

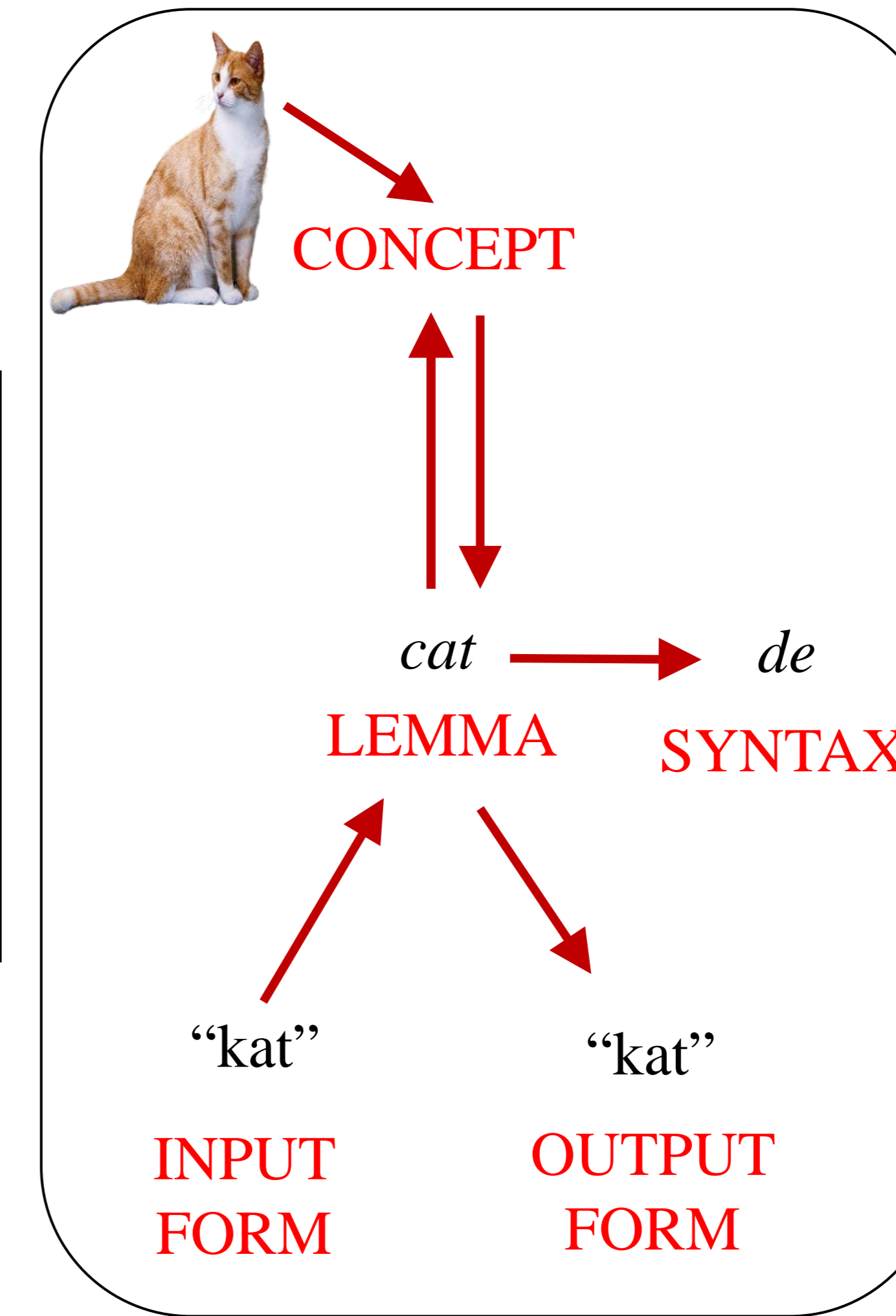
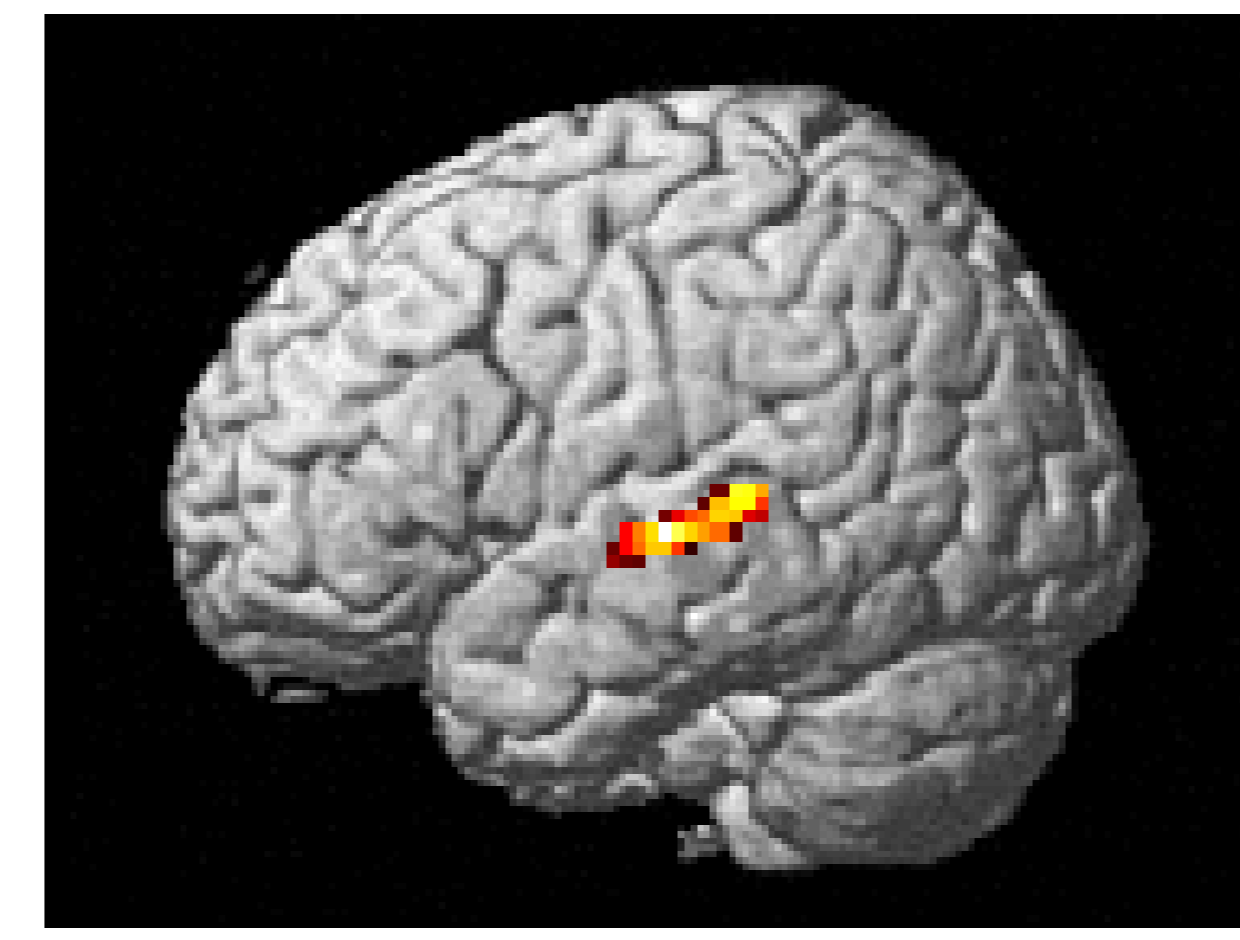
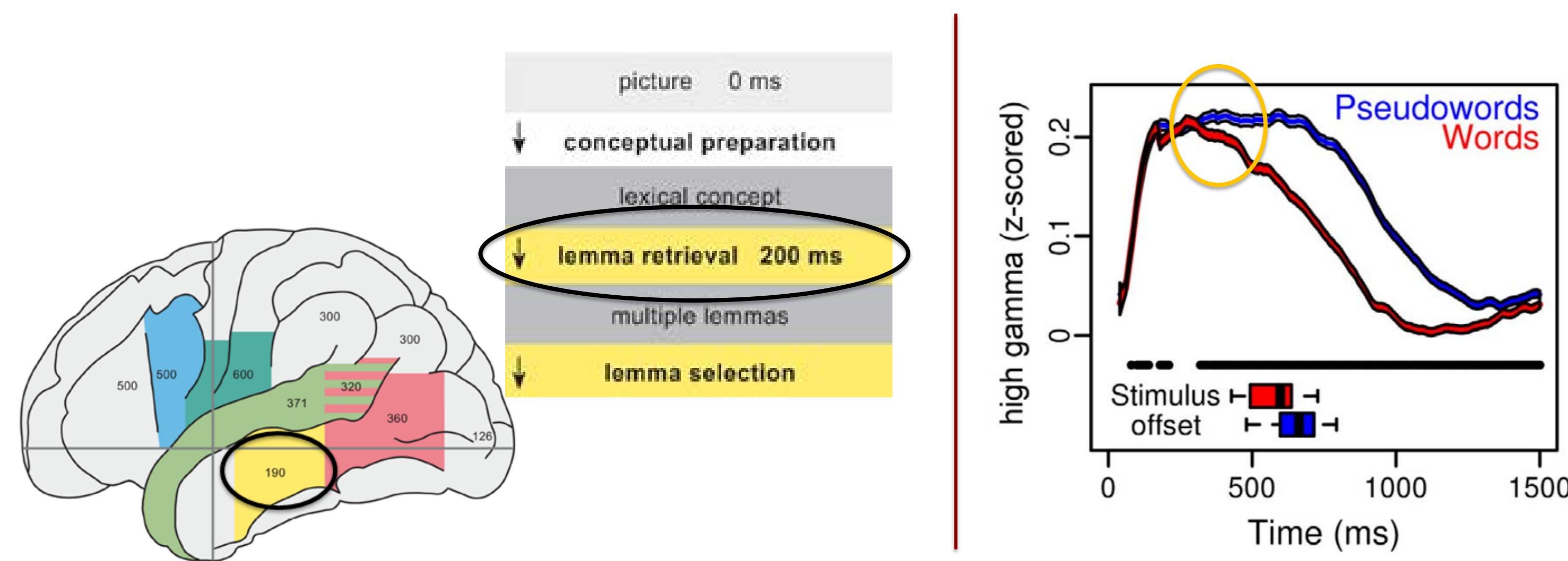
A TMS investigation of left middle-MTG involvement in lemma access in speech production and comprehension

