



Two Views Are Better Than One: Comparison Helps Infants Abstract Event Components

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BACKGROUND

- To learn a language infants must extract elements of events that relational words (e.g., verbs, prepositions) label. For example, to learn the verb "run" (a *manner* word), infants must form a non-linguistic category of "running events", regardless of the agent performing the action. Likewise, to learn the