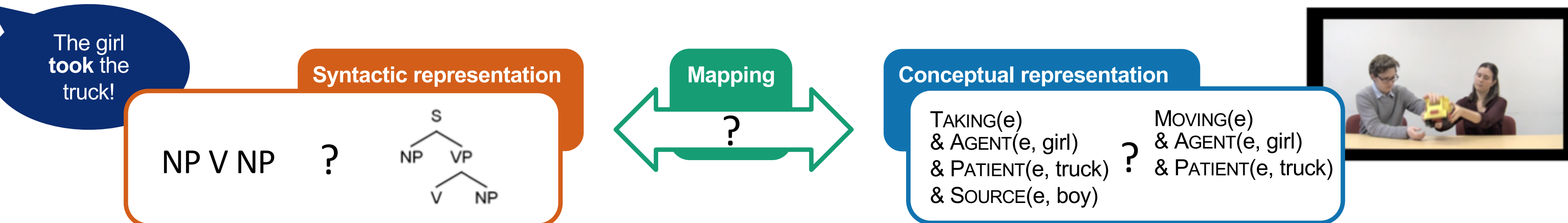# Getting a grip on infants' event representations:
Participant number in TAKE and PICK-UP

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Introduction: Linguistic and Conceptual Structure

Big Picture: How do children acquire verb meanings?
- Infants exploit relations between linguistic and conceptual structure to infer kinds of events a new verb can label [1]
- What kinds of relations do learners exploit, number-based [2-3] or content-based [4-5] mapping?
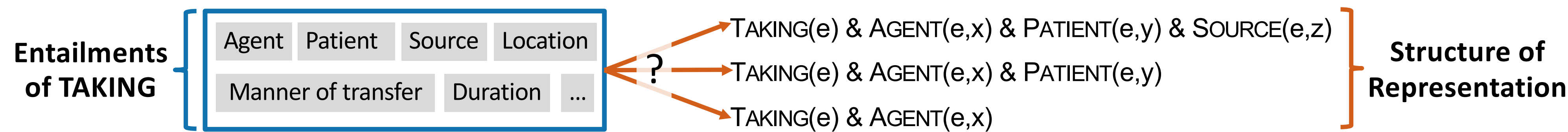 - Teasing apart these hypotheses requires fixing both sides of the bootstrapping equation

The girl **took** the truck!

Syntactic representation
NP V NP

S
NP VP
V NP

Mapping
?

Conceptual representation
TAKING(e)
& AGENT(e, girl)
& PATIENT(e, truck)
& SOURCE(e, boy)

MOVING(e)
& AGENT(e, girl)
& PATIENT(e, truck)

?

Syntactic-Conceptual Mapping
- **Number-based**: Children expect number of participants perceived in an event to match one-to-one the number of arguments in the clause describing that event [2-3]
  - e.g., two-argument clauses describe two-participant events
- **Content-based**: Children expect particular argument positions to name certain participant roles [4-5]
  - e.g., transitive subjects tend to name agents; objects name patients
- Evaluating these strategies requires identifying how infants represent particular events in the world