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INTRODUCTION

- Lemma representations relay among conceptual, phonological, & syntactic representations of a word in both speaking and listening [1]
- Evidence of lemma processing in mid portion of the middle temporal gyrus (mMTG) from meta-analyses, simulations, patient and healthy data for [2,3,4,5,6]
- However, the existence of lemmas are a point of debate [7,8]
- Recent evidence for shared lemma representations in mMTG both production and comprehension [9]
- Lemma access in production estimated around 200ms post-stimulus onset [2,3]
- Lemma access in comprehension estimated around 320 post stimulus onset [2,11]



- In the current study we utilize TMS to probe the site found in Garg et al. (in prep) [9] at different time points during word production and word comprehension to interfere with lemma access

PLANNED ANALYSIS

Hypothesis:

- If lemmas are in left mMTG, TMS stimulation of the region should impact reaction times (RT) in naming (production) and classification (comprehension)
- Response times should differ due to cortical stimulation across time windows in real (experimental trials) BUT not in pseudo (control trials)

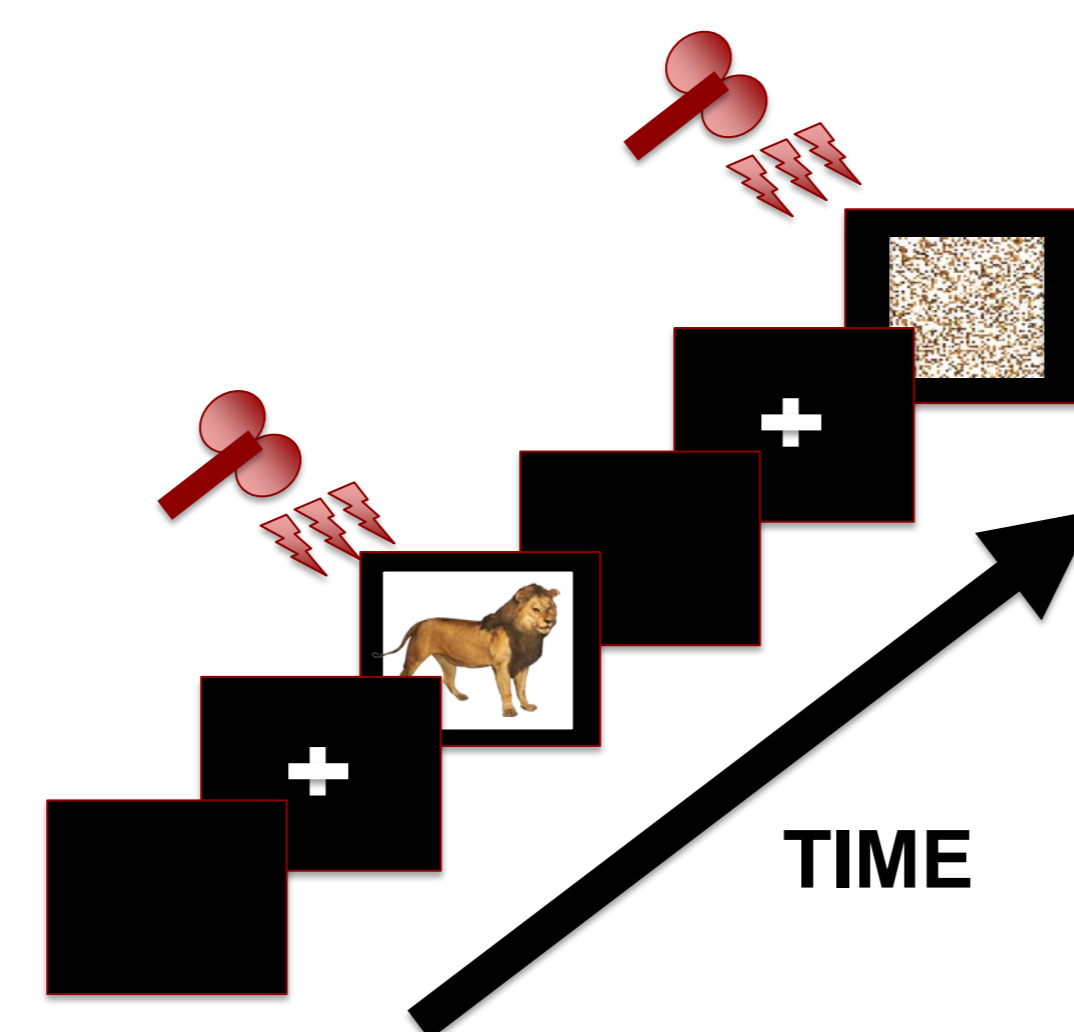
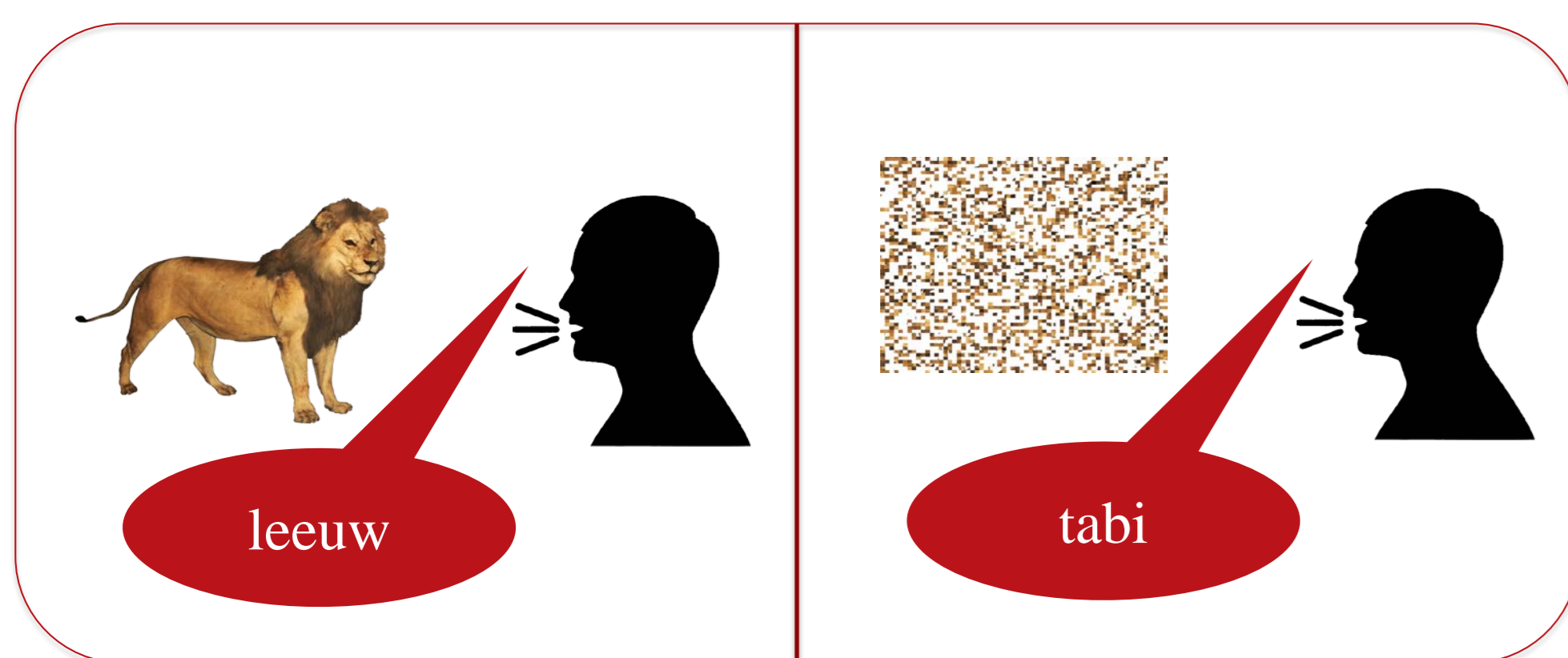
Analysis Details:

- Data analyzed using mixed effects models (MEM) in R
- Production and comprehension tasks analyzed separately
- Fixed factors: Condition (real or pseudo) & Time Window (3 levels)
- Random factors: Participants & Stimuli
- TMS-specific discomfort ratings collected and used as covariate

RT ~ Condition (real or pseudo)
* **Time Window (3 levels)**
* **TMS Ratings (covariate)**
+ (1|participants)
+ (1|items)

METHODS & DESIGN

Bare Picture Naming (Production)



Stimulation:

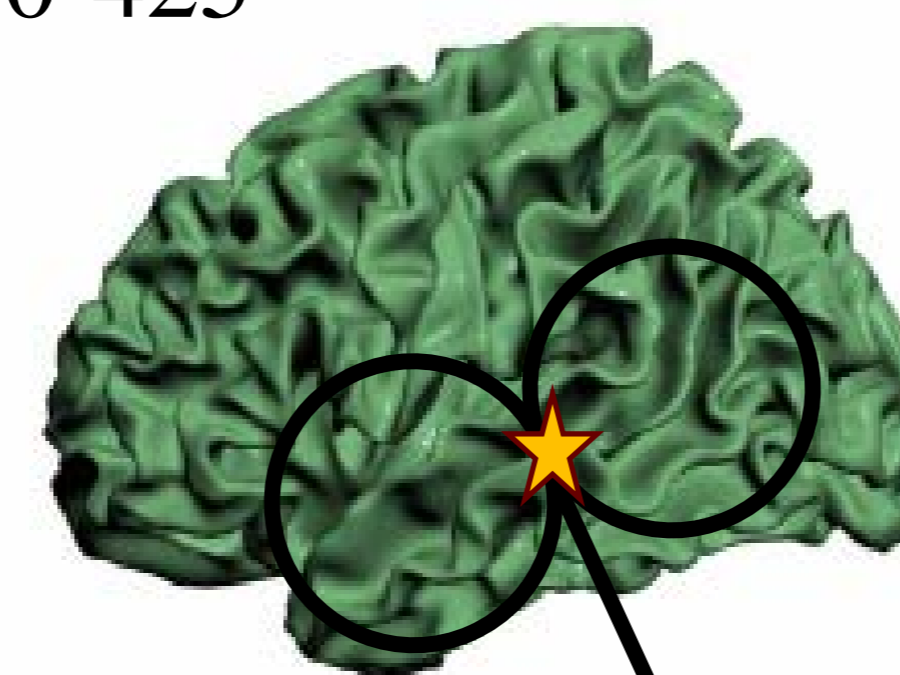
100-120% MT; 40Hz
Time windows:
225-250-275
300-325-350
375-400-425

