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Introduction

Aphasia is a language disorder that often occurs after stroke, when language areas of the brain are affected. Aphasia is also accompanied by short-term memory (STM) difficulties, which can exacerbate the symptoms of aphasia (e.g., ability to produce words). Figure 1 shows the close relationship between language and STM in the brain.

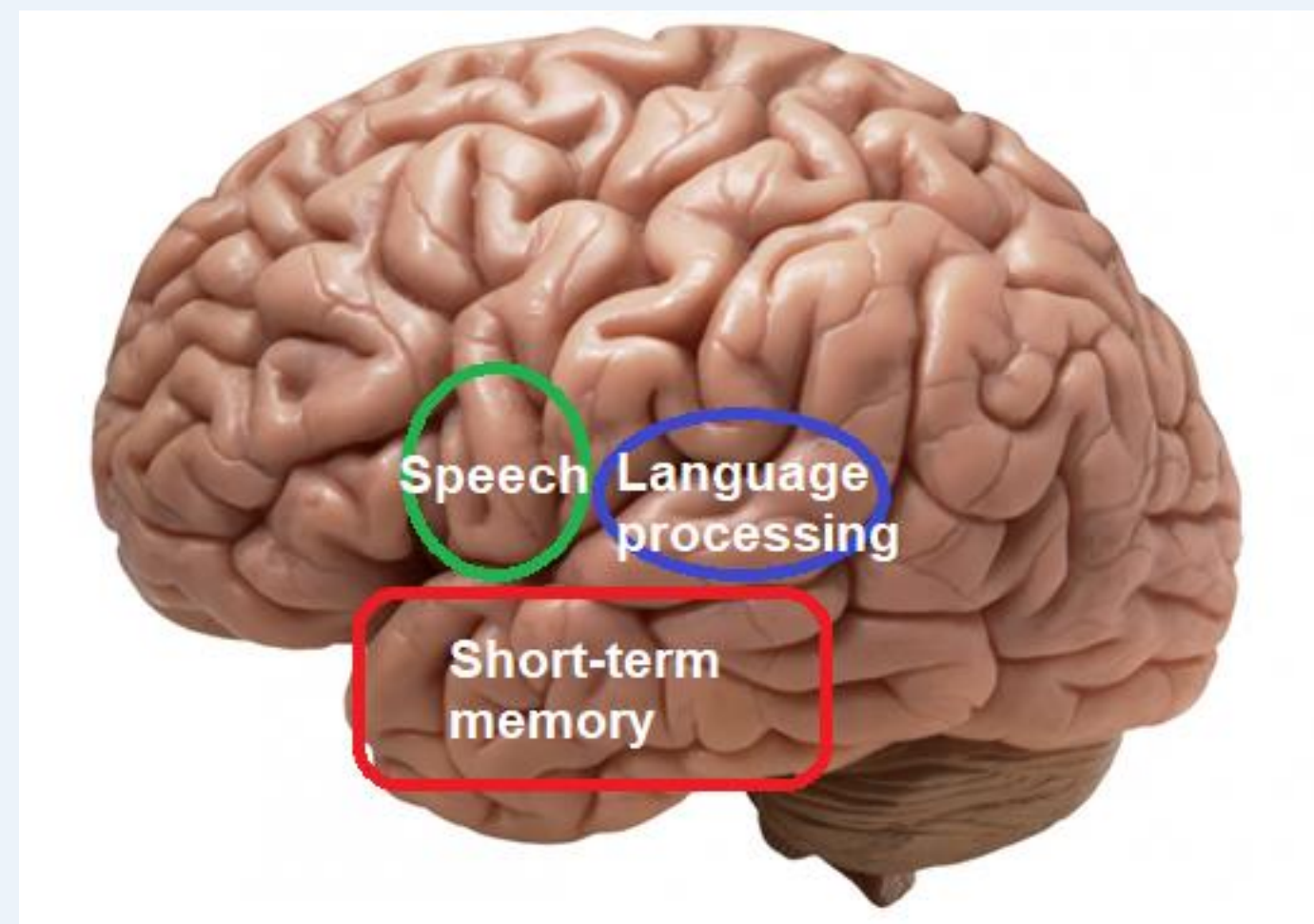


Figure 1. Schematic representation of language and STM areas in a healthy brain

In terms of recovery from stroke and aphasia, complete recovery may not always be possible and this often becomes obvious as a reduction in the speed of processing language ability [1, 2]. For example, word production may be slow, yet accurate. Additionally, people who have recovered from aphasia, continue to have subtle difficulties with language and STM [2, 3]. In this project, we explore for the first time the potential of speech-timing measures (that is, duration of spoken utterances) to achieve the following aims.

