

AIMS OF THE STUDY

In our project, we investigate how different sentence structures are processed by people of different ages and people with aphasia, focusing on variability between and within participants.

content of the poster

Here, we use control structures to investigate how dependency length and the similarity of dependent and non-dependent elements influence sentence processing.

- ▷ We investigate how control structures are processed in healthy German adults.
- ▷ We test the assumptions of the cue-based retrieval model of Lewis & Vasishth (2005).
- ▷ We investigate interference effects with a self-paced listening task with sentence-picture matching.

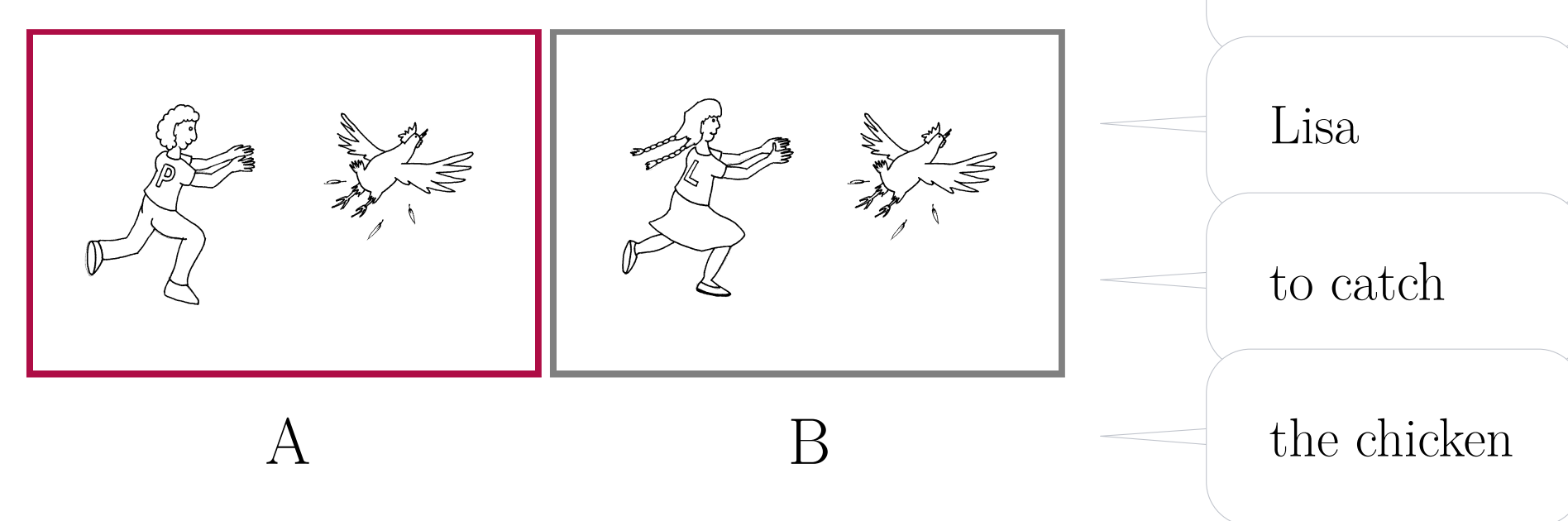
METHODS & DESIGN

participants: n=48 German-speaking healthy adults (18 ♂, age: 19–83 years, M=49 years)

self-paced listening with

sentence-picture matching:

Who interacts with the animal?

