Motor priming by action-related verbs

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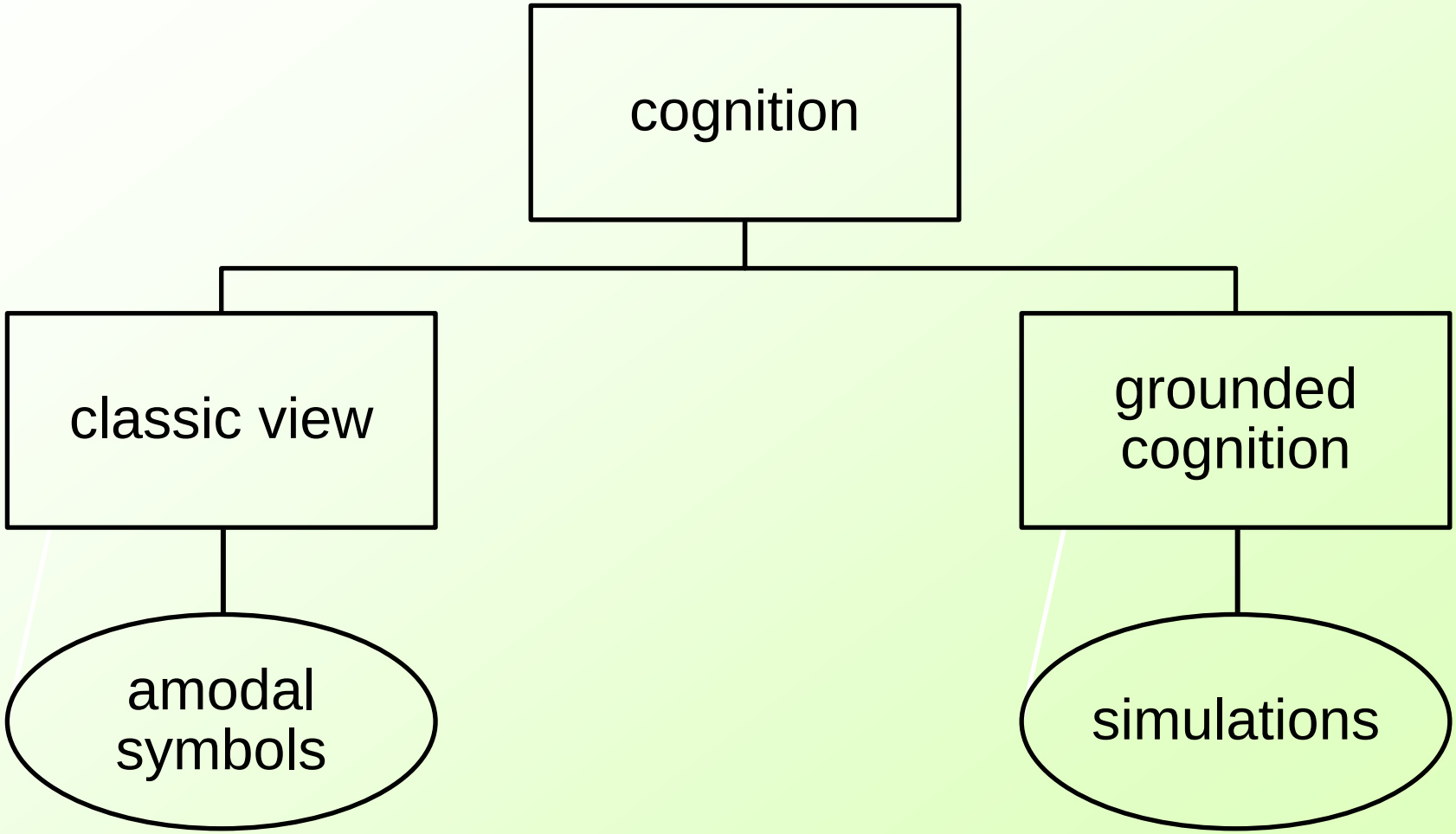
Introduction



Introduction – short summary

- location of activation
  - motor areas
- activation crucial?
  - possible; seems to be crucial
- time course?
  - about 170-200 ms after word onset

Introduction - relevant research

- focus on reaction time
- semantic processing seems important (Sato et al., 2008; Mirabella et al., 2012)
- different findings
  - interference effect (Boulenger et al., 2008)
  - facilitation effect (Scorolli & Borghi, 2007)

Introduction – relevant research

- timing: 400 ms
- task
  - no reaction to the prime verb
  - hand and foot reactions in one task required
- modulation of
  - imageability (Imgbl.)
  - movement energy (MovEn.)

