



Institut für
Maschinelle
Sprachverarbeitung

Spatial Meaning Shifts in German Particle Verbs with “auf” and “an”

Diego Frassinelli, Alla Abrosimova, Sylvia Springorum,
Evangelia Kiagia, Sabine Schulte im Walde
frassinelli@ims.uni-stuttgart.de

Motivation

Particle Verbs and Meaning Shifts

- **German particle verbs (PVs)**: highly productive compositions of particle prefixes and base verbs (BVs)

schieben ('push something') ▷ **an+schieben** ('push something forward')

- PVs often trigger (regular) **meaning shifts** with respect to their BVs
- Focus: particles that differ in their **predominant spatial meaning**
 - AN: horizontal directionality (↔)
 - AUF: vertical directionality (↑↓)

Hypothesis

- **Match** between particle direction (*an* ↔) and base verb direction (*schieben* →): **literal PV meaning** ('push something forward')
- **Mismatch** between particle direction (*auf* ↑↓) and base verb direction (*schieben* →): **meaning shift** ('postpone')

Prediction

Meaning shifts may be reflected in **longer reaction times** (inhibition process) during language comprehension

Item Generation

Classification of Base Verbs

- **Human annotators** (15 per BV) selected one or more directions that best represent the action described by the BV

	↑	↓	←	→
schieben				✓
setzen		✓		

Selection of Experimental Items

- **22 German BVs** with a strongly preferred direction
 - 11 with **horizontal** preference (e.g., *schieben*)
 - 11 with **vertical** preference (e.g., *setzen* 'sit')

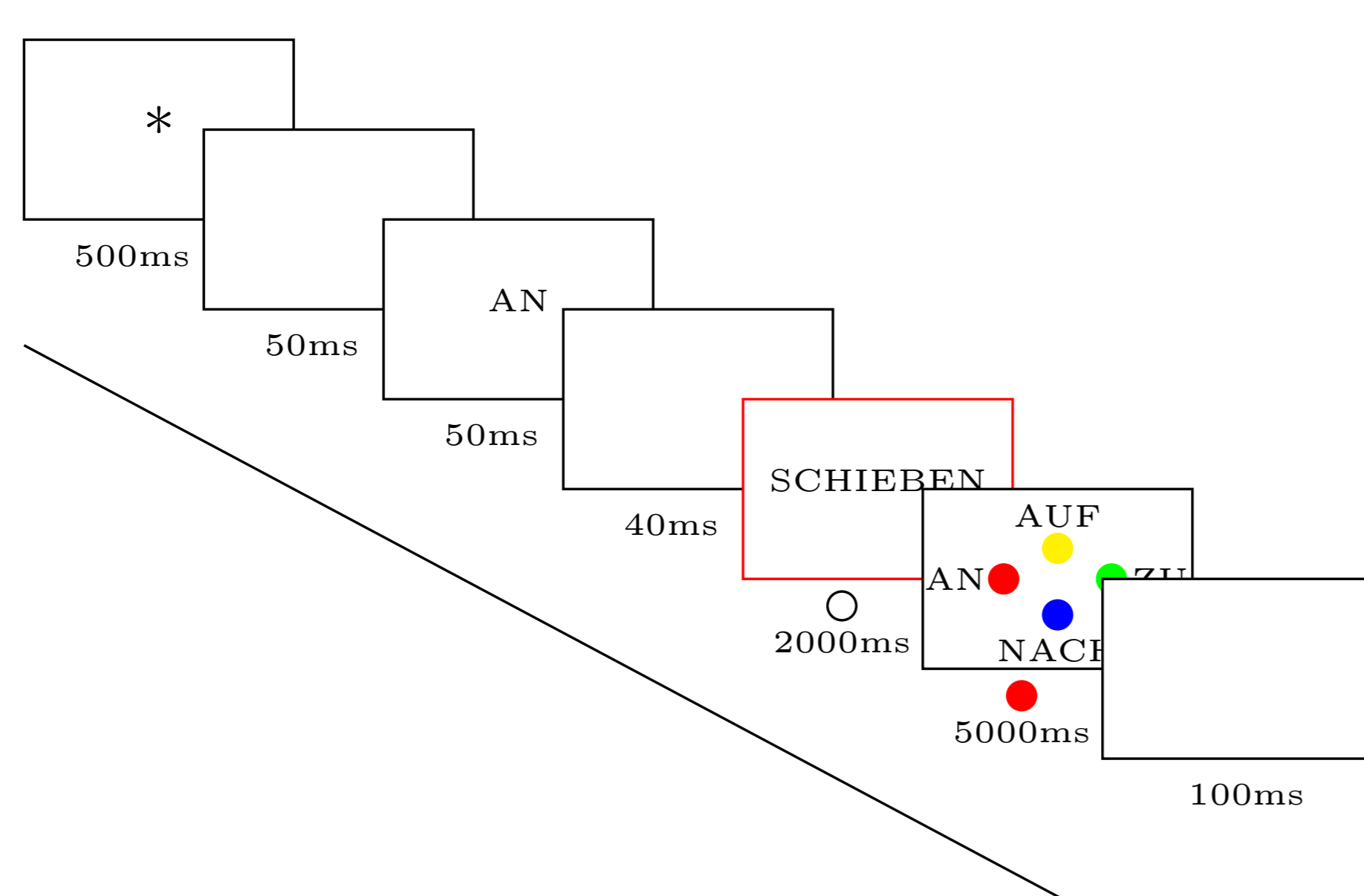
Experimental Design: Go/No-Go Priming Study