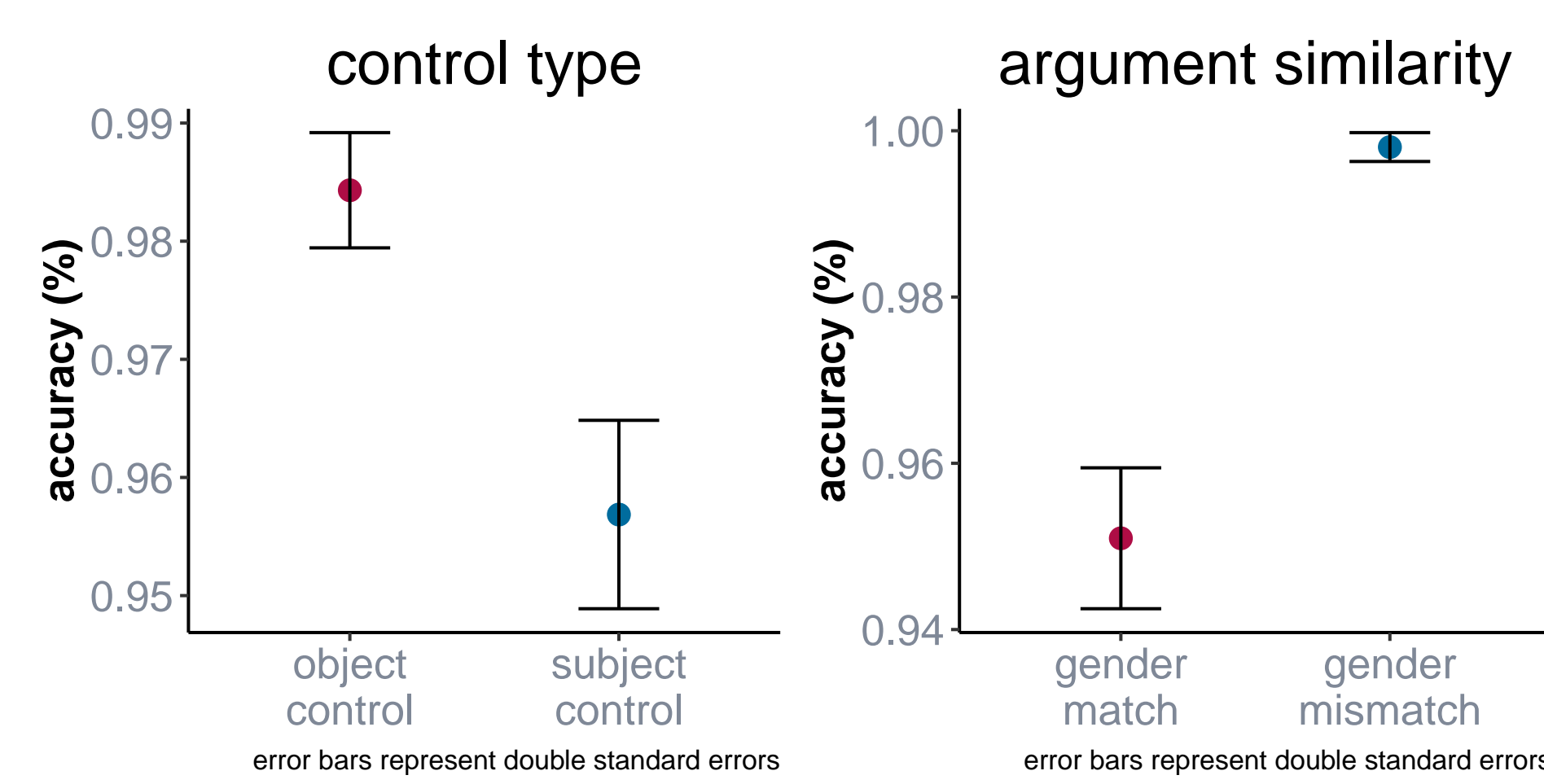


▷ n=50 items per subject

outcome measures & statistical analyses:

- ▷ listening times & RT for picture selection: linear model (individual intercepts & slopes for subjects & items)
- ▷ accuracy (correct/incorrect picture): generalized linear model (individual intercepts for subjects & items)

RESULTS: ACCURACY



Discussion

control type

- ▷ The direction of the effect is in line with the cue-based parsing model.
- ▷ Interference effects were reflected in higher listening times and lower accuracies in the subject control condition.
- ▷ Interference effects were manifested in the post-critical region. This is different from the eye-tracking studies of Betancort et al. (2005) and Kwon & Sturt (2016) in which interferences occurred directly at PRO.
- ▷ We found that the control type influenced comprehension accuracy.