Event Representations
- An event concept **entails** many relations; Only some of these are **psychologically privileged**, explicit in the *structure* of the representation. Call these **participant relations** [4]
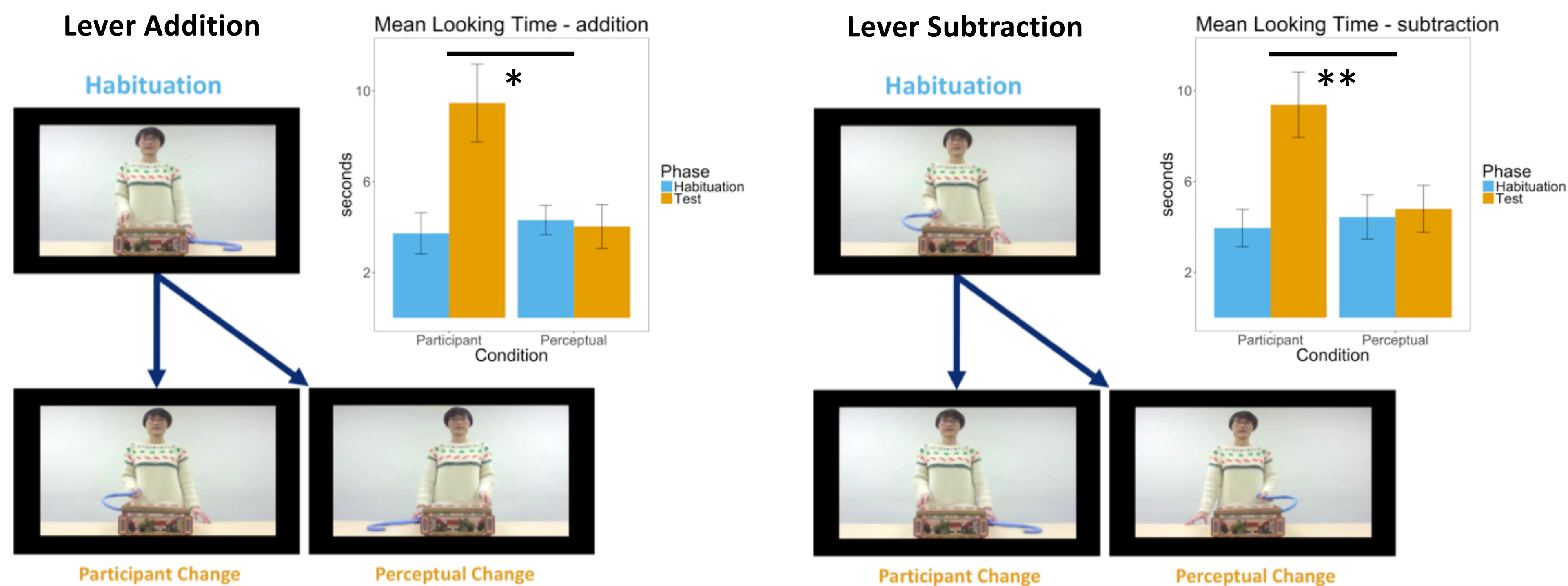
Entailments of TAKING

Agent	Patient	Source	Location
Manner of transfer	Duration	...	

?

TAKING(e) & AGENT(e,x) & PATIENT(e,y) & SOURCE(e,z)
TAKING(e) & AGENT(e,x) & PATIENT(e,y)
TAKING(e) & AGENT(e,x)

Structure of Representation

- **Current aim:** For a given stimulus scene, which relations are privileged in the concept infants view it under?

