



THE INTERACTION OF VERBAL CONSTRAINTS & CROSS-SITUATIONAL WORD LEARNING

- 1) Listeners integrate information from the visual context, the linguistic context, and their world knowledge into comprehension: When hearing the restrictive verb *eat*, for instance, they look rapidly and predictively to edible objects in visual scenes (Altman & Kamide, 1999). This mechanism enables word learning in adults (*word learning based on verbal constraints, WLVC*, Köhne & Crocker, 2010).
- 2) Language novices exploit their experiences with co-occurring visual referents and novel words to learn word meanings (*cross-situational word learning, CSWL*, Yu & Smith, 2007).
- 3) These mechanisms interact in a beneficial way in second language word learning when they are applicable in a complementary way (Köhne & Crocker, 2010).

Which cue dominates when WLVC and CSWL are in conflict?

→ **Experiment 1**

What is the nature of CSWL and WLVC? Is CSWL parallel (Vouloumanos, 2008) & WLVC more deterministic? Can WLVC block this sensitivity in CSWL when both mechanisms are independently applicable?

→ **Experiment 2**

EXPERIMENTAL PARADIGM & PROCEDURE

German adults learn a mini semi-natural language (based on Indonesian) in three basic phases:

1. **Verb learning:** Participants are familiarized with restrictive verbs (e.g. eat, sew) and non-restrictive verbs (e.g. take).
2. **Noun learning:** Visual static scenes & auditory SVO-sentences are presented. Participants are asked to understand the sentences and learn the nouns.
3. **Vocabulary test** ('Click on the object matching the spoken noun.') & confidence rating ('How sure are you about your choice?', 1(not sure)-9(sure))



NOUN LEARNING PHASE

Each noun has two potential meanings

- Low frequency meaning (co-occurrence noun and object across trials: 50%)
- **High frequency meaning** (co-occurrence noun and object across trials: 83%)

Each noun is in one of 2 conditions

- **R(estrictive):** Noun occurs with restrictive verbs (in some trials)
- **N(on-restrictive):** Noun always occurs with non-restrictive verbs

EXPERIMENT 1

WLVC and CSWL are in conflict.

R: 83% meaning (hat) favored by CSWL, 50% (carrot) fav. by WLVC

N: 83% meaning (hat) favored by CSWL, 50% (carrot) less favored

EXPERIMENT 2

WLVC and CSWL are independently applicable.

R: 83% meaning (carrot) favored by CSWL AND WLVC, 50% (hat) disfavored by WLVC and less favored by CSWL

N: 83% meaning (carrot) favored by CSWL, 50% (hat) less favored

TWO VOCABULARY TEST TYPES:

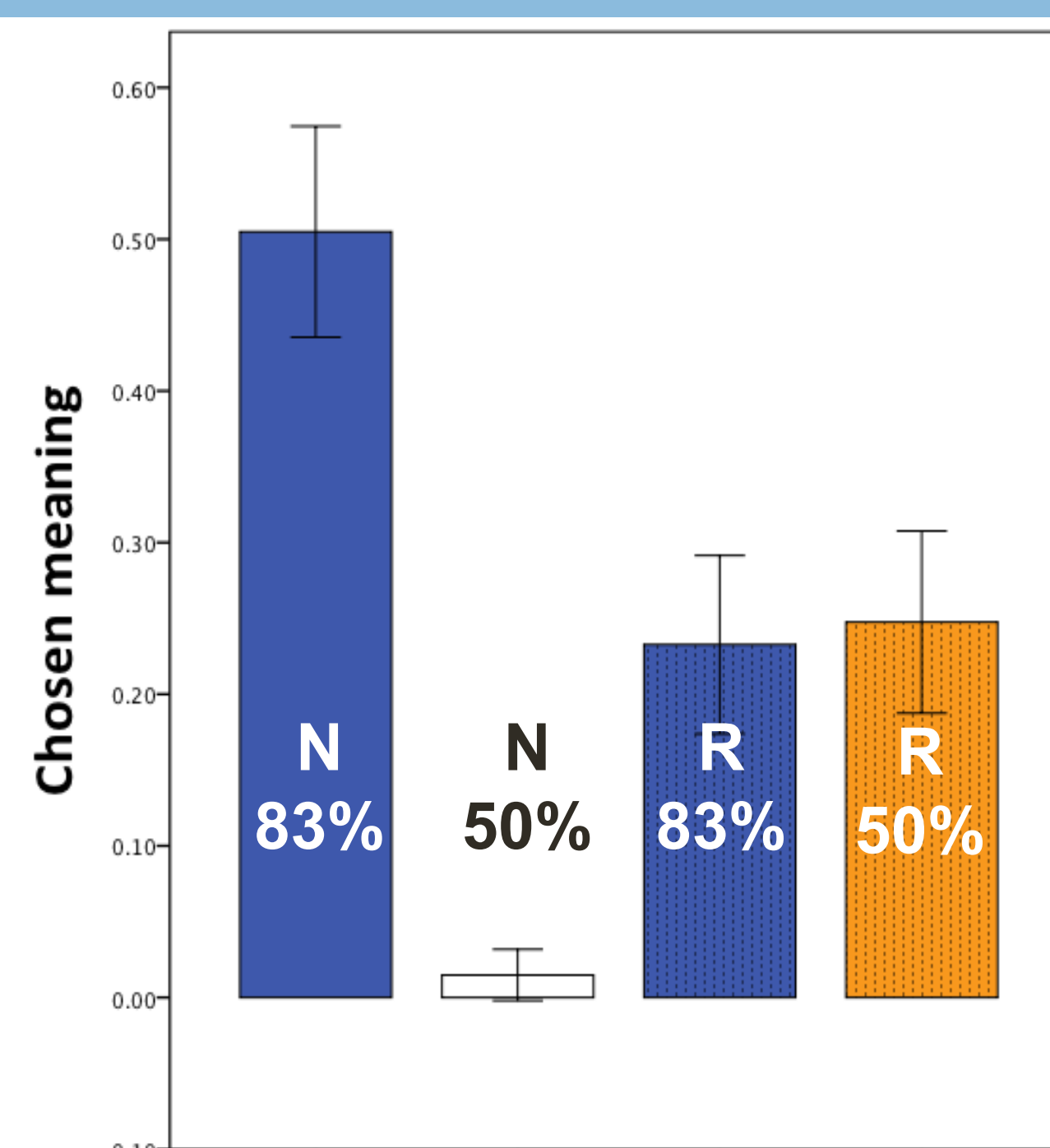
- 1) Depicted: 83% object (carrot), 50% object (hat), 2 distractors (pizza and shirt)
- 2) Depicted: 50% object (hat), associate of the 83% object's category (apple), 2 distractors (jeans, skirt)

RESULTS

✓ Noun learning sig. above chance for both conditions, no sig. difference (N: 87.5%, R: 80.8%)

- ✓ **N:** 83% meaning chosen 97%
- ✓ **R:** 83% meaning: 48.5%
- > Interaction chosen meaning & condition

✓ 83% target was looked at reliably more often than the 50% object in both conditions (during learning and testing)



>>> *In R, learners' final choices are clearly biased by WLVC. However, eye-movements reveal an overall tendency to attend to the 83% target more often than to the 50% target on-line.*