Aims

- To investigate whether novel speech-timing measures can identify subtle differences in people who have recovered from aphasia after stroke.
- To broaden theoretical and clinical knowledge of the possible presence of subtle language and STM differences in people who have recovered from aphasia after stroke.

Method

Participants: A group of 33 people with aphasia and 27 people who made a full recovery from aphasia (“recovered”) from the Aphasia Bank [4] were included.

Analyses: The speech material was from a word repetition STM test (exemplified in Figure 2). Speech-timing measures were elicited with PRAAT software, using a semi-automated function that identified boundaries and timings of speech and silent segments (i.e., pauses) (Figure 3). Boundaries were manually adjusted to maximise precision.

The measures were:

- Preparation time:** Time from end of stimulus to onset of spoken repetition
- Pronunciation time:** Time of all words added together (including pauses)
- Speech time:** Time of all words added together (excluding pauses)
- Word length:** Individual word durations
- Pause time:** Sum of all pause durations
- Total response time:** Total time of all measures

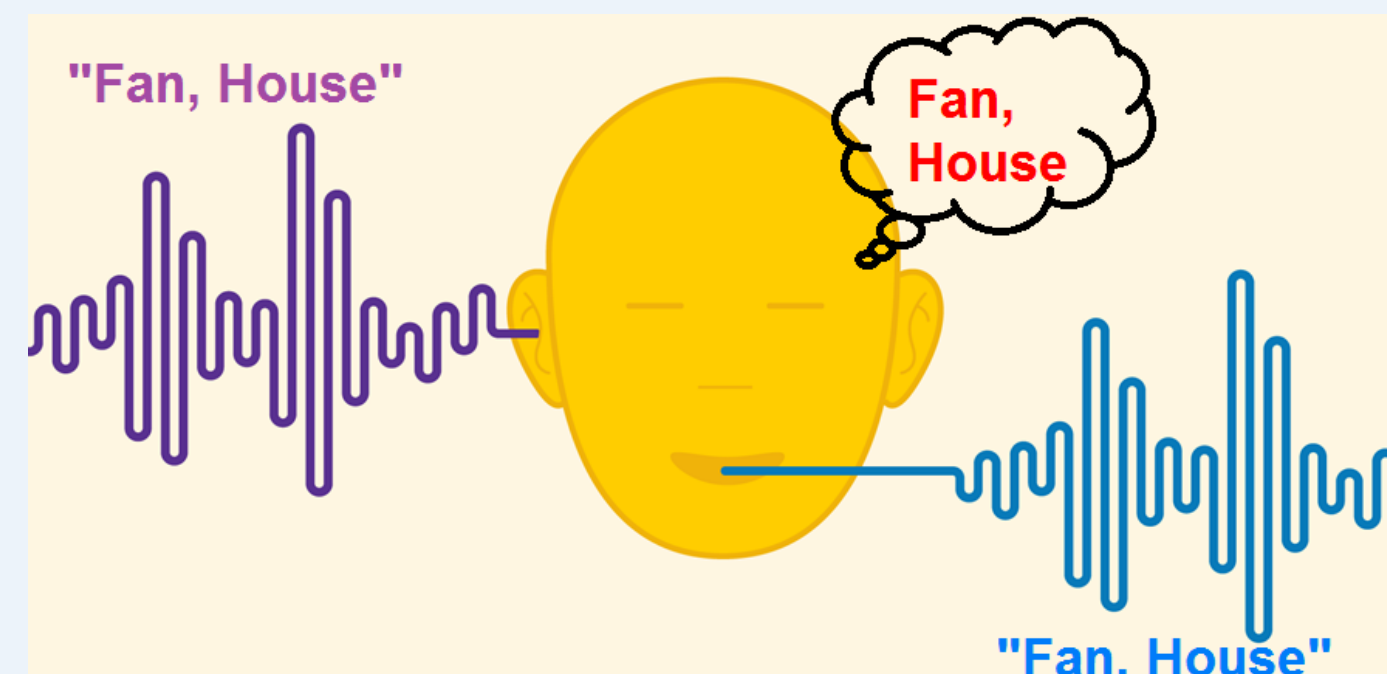


Figure 2. STM word repetition task

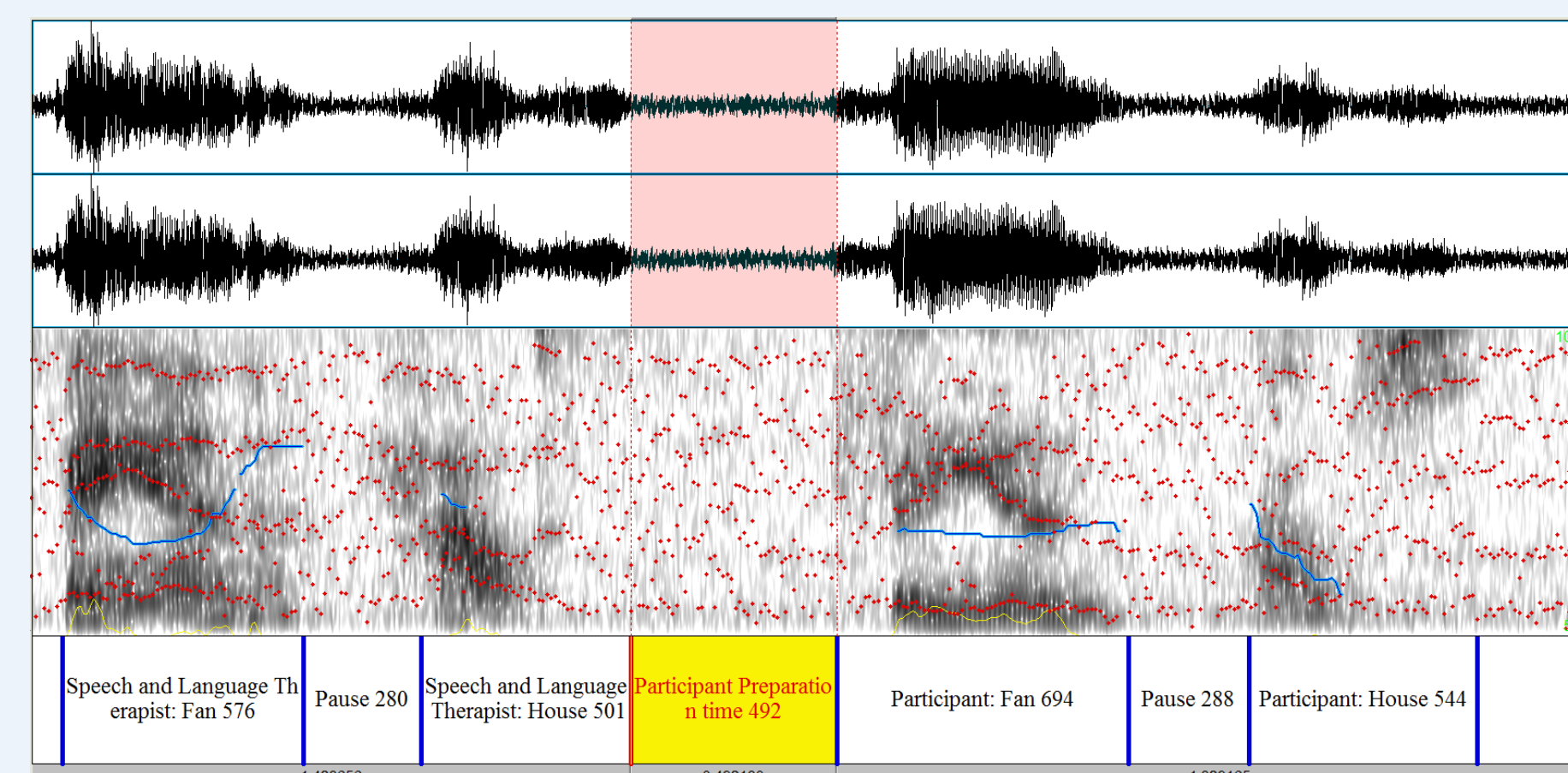


Figure 3. Recording of speech-timing measures using PRAAT

Results & Discussion

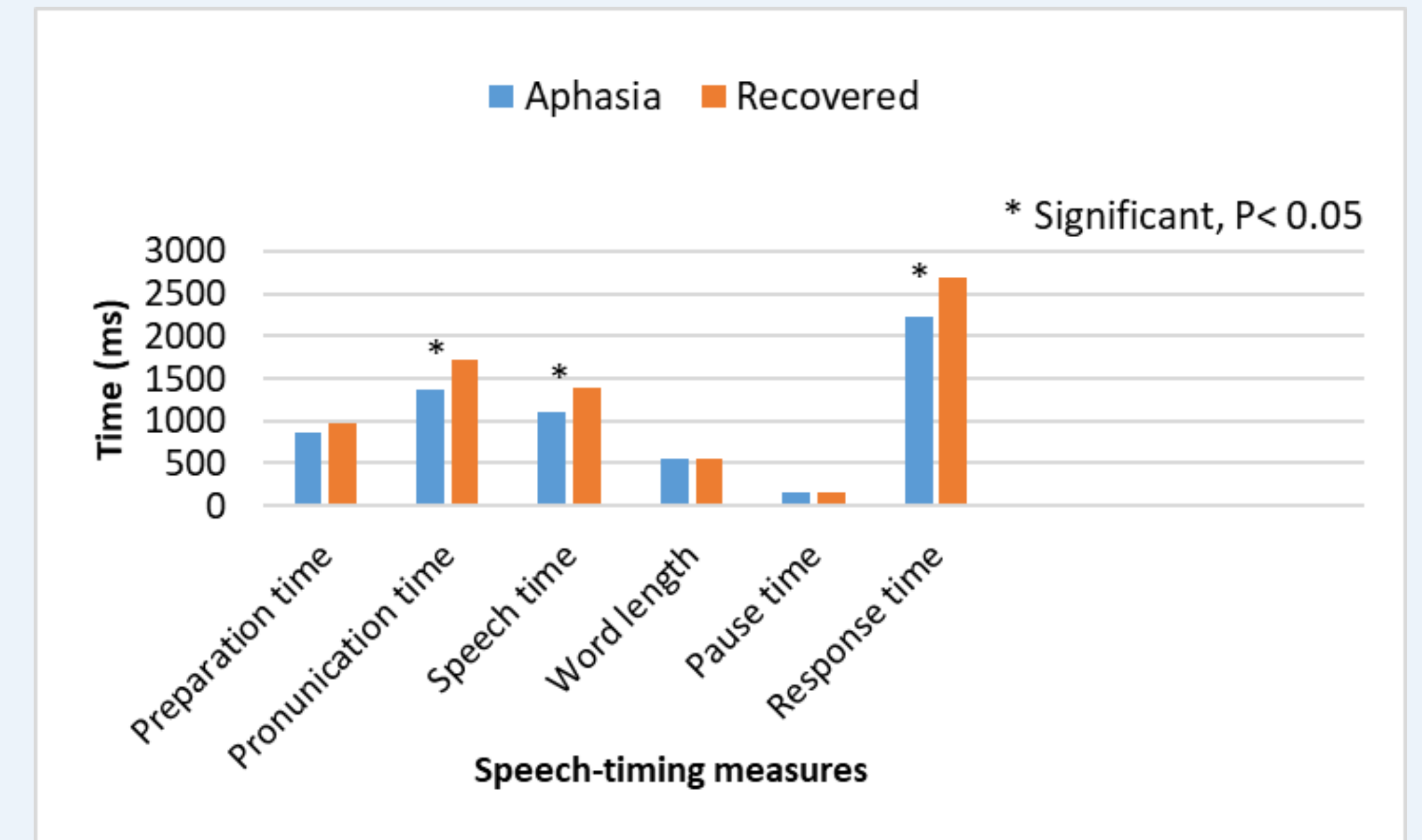


Figure 4. Mean durations and comparisons between the two groups

Compared to the aphasia group, the “recovered” group had significantly longer times (i.e., slower) in the following three of the six measures:

- Pronunciation time
- Speech time
- Response time

This is a novel finding which corroborates similar issues identified in studies that used other processing speed measures [1, 2, 3]. STM difficulties may be manifested as slower processing speed which persists after recovery from aphasia. In future studies, a larger sample and inclusion of healthy participants could confirm our novel findings.

Conclusion

Speech-timing measures have the promising potential to identify subtle characteristics of cognitive functioning in people who have made a full recovery from aphasia after stroke. This avenue of research has clinical and theoretical implications, yet to be realised.

Acknowledgements

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References

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