ Event-related potentials (ERPs): e.g. Mismatch Negativity (MMN)
  ✓ Pre-attentive discrimination of phonemes[3]

Research questions

- Does therapy-related recovery occur in patients with chronic aphasia after online SLT, as measured by behavioral language tests and by the ERP technique (MMN)?
- If yes, are there measurable differences between aphasic patients who received traditional and online SLT, patients who received traditional SLT and computer stimulation (e.g. cognitive games), and aphasic patients who received traditional SLT only?

Method

Literature review

Databases: Pubmed, Web of Science & Embase

⇩

25 studies included

⇩

In all studies, language recovery was evaluated with classic language tests
In none of the studies ERPs were used

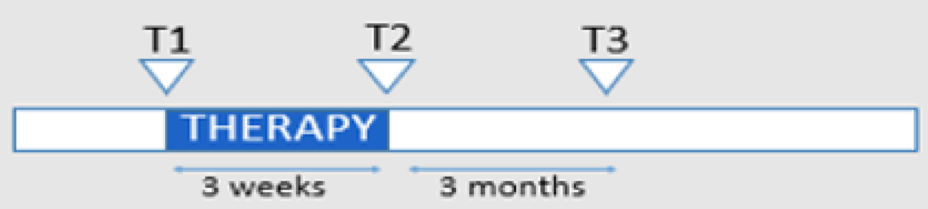
Experiment (RCT[4])

Participants

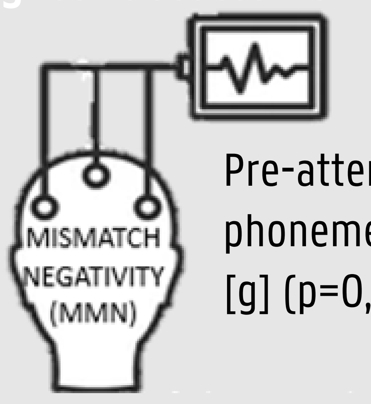
- Speech Therapy App (STAPP[5]) + Traditional SLT (n=3)
- Cognitive stimulation + Traditional SLT (n=4) Control group 1 (CG1)
- Traditional SLT (n=3) Control group 2 (CG2)

STAPP[5]: cognitive linguistic therapy focusing on the modules of Ellis & Young

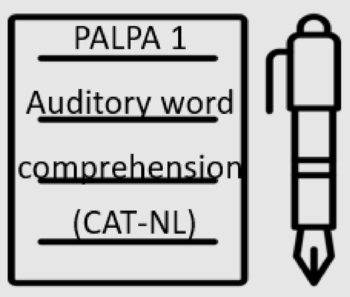
Intervention



Diagnostic assessment



Pre-attentive discrimination of standard phoneme [b] (p=0,80) and deviant phoneme [g] (p=0,20), while watching a silent movie.



Phonological skills

Conclusion

Literature review

The results of **classic language tests** showed that online SLT, either as stand-alone therapy or as computer-assisted therapy, could be effective in patients with chronic aphasia after stroke.

Experiment

Online SLT could be effective in addition to traditional SLT, as measured with **event-related potentials** (MMN). A higher (more negative) mean amplitude was identified across the three groups. Over the entire period (T1-T3), the STAPP group showed the greatest increase in amplitude, as compared to the other groups.

Results

Literature review

✓ Online SLT significantly improves the results on classic test batteries targeting various language aspects (24/25, 96%) .
✓ This progress was maintained for at least two weeks to six months after completion of the online therapy (16/25, 64%).
✓ Online therapy appears to be equally effective as traditional therapy (5/5, 100%).

Experiment

Repeated Measures ANOVA/Friedman Test:

✓ MMN: no significant changes in amplitude and latency were found after therapy compared to before therapy.
✓ Language tests: no significant changes were found after therapy compared to before therapy.

Cohen's d:

ACROSS GROUPS

✓ MMN amplitude (100-500ms)
  - T1-T2; T2-T3: small positive effect (d = -0.356; -0.233)
  - T1-T3: medium positive effect (d = -0.711)
✓ MMN latency
  - T1-T2; T1-T3: small positive effect (d = 0.253; 0.301)
  - T2-T3: very small positive effect (d = 0.056)
✓ PALPA 1 place of articulation
  - T1-T2; T1-T3: very small negative effect (d = -0.145)
✓ CAT-NL auditory word comprehension
  - T1-T2; T1-T3: small positive effect (d = 0.353; 0.450)
  - T2-T3: very small positive effect (d = 0.035)

