More Haste, Less Speed? Speed Listening and Attention

Amy Zhang
PNB3EE3 Perception Lab, Department of Psychology, Neuroscience and Behaviours, McMaster University

Background

- **Attention** is a limited resource, and it impacts how well we can process and retain information
- **Cognitive load** is the amount of mental effort required by a task
- *Fast rate* and *high complexity* of incoming information increase cognitive load and strains attention
- **Speed listening** increases cognitive load, which is taxing on attention
- Previous studies found *no difference* in learning outcome for up to 2.0x speed
- But these studies don't control for test duration and don't directly measure attention over longer time

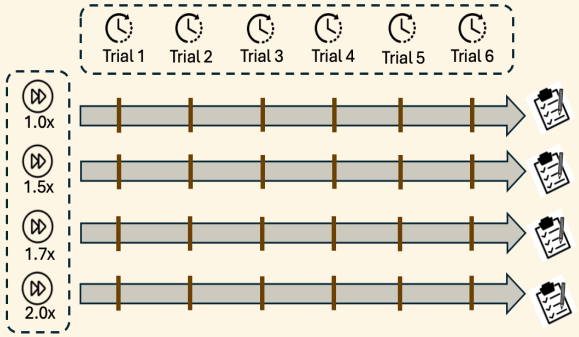
Research Objective

How does listeners' attention change under different listening speeds over longer periods of time?

Hypotheses

1. Attention should generally ***decrease*** over time ***regardless*** of audio speed
2. This attention decline should be ***more pronounced*** in the conditions with ***higher*** speeds
3. There is ***no predicted direction*** of the differences in attention level across speed level conditions
4. *Exploratory*: relationship between attention and subjective listening experience

Method



Each participant will (total n=92):

- be randomly assigned to 1 of 4 conditions (1.0x, 1.5x, 1.7x, 2.0x).
- listen to a 25-minute AI-generated audio clip
- complete 6 multiple-choice trials based on material from the one-minute prior to the question trial*
- complete a survey about speed listening experience

*Attention measured by *Inverse Efficiency Score* (IES)

$$= \frac{mean\ reaction\ time}{mean\ accuracy}$$

Results

A mixed design ANOVA found:

- Significant main effect of conditions ($F(3, 88)=137.72$, $p<.001$, $\eta^2 = 0.81$)
- Significant main effect of trials ($F(5, 440)=4.22$, $p=.001$, $\eta^2 = 0.04$)
- No significant interaction

Post hoc tests found:

- Significance between all condition pairs ($p<0.05$)
- Significance between trial 2&4 ($p<0.01$) and 2&6 ($p<0.05$)
  - no correlation between self-reported attention level and IES ($r = -0.129$, $p = 0.220$)

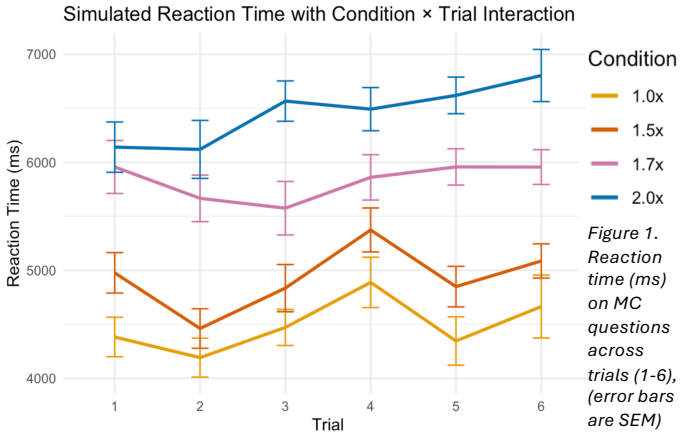


Figure 1. Reaction time (ms) on MC questions across trials (1-6), (error bars are SEM)

Discussion & Limitation

- Attention decreased with longer time and higher speed level (may not be linear) (H1, H3)
- No significant interaction between speed level and time, though pattern is visually different (H2)
- People's self-perceived level of attention is not a good indicator of their attention measured by IES (H4)

- Both independent variables are categorical, future study can use continues measure to find an optimal listening speed and attention duration for individual
- Used only auditory stimuli, future studies can incorporate audio-visual to increase ecological validity

Reference