Introduction - design/hypotheses

- motor priming paradigm applied

- hypotheses

main effect response	hand reactions faster than foot reactions
main effect imageability	high level elicits faster reactions
main effect movement energy	high level elicits faster reactions
interaction verb*response	***interference/facilitation***

Methods - participants

- 21 healthy subjects (10 male, mean age = 21.3, SD = 1.2)
  - monolingual German native speakers
  - right-handedness and right-footedness confirmed

Methods - verbs

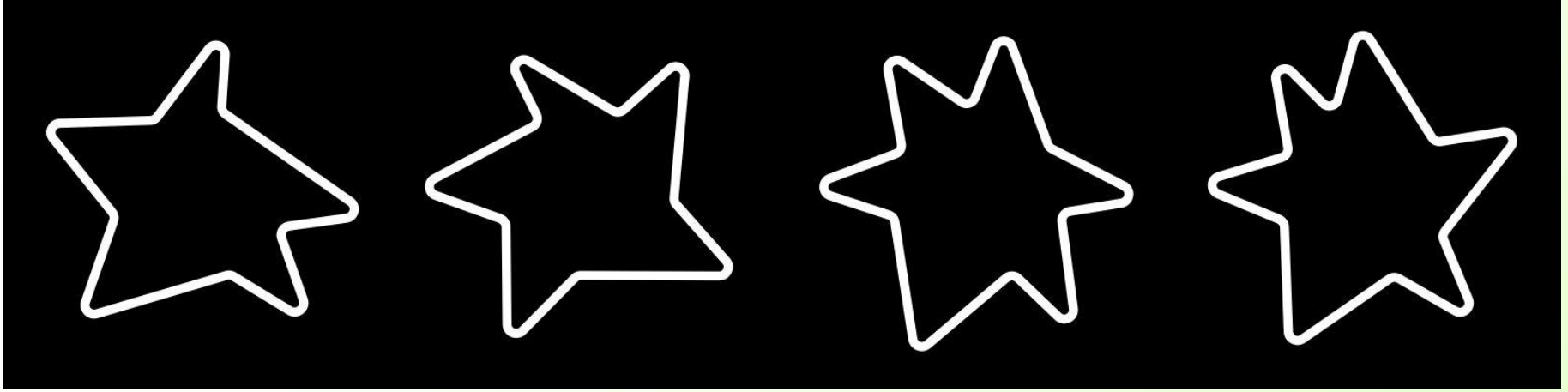
- stimulus set: 96 action verbs (48 hand verbs + 48 foot verbs) + 12 non-body verbs