RESULTS

Test Type 1

✓ 83% meaning sig. more often than other objects in both conditions

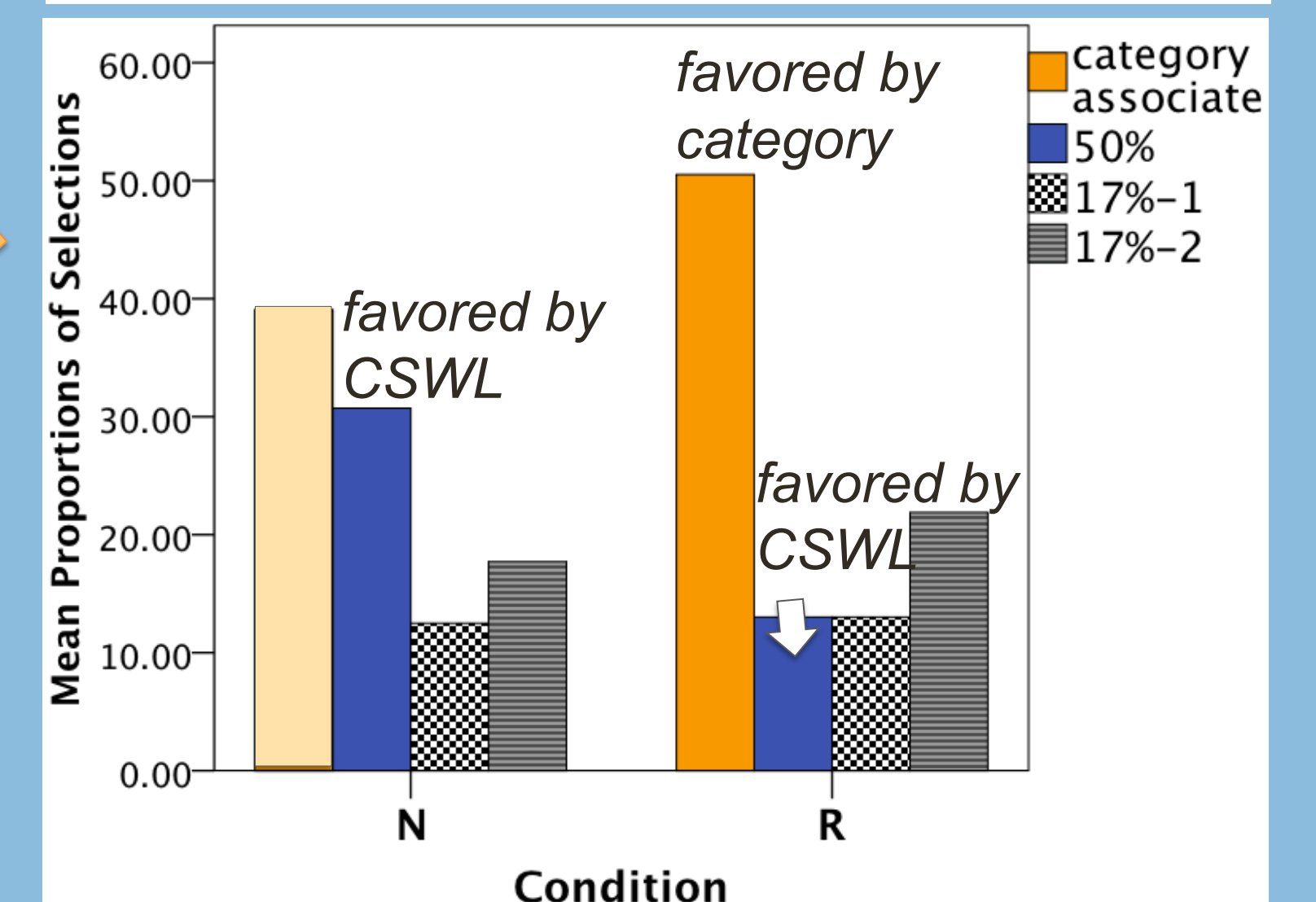
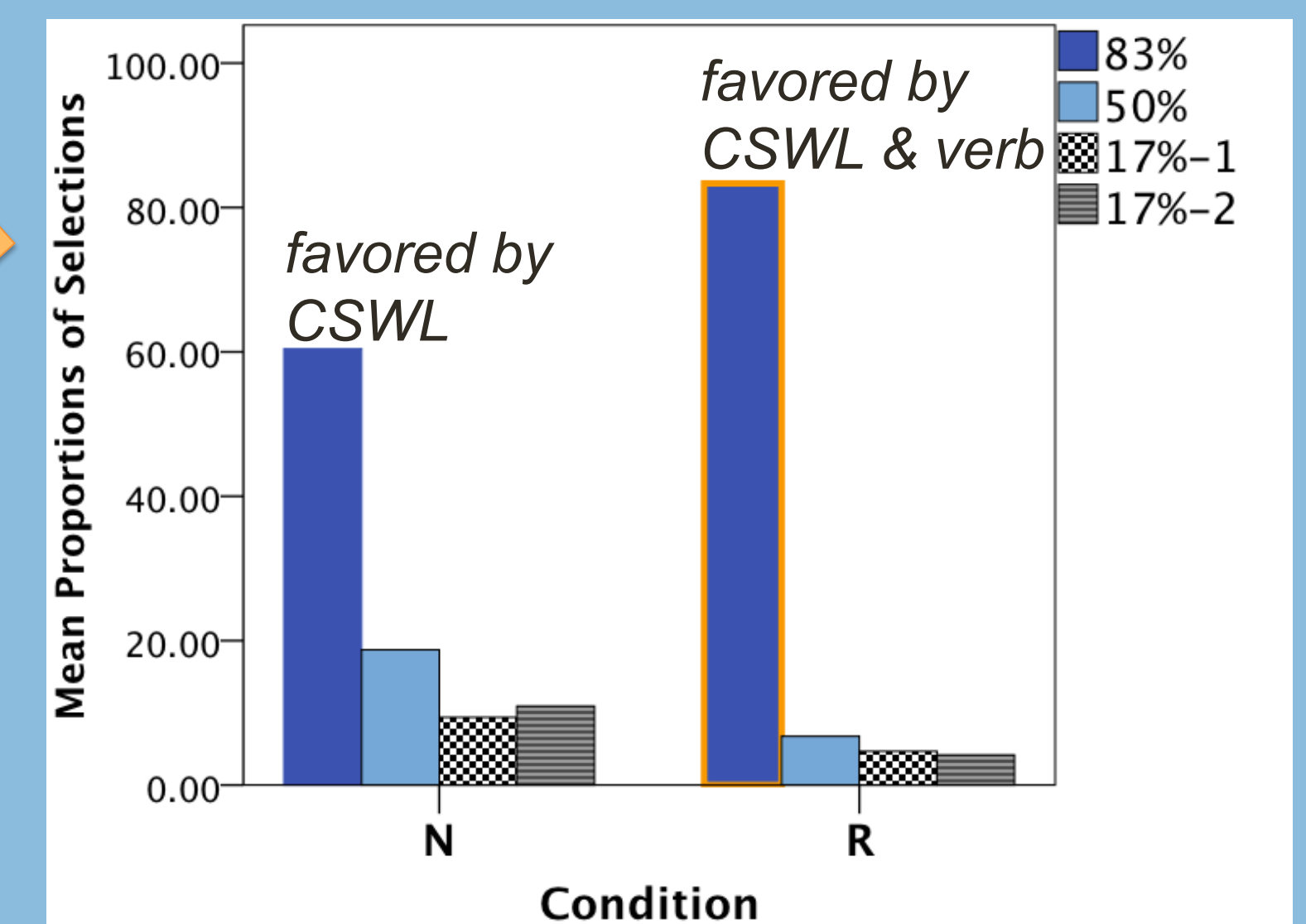
- ✓ 83% meaning sig. more often in R than N
- ✓ 50% meaning sig. more often in N than R

Test Type 2

✓ In R, category associate sig. more often than other objects

✓ In N, category associate AND 50% object sig. more often than distractors, no sig. difference between cat. associate and 50%

- ✓ 83% meaning sig. more often in R than N
- ✓ 50% meaning sig. more often in N than R



> **N:** fine-grained sensitivity for differences in frequency of co-occurrence (83% vs. 50% vs. 17%), evidence that **CSWL is parallel**

> **R:** **WLVC blocked statistical sensitivity (> determinism!) & increases sensitivity f. category assoc.**

OVERALL CONCLUSIONS

- When in conflict, CSWL and WLVC are equally powerful but CSWL is still considered even when WLVC is given priority.
- WLVC blocks sensitivity to lower frequency meanings when both cues are independently applicable. > While CSWL offers a gradient and parallel way of learning, WLVC works in a more deterministic manner.
- CSWL increases sensitivity for category associations.