Development of novel word acquisition paradigm for non-invasive brain stimulation studies

Anna A. Zhuravleva
Ekaterina A. Stupina
Svetlana A. Malyutina, Ph.D.

Center for Language and Brain, National Research University Higher School of Economics

Non-invasive brain stimulation & Language processing

- Can non-invasive brain stimulation modulate language processing in healthy individuals?

- Task performance often **at ceiling** -> insensitive to any stimulation effects

- **Need for challenging language tasks** that would be sensitive to stimulation effects

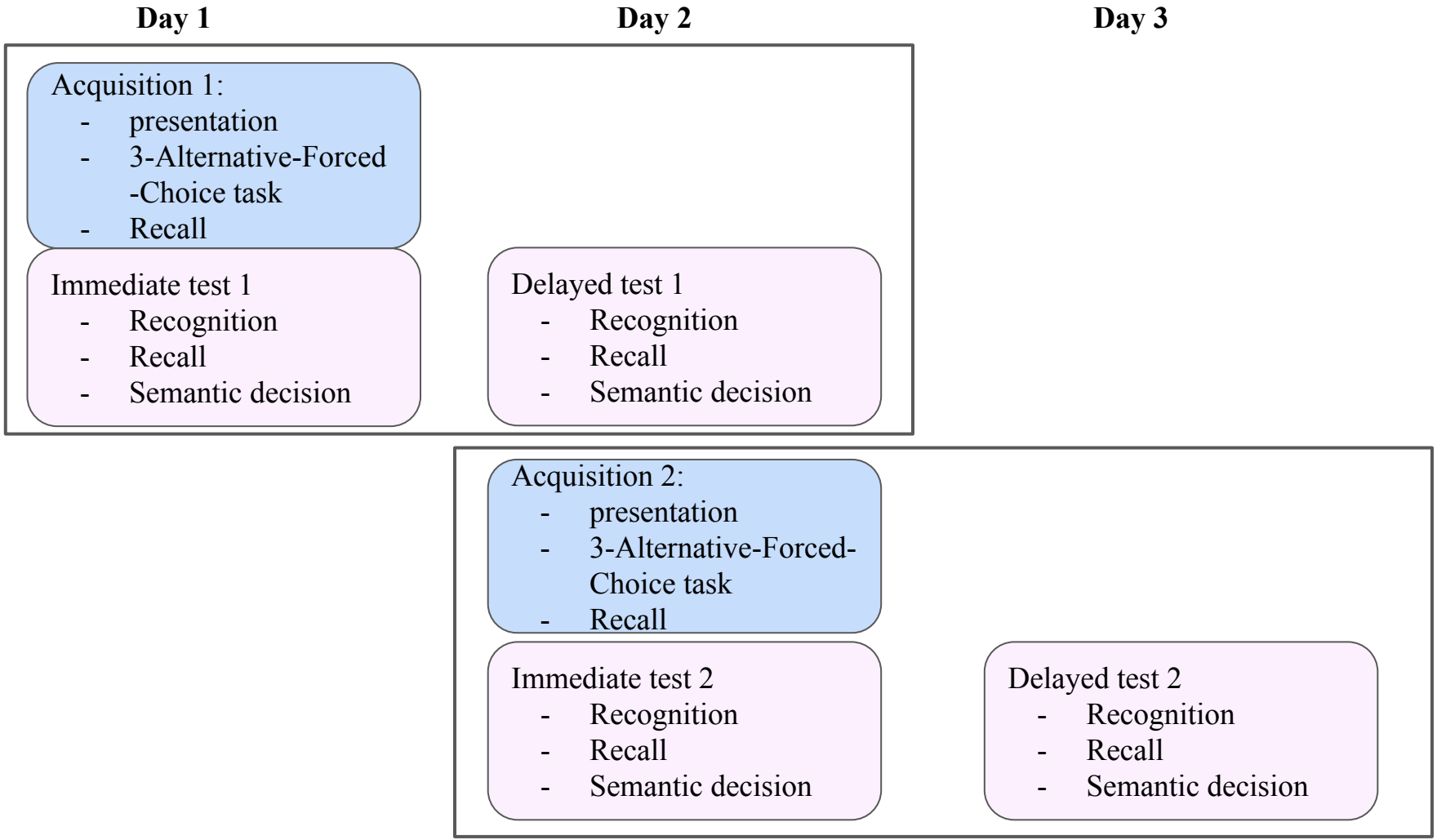
Methods and materials

Stimuli:

- 80 pseudowords (Stupina & Chrabaszcz, 2020)
- 80 L1 stimuli (Akinina et al., 2014)
- Stimuli: link

Pseudowords examples:
aderu
bokente
enkadu
favatu
kampibu
mugalu
pentave
takuru

L1 stimuli examples:
самолет ('airplane')
шприц ('syringe')
одуванчик ('dandelion')
свисток ('whistle')
наперсток ('thimble')
аквариум ('aquarium')
колбаса ('sausage')
стрела ('arrow')


Day 1
Day 2
Day 3
Acquisition 1:
- presentation
- 3-Alternative-Forced -Choice task
- Recall
Immediate test 1
- Recognition
- Recall
- Semantic decision
Delayed test 1
- Recognition
- Recall
- Semantic decision
Acquisition 2:
- presentation
- 3-Alternative-Forced-Choice task
- Recall
Immediate test 2
- Recognition
- Recall
- Semantic decision
Delayed test 2
- Recognition
- Recall
- Semantic decision

Online validation

- Participants acquired novel word forms **enough to recognize** them, but still were **unable to reproduce** them properly
- Overall participants' performance **improved in the delayed testing** phase: novel words have become partially consolidated
- Participants performed well in most of the tasks, and still their performance was not at ceiling and could be potentially improved

Discussion

- The current paradigm **matches an optimal difficulty level** of the planned experiment and **can be adapted for other studies** on novel word acquisition