Stimuli: 90 real words/pictures per task (experimental trials) + 90 scrambled words/pictures per task (control trials)

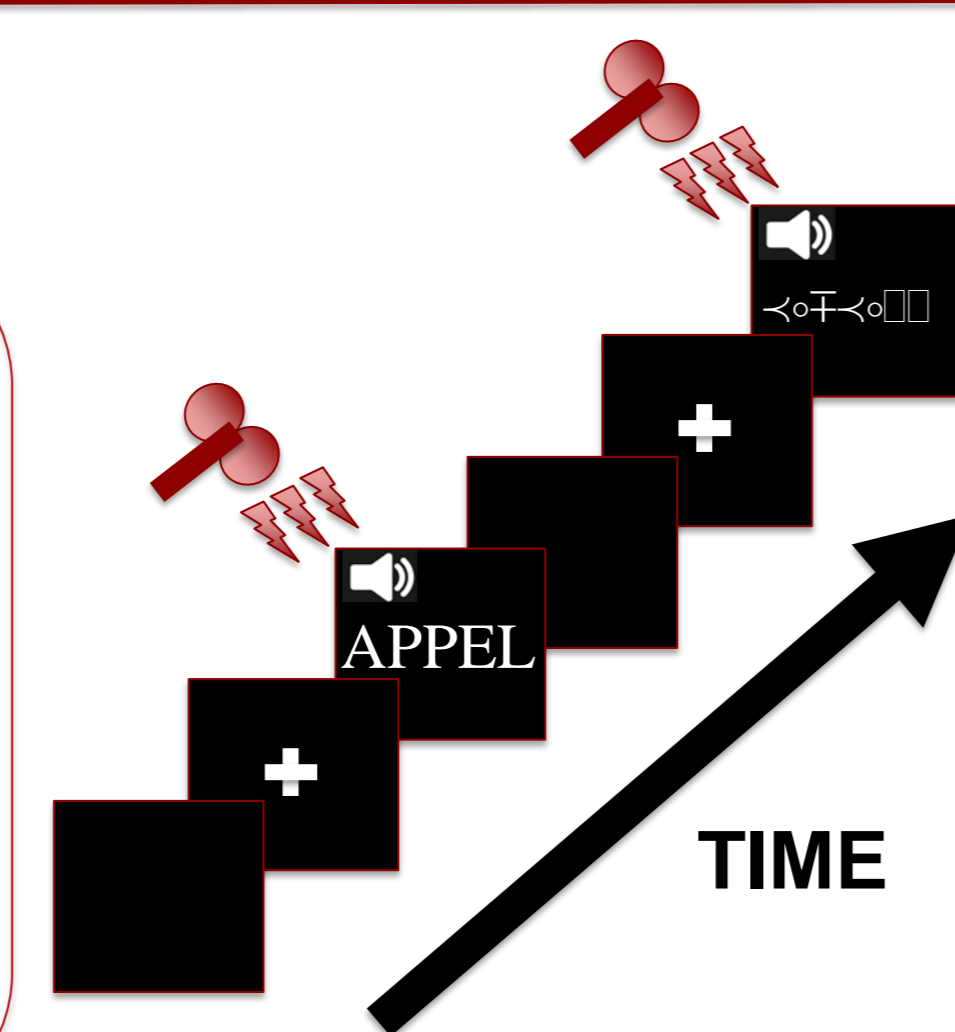
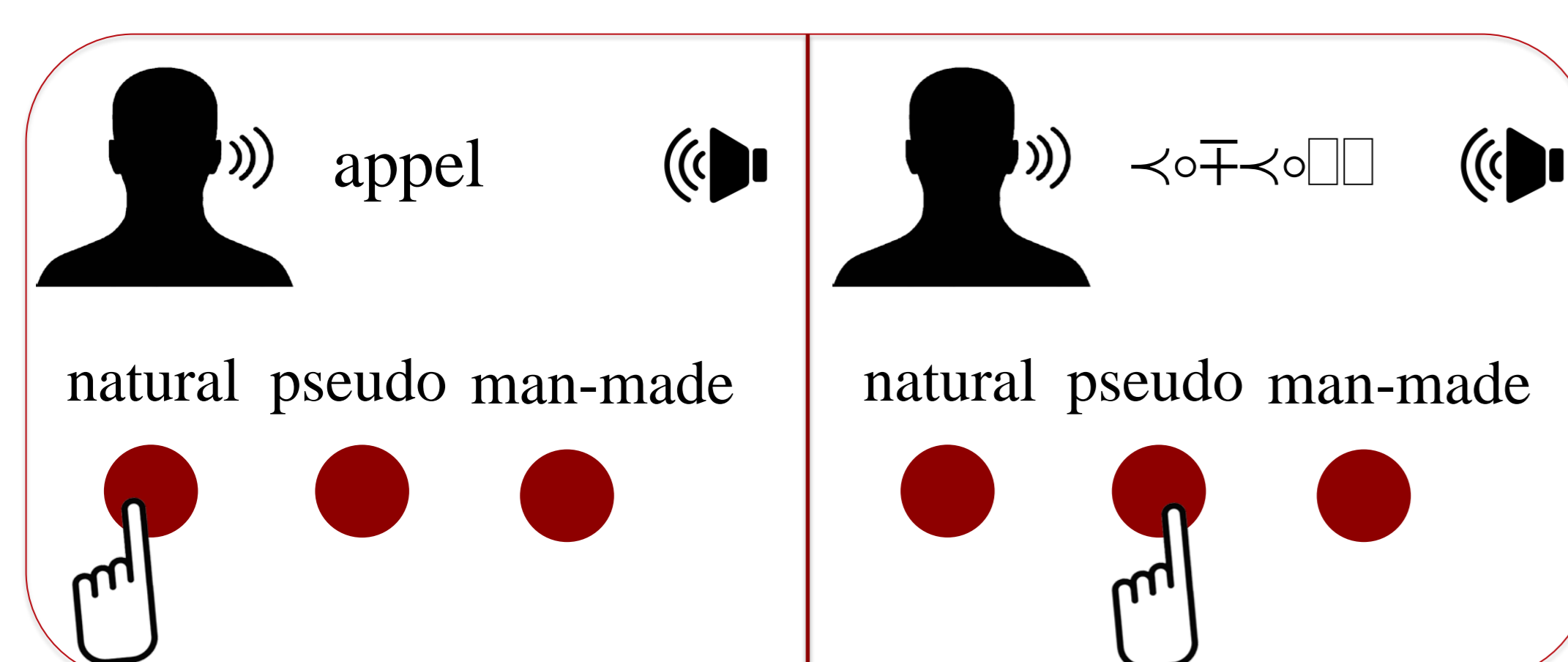
Participants: 28 native Dutch speakers

TMS:

- Magpro-X-100 magnetic stimulator & C-B60 coil (MagVenture)
- Online chronometric triple pulse TMS
- 3 post-stimulus stimulation time-windows
- Stimulation of left mMTG - coordinates from Garg et al. (in prep)[9]



Semantic Classification (Comprehension)



Stimulation:

100-120% MT; 20Hz
Time windows:
200-250-300
325-375-425
450-500-550

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