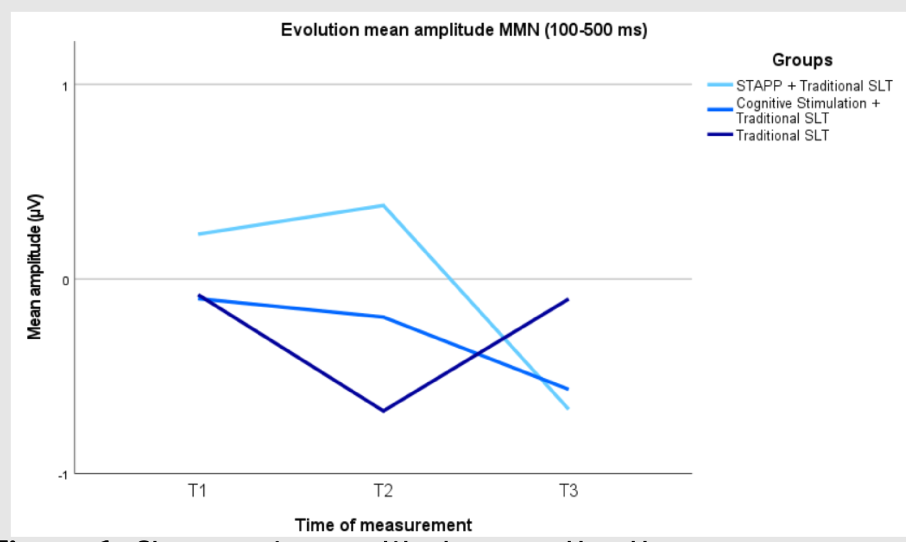


Figure 1: Changes in amplitude over the three measurement times. A higher (more negative) amplitude corresponds to more neuronal allocation.

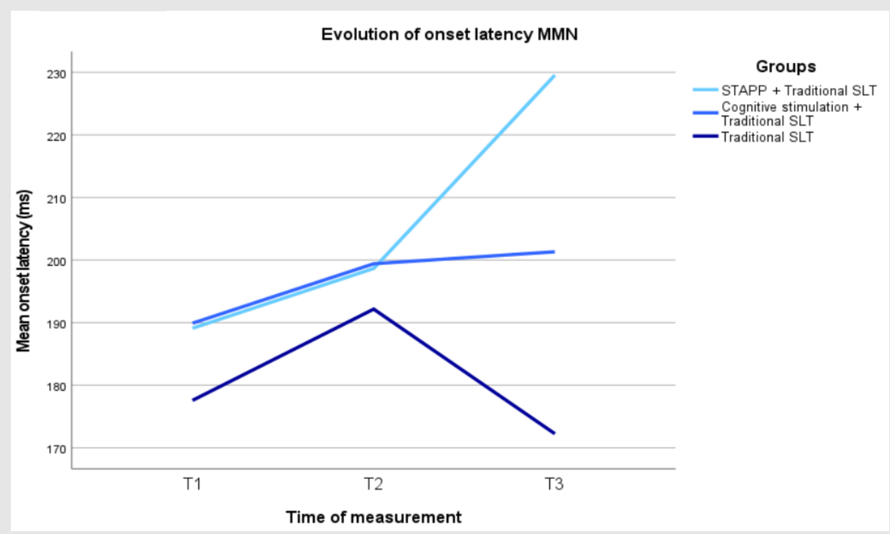


Figure 2: Changes in onset latency over the three measurement times. A higher onset latency corresponds to a slower processing speed.

BETWEEN GROUPS

✓ MMN amplitude (100-500ms)
  - T1-T2:
    - STAPP < CG1 (d = 0.173)
    - STAPP < CG2 (d = 1.359)
    - CG1 < CG2 (d = 1.158)
  - T1-T3; T2-T3:
    - STAPP > CG1 (d = -0.797;-0.508)
    - STAPP > CG2 (d = -0.980;-2.160)
    - CG1 > CG2 (d = -1.471; -2.147)
✓ MMN latency
  - T1-T2; T2-T3; T1-T3:
    - STAPP < CG1 (d = 0.230; 2.703; 0.356)
    - STAPP < CG2 (d = 0.411; 1.675; 1.322)
    - CG1 < CG2 (d = 0.190; 2.169; 0.655)
✓ PALPA 1 (place of articulation)
  - T1-T2; T1-T3:
    - STAPP < CG1 (d = -1.166; 0.087)
    - STAPP < CG2 (d = -1.166; -1.166)
    - CG1 = CG2 (d = 0)
  - T2-T3
    - STAPP > CG1 (d = 0.866)
    - STAPP < CG2 (d = -0.867)
    - CG1 = CG2 (d = 0)
✓ CAT-NL (auditory word comprehension)
  - T1-T2:
    - STAPP < CG1 (d = -1.161)
    - STAPP < CG2 (d = -1.500)
    - CG2 < CG1 (d = 1.500)
  - T1-T3; T2-T3:
    - STAPP > CG1 (d = 0.204; 0.693)
    - STAPP < CG2 (d = -2.002; -0.904)
    - CG2 > CG1 (d = -2.350; -2.324)

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