- Task: **go/no-go lexical decision** (press a button if the target is a word)
 - Prime: particle (*an*, *auf*, other)
 - Target: base verb
- 3 x 2 Design (Particle x Direction of Base)

	Horizontal	Vertical
An	MATCH	MISMATCH
Auf	MISMATCH	MATCH
Other	CONTROL	CONTROL

- **320 items** (words/non-words), in total balanced by **frequency** and **distributional semantic similarity**:
 - 22 target items
 - 78% fillers

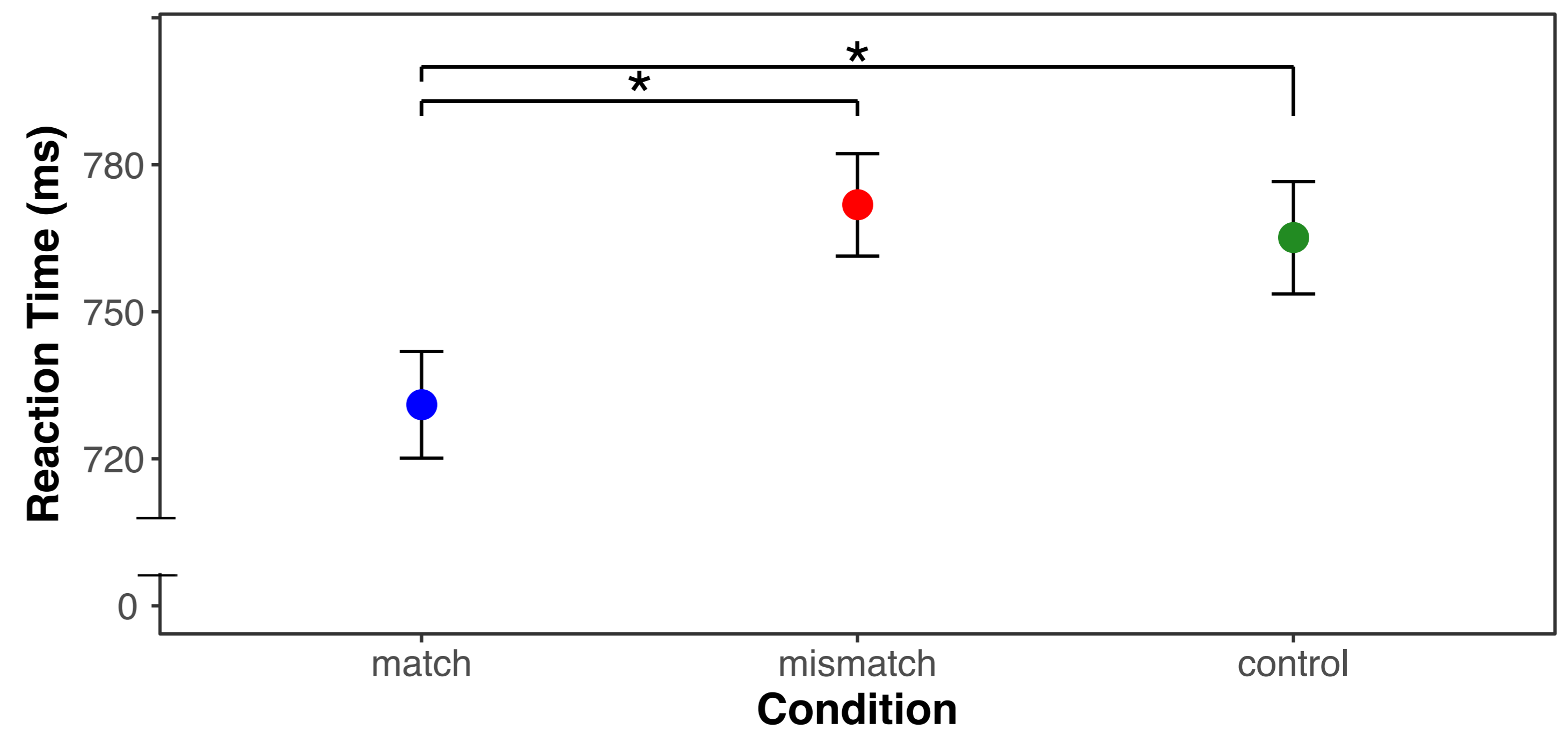
- **65 (66-1) participants**: 14 females, 23yo (± 3)