CONTROL STRUCTURES

In control structures, the subclause subject (*controllee*) is identified with a noun of the main clause (*controller*). The controllee can be covert (PRO, see (1)) or overt (pronoun, see (2)). The controller can be the subject (1a) or the object (1b).

We investigate two factors:

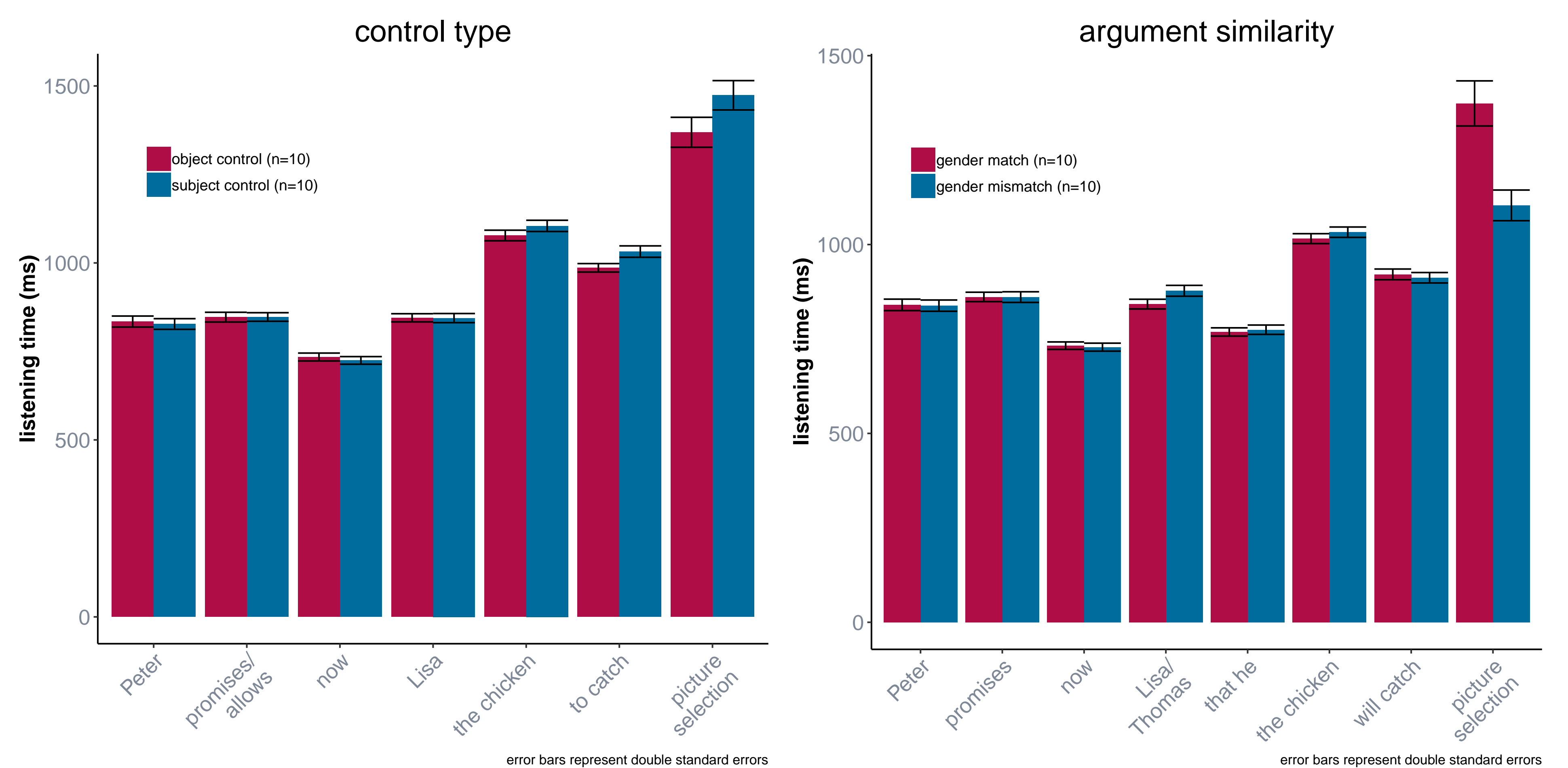
Peter *erlaubt* / *verspricht* nun Lisa, das kleine Huhn zu jagen und zu fangen.