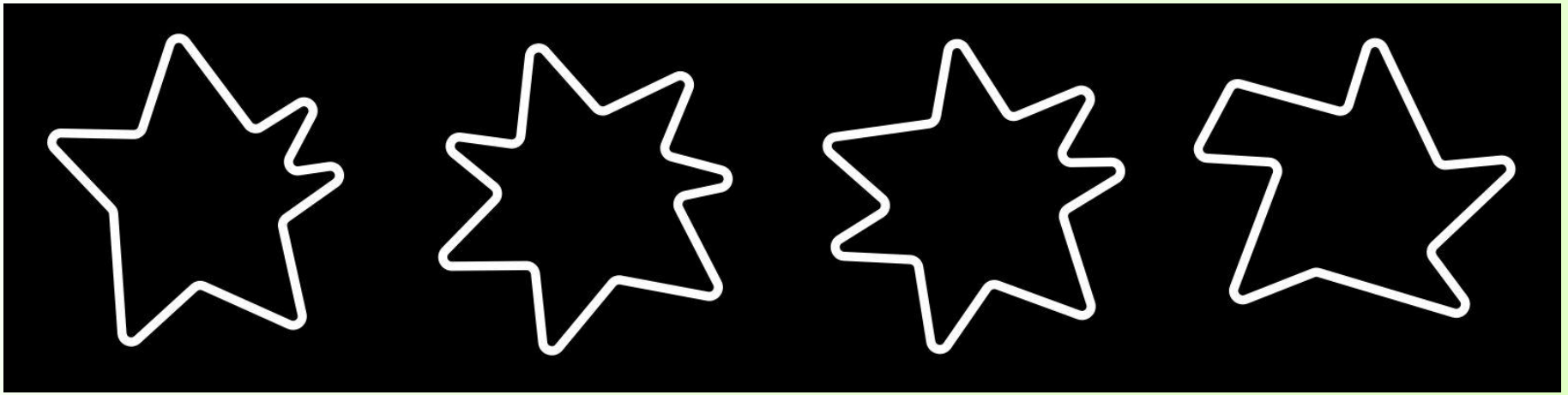
Imgbl.	**high**		**low**	
MovEn	**high**	**low**	**high**	**low**
Hand verbs Foot verbs	boxen, kneifen eilen, rennen	angeln, binden gehen, stehen	kehren, rütteln hasten, rasen	fassen, tippen hoppeln, trotten
	hi_hi	**hi_lo**	**lo_hi**	**lo_lo**

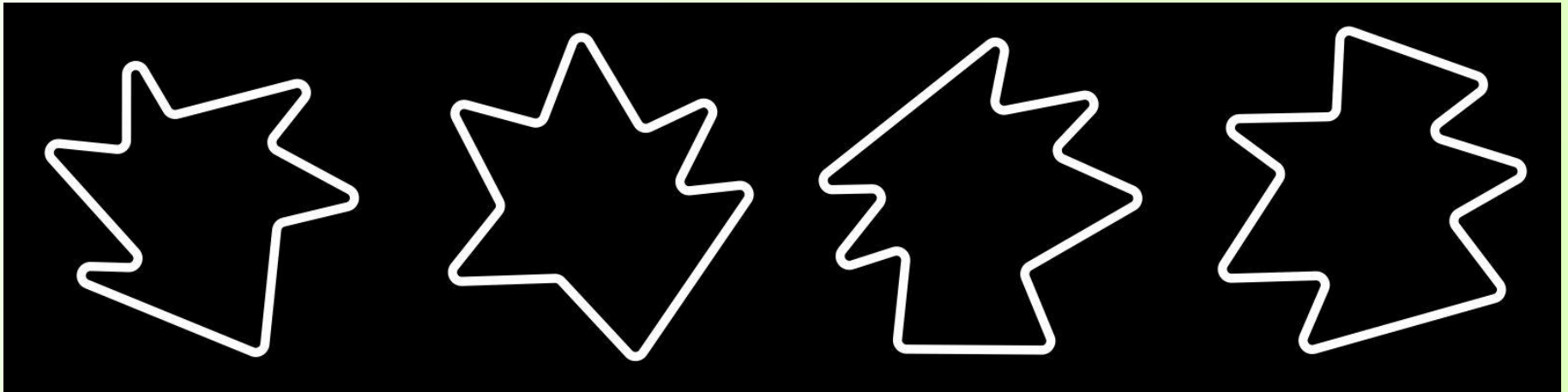
- non-body verbs
  - ähneln, grübeln, wundern, wünschen...