Analysis

Regression Model

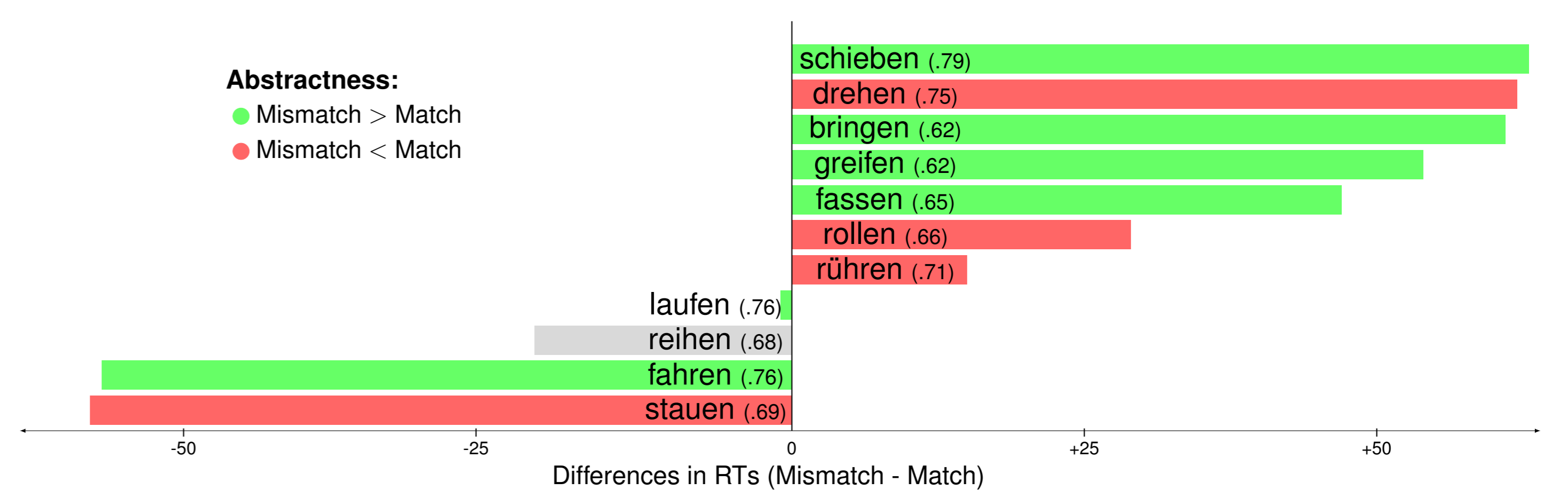
$$\log RT \sim \text{Condition} + (1 + \text{Condition} | \text{Subject}) + (1 + \text{Condition} | \text{Item})$$