Background: Infants' Sensitivity to Entailed and Privileged Roles
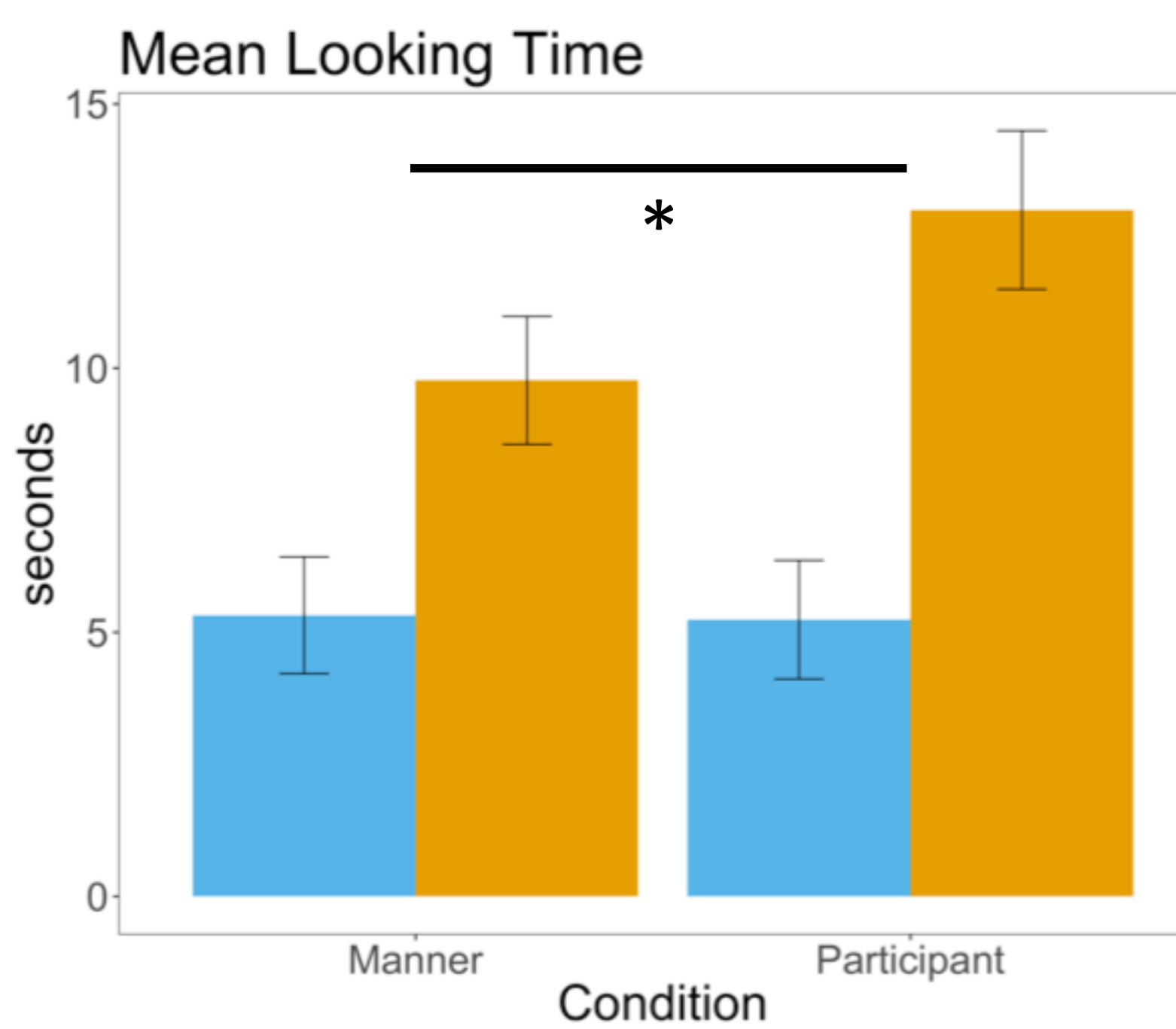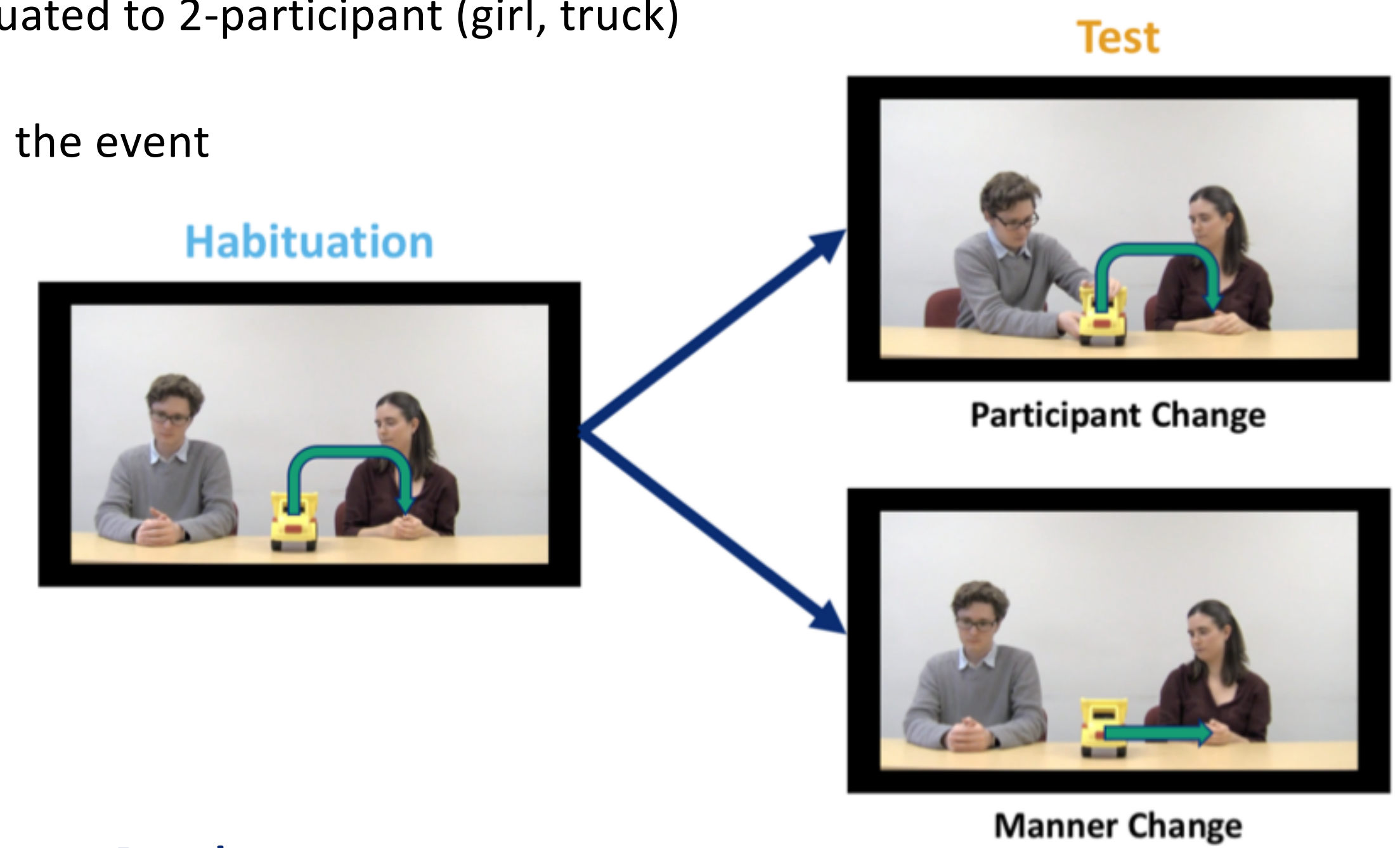
Evidence from Habituation-Switch Studies
- 10-month-olds notice when a gift (teddy bear) is removed from videos of giving events, but not when the same object is removed from videos of hugging events [6-7]
- 10-month-olds notice when an instrument (lever) is added to or subtracted from an opening scene [7]