Methods - shapes

- shape decision task
  - 12 pointed shapes, 12 rounded shapes
- hand reactions: space-key
- foot reactions: foot pedal







Methods - procedure

- 6 practice trials
- 6 blocks à 72 trials (432 trials)

Fixation	Cue	Prime	Break	Target	Response
+	+	boxen sprinten wünschen			Button Pedal
1000 ms	500 ms	300 ms	100 ms	max. 2000 ms	

Methods - statistical design

- repeated measures ANOVA

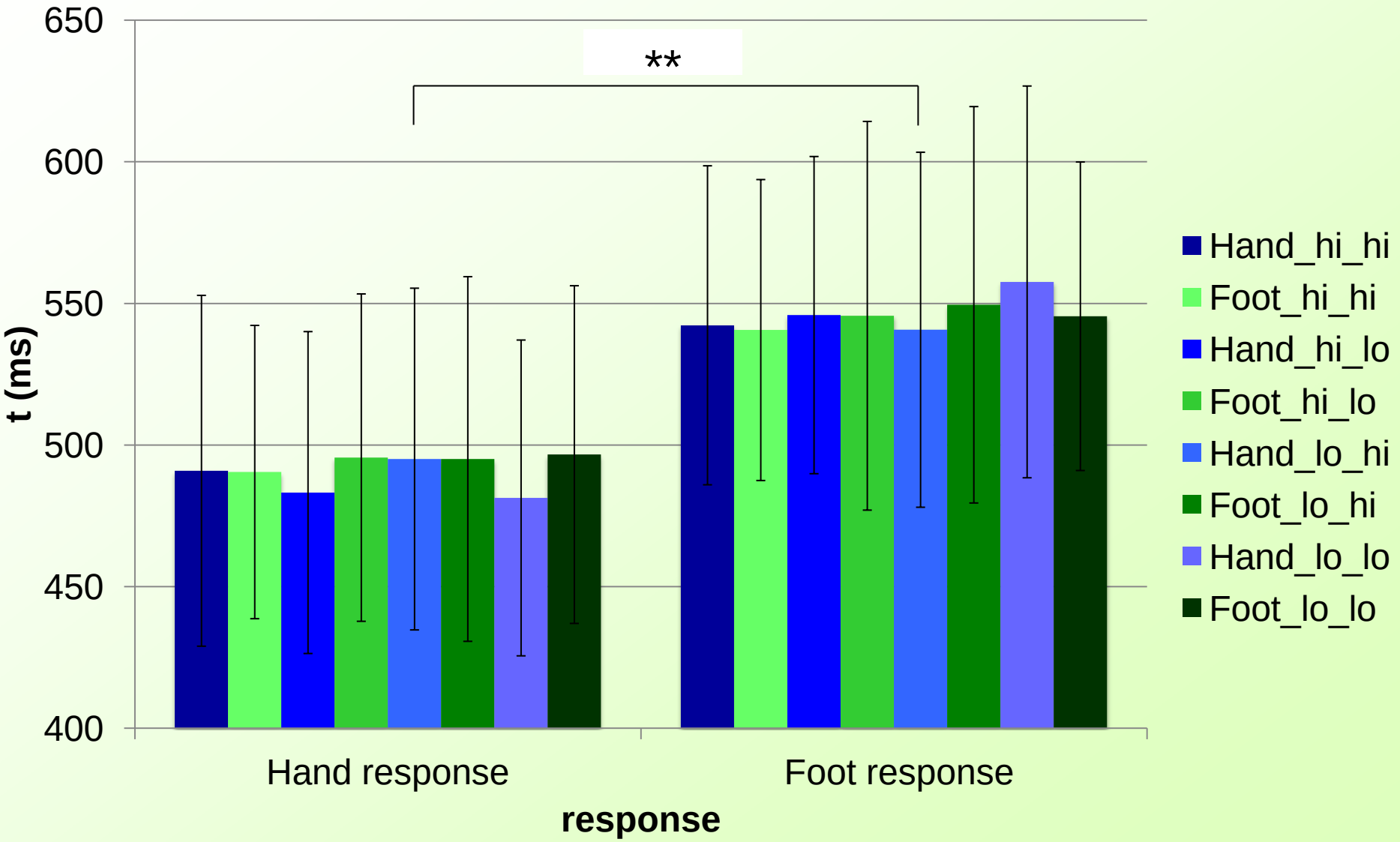
- factors
  - imageability (2: high, low)
  - movement energy (2: high, low)
  - response (2: hand, foot)
  - verb (2: hand, foot)