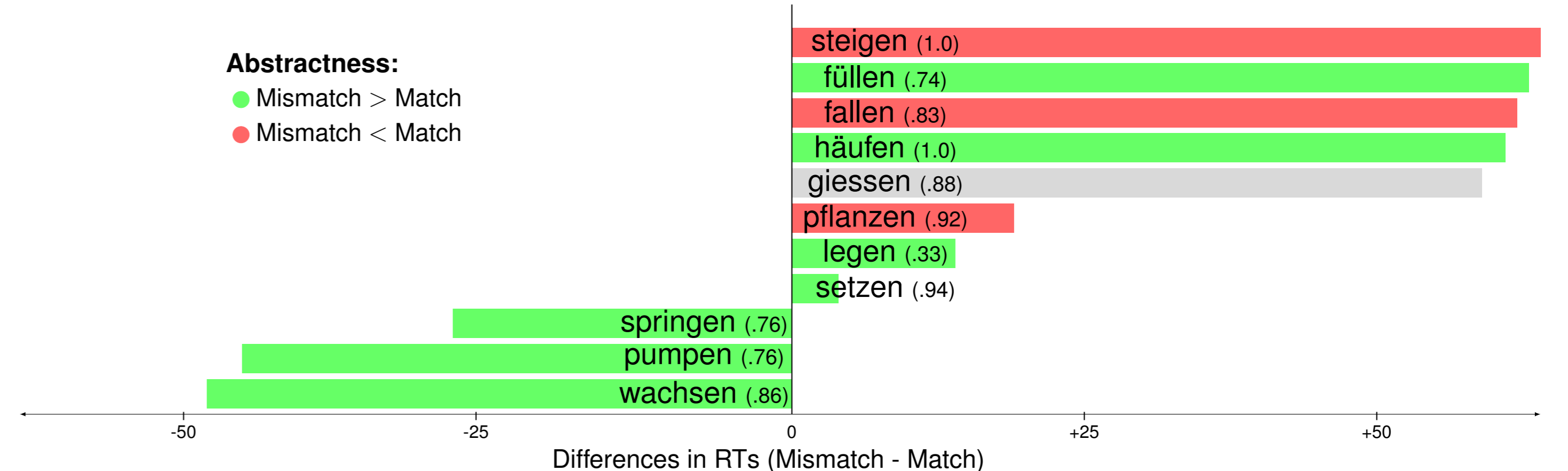
- **matching** condition (*an+schieben*, ↔ + →) processed **significantly faster** than **mismatching** (*auf+schieben*, ↑ + →) and **control** (*nach+schieben*) condition
- **No significant difference** between the **mismatching** and **control** condition

Qualitative Analysis by Item

Horizontal Direction (AN+BV)



Vertical Direction (AUF+BV)



Discussion

Findings

- The primary direction of the particle has an effect
- **Inhibition process**: mismatch in the directionality of particles and base verbs results in **longer processing time** (RTs) with respect to the matching condition

MATCH	MISMATCH	CONTROL
literal	meaning-shifted	
AN+SCHIEBEN 'push something forward'	AUF+SCHIEBEN 'postpone'	NACH+SCHIEBEN 'continue pushing'
AUF+SETZEN 'put on'	AN+SETZEN 'begin'	VOR+SETZEN 'put in front'

Open Issues

- What is triggered by the mismatch?
 - **Metaphorical shift** (increase in abstractness)
 - **Verb polisemy** (not necessarily more abstract)
- Need for a better understanding of the control condition