Lever Addition

Habituation

Mean Looking Time - addition

*

Participant Change | Perceptual Change

Lever Subtraction

Habituation

Mean Looking Time - subtraction

**

Participant Change | Perceptual Change

TAKE versus PICK-UP

Method: Habituation-Switch [8]
- 32 infants aged 9;21 – 12;15 (mean=10;23) habituated to 2-participant (girl, truck) picking-up event, with boy sitting idly
- **Participant change**: boy added as a participant in the event
- **Manner change**: arc motion replaced with slide
  - Perceptually salient change
  - Manner of motion is an event sortal (e.g., PICK-UP versus SLIDE)

Habituation

Test

Participant Change

Manner Change

Mean Looking Time

*

Phase: Habituation (blue), Test (orange)

Results
- Infants dishabituate when manner is changed
- Infants dishabituate more when the boy is added as a participant than when manner of motion is changed
  - Infants, like adults, view our taking video under a concept with the boy filling a psychologically privileged role

TAKING(e) & AGENT(e, girl) & PATIENT(e, truck) & SOURCE(e, boy)

Future Directions: Adding Language

Evaluating Mapping Strategies
- Being more confident that infants view this TAKING scene under a 3-participant event representation, we can evaluate how they map a sentence to that representation
- **Method: Verb-Extension Task [9]** – Three-participant video paired with two-argument clause

Familiarization (x4)

The girl **pimmed** the truck!

- **Number-based mapping** (between arguments and participants) leads learner to think *pim* means MOVE (a 2-participant event)
- **Content-based mapping** allows learner to pair *pim* with the 3-participant TAKING concept under which they readily view this scene, predicting that they will think *pim* means TAKE

Response Phase

Predicted Looking Preferences During Response Phase
- Number-based mapping
  - Looks to either video (both show the girl moving the truck)
- Content-based mapping
  - More looks to taking video (moving video does not show *pimming*)

Find the one where she's **pimming** the truck.

Control Conditions
- *The girl pimmed the truck from the boy* (*pim*=TAKE under both theories)
- *The truck pimmed* (*pim*=MOVE under both theories)

References: [1] Gleitman (1990) The structural sources of verb meanings. [2] Naigles (1990) Children use syntax to learn verb meanings. [3] Fisher, Gertner, Scott, & Yuan (2010) Syntactic bootstrapping. [4] Williams (2015) Arguments in syntax and semantics. [5] Fillmore (1968) The grammar of 'hitting' and 'breaking'. [6] Gordon (2003). The origin of argument structure in infant event representations. [7] Wellwood, Xiaoxue He, Lidz, & Williams (2015). Participant structure in event perception: Towards the acquisition of implicitly 3-place predicates. [8] Werker, Cohen, Lloyd, Casasola, & Stager, (1998). Acquisition of word–object associations by 14-month-old infants. [9] Waxman, Lidz, Braun, & Lavin (2009) Twenty four-month-old infants' interpretations of novel verbs and nouns in dynamic scenes.