- (1) control type
 - ▷ subject control (a) vs. object control (b)
 - a. Peter promises Lisa PRO to catch the chicken.
 - b. Peter allows Lisa PRO to catch the chicken.

Peter verspricht nun Lisa / Thomas, dass er das kleine Huhn jagt und fängt.

- (2) argument similarity
 - ▷ referents' genders match (a) vs. mismatch (b)
 - a. Peter promises Tom that he will catch the chicken.
 - b. Peter promises Lisa that he will catch the chicken.

RESULTS: LISTENING TIMES



SUMMARY OF THE RESULTS

control type

- ▷ listening time at the critical region *the chicken*: 27ms faster for object control ($t = 1.28, SE^1 = 0.016$)
- ▷ listening time at the critical region+1 *to catch*: 45ms faster for object control ($t = 2.05, SE^1 = 0.014$)
- ▷ picture selection, reaction time: 104ms faster for object control ($t = 1.71, SE^1 = 0.033$)
- ▷ picture selection, accuracy: 2.7% higher for object control ($z = 2.57, SE = 0.43$)

¹SE for reaction times on the log scale

CUE-BASED RETRIEVAL MODEL

When the controllee of a control structure is heard, the controller has to be retrieved from memory to understand the sentence. However, two nouns (e.g. Peter & Tom) are encoded in memory. The distractor noun can slow down the controller's retrieval, which is called interference. The cue-based retrieval model predicts these interferences:

1. control type

- ▷ greater interference when the distractor is close to the controllee (1a) vs. precedes the controller (1b):
- ▷ interference should occur at the retrieval point:
- ⇒ critical region: PRO (*the chicken*)

2. argument similarity

- ▷ greater interference when the main clause nouns bear same gender (2a) vs. different gender (2b):
- ▷ interference should occur at the retrieval point:
- ⇒ critical region: pronoun (*that he*)

argument similarity

- ▷ listening time at the critical region *that he*: 5ms faster for gender match ($t = 0.2, SE^1 = 0.016$)
- ▷ listening time at the critical region+1 *the chicken*: 17ms faster for gender match ($t = 1.2, SE^1 = 0.015$)
- ▷ listening time at the critical region+2 *will catch*: 5ms slower for gender match ($t = 0.65, SE^1 = 0.015$)
- ▷ picture selection, reaction time: 269ms slower for gender match ($t = 4.1, SE^1 = 0.03$)
- ▷ picture selection, accuracy: 4.7% higher for gender match ($z = 3.2, SE = 1.02$)

References

- ▷ Betancort, M., Carreiras, M., & Acuña-Fariña, C. (2006). Processing controlled PROs in Spanish. *Cognition*, 100, 217–282.
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- ▷ Lewis, R. L., & Vasishth, S. (2005). An activation-based model of sentence processing as skilled memory retrieval. *Cognitive Science*, 29, 375–419.
- ▷ Schroeder, S. (2007). Interaktion gedächtnis- und erklärungs-basierter Verarbeitungsprozesse bei der pronominalen Auflösung. Analyse der Effekte von Impliziten Kausalitäts- und Gender-Informationen durch die Modellierung von Reaktionszeitverteilungen. Doctoral dissertation, Köln: University of Köln.

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