Results

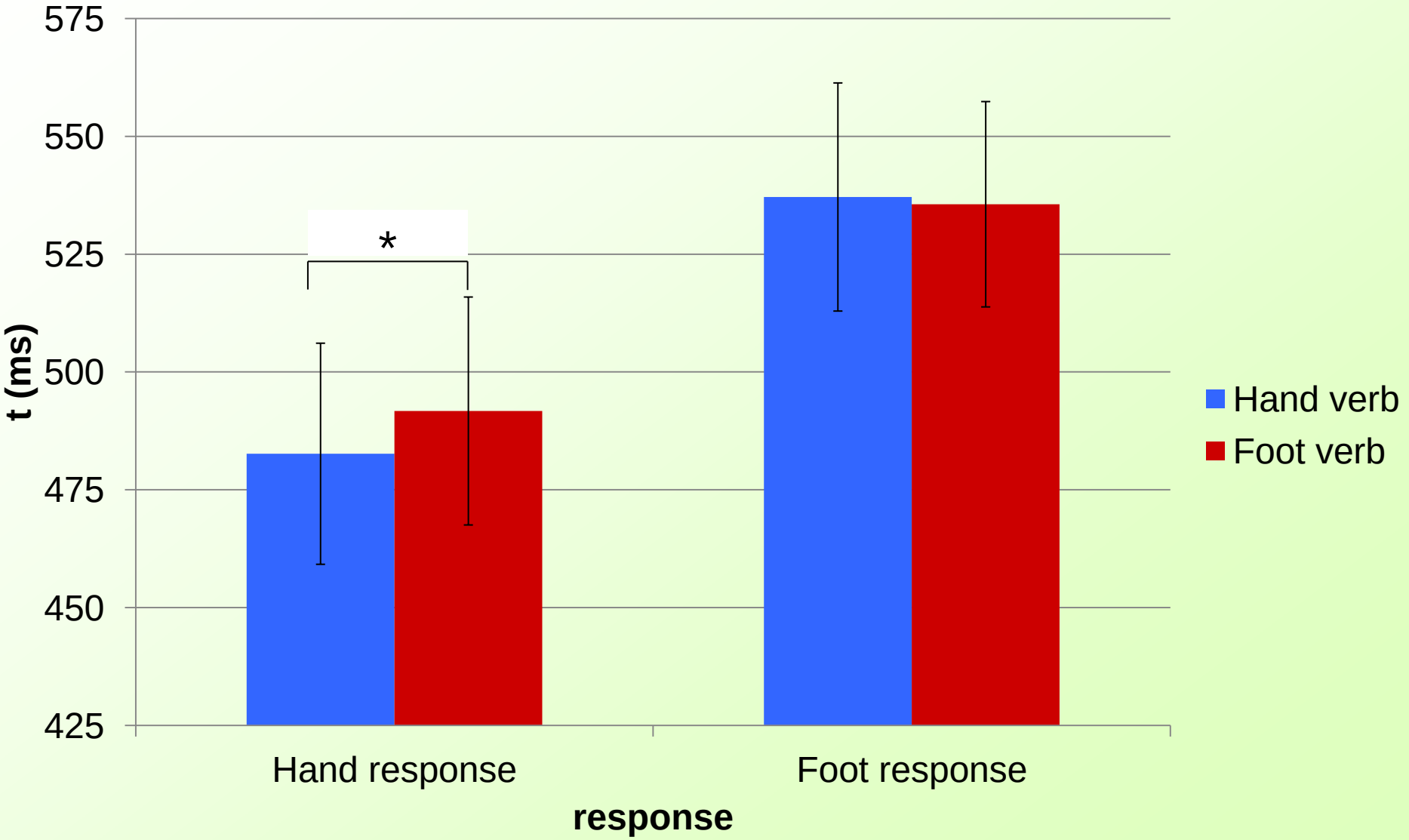
factor	per-subject analysis	per-item analysis
response	**	**
verb	n.s.	n.s.
Imgbl.	p = .072	n.s.
MovEn.	n.s.	n.s.
verb*response	n.s.	*
verb*response*MovEn.	*	*

* $p \leq .05$
** $p \leq .001$

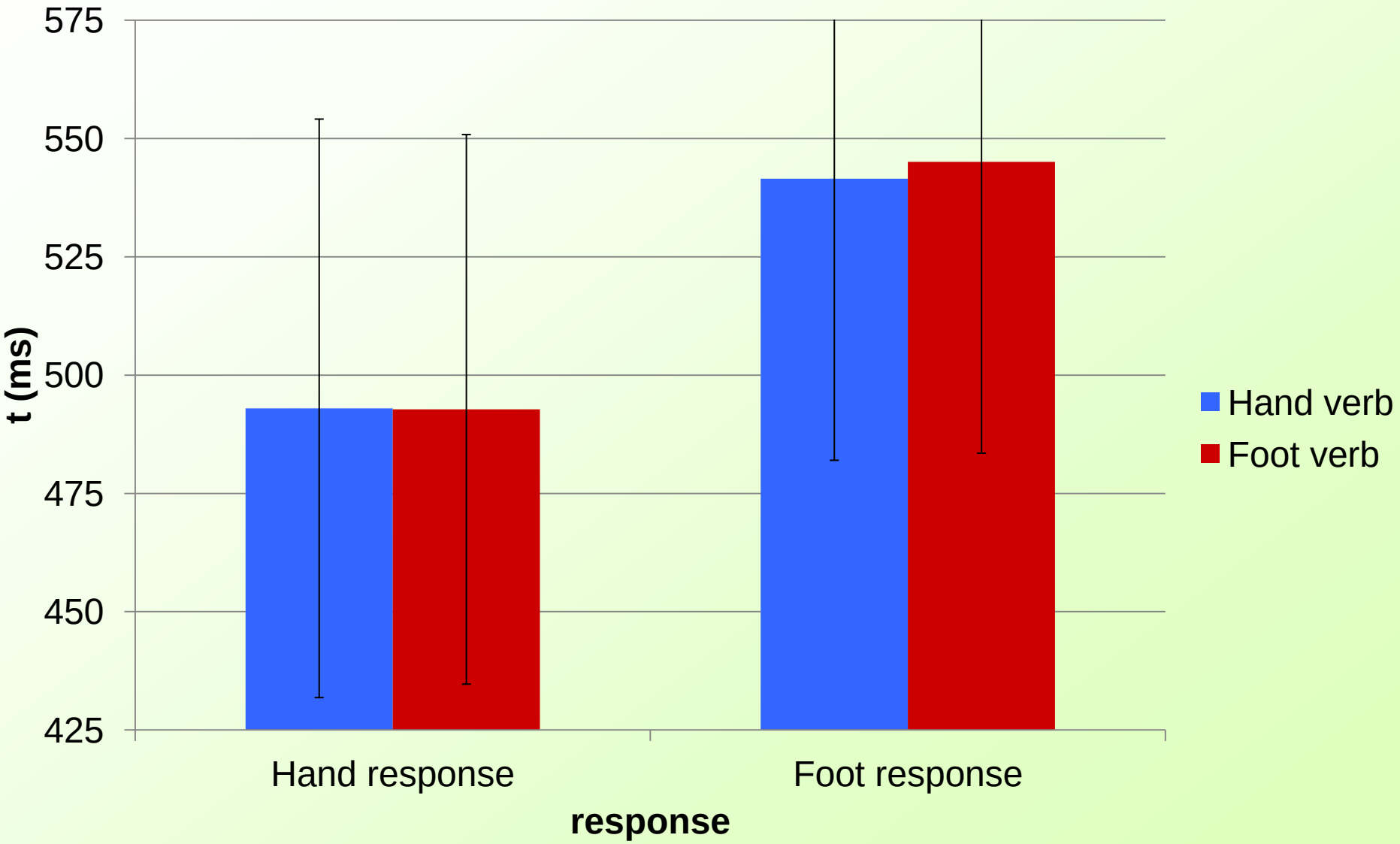
Results – main effect response



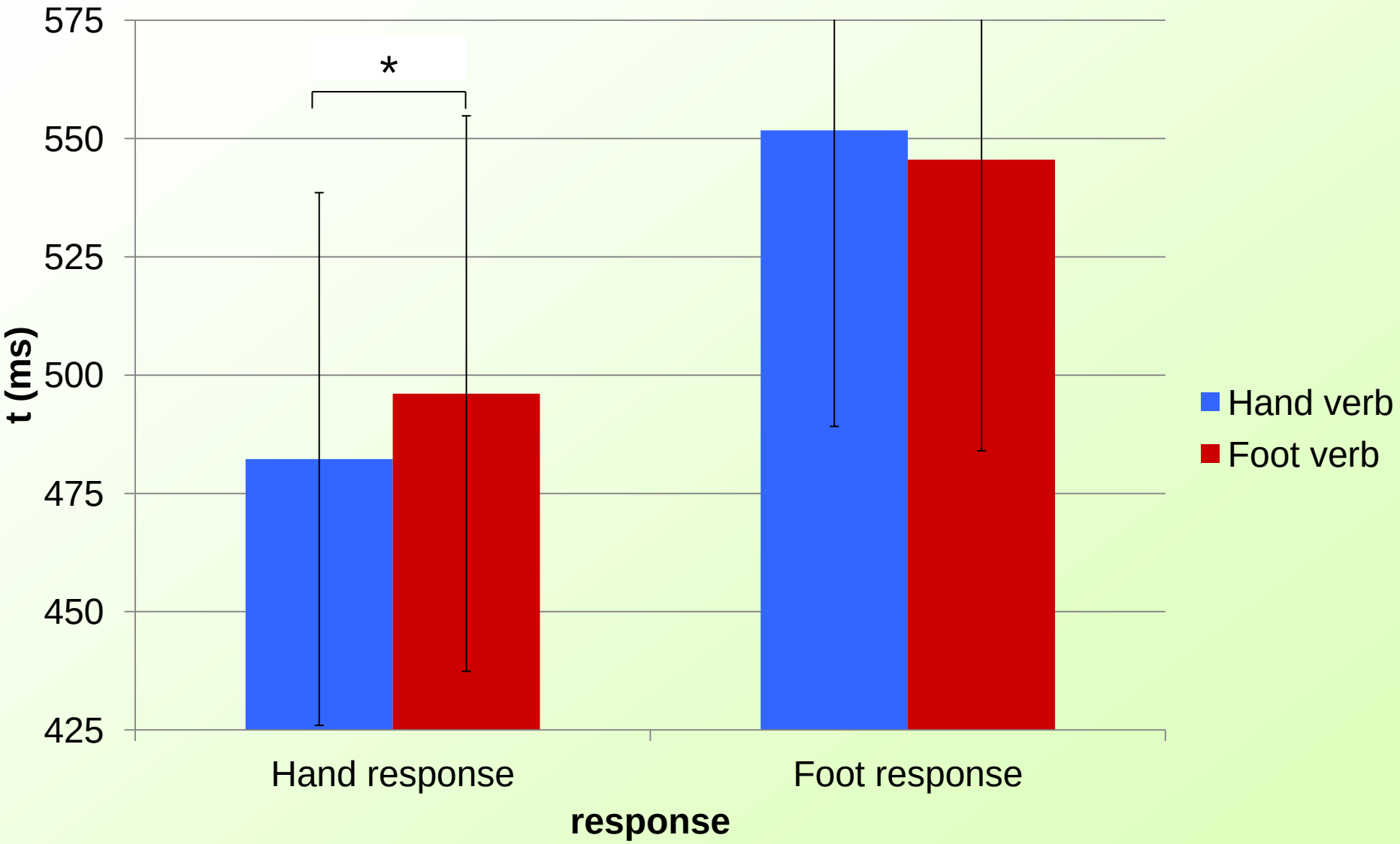
Results – interaction verb*response



Results – interaction verb*response*MovEn.



Results – interaction verb*response*MovEn.



Discussion

- no main effect Imgbl./MovEn.
  - no reaction to verb required

- interaction verb*response*MovEn.
  - facilitation effect

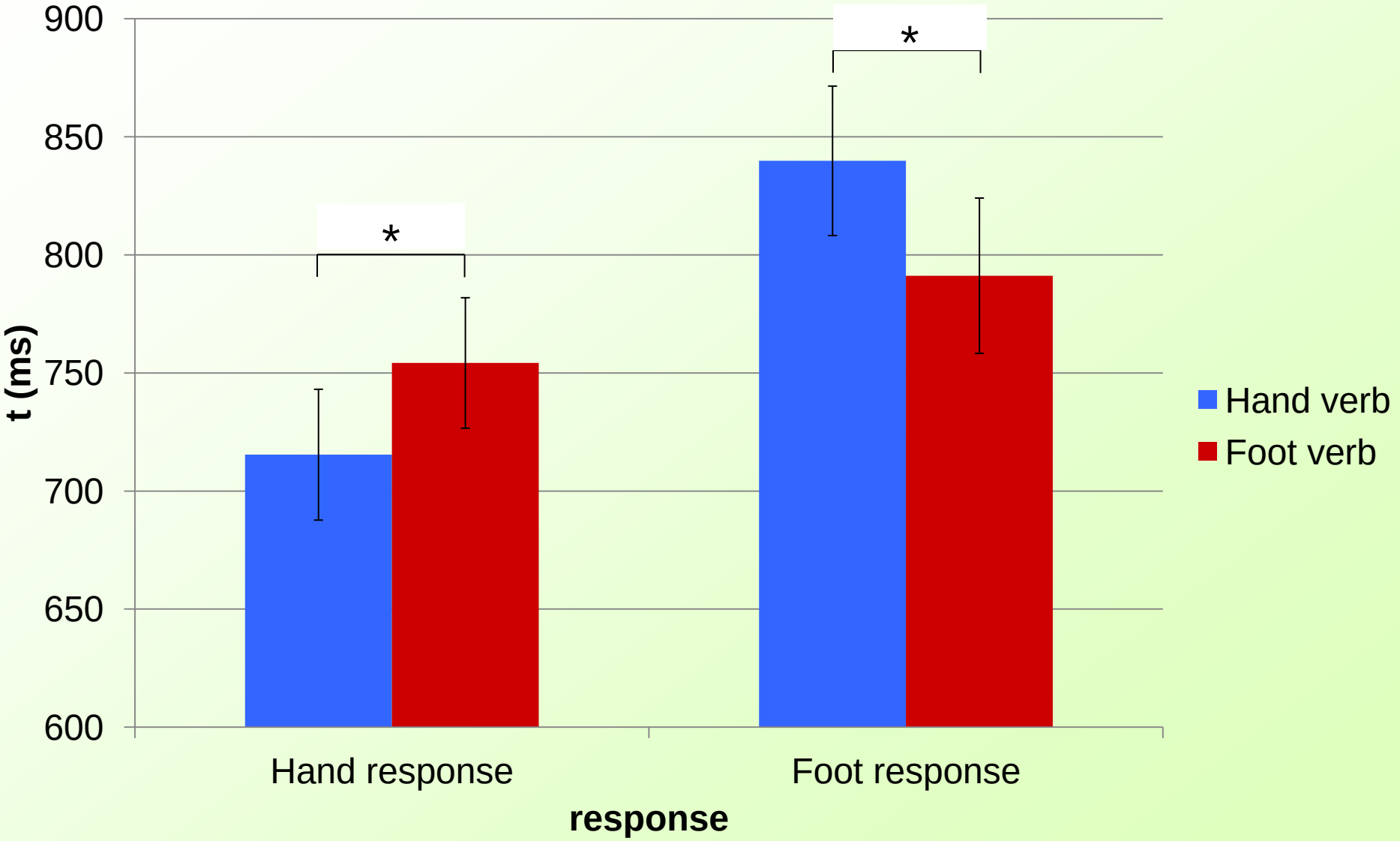
  → results support grounded cognition (Barsalou, 2008)

Future research

- semantic factors influence response times
- EEG/MEG

- timing
  - shorter time span
  - masked prime
- task
  - same design
  - reaction only following an action verb

Future research – Work in progress



The end.

Thank you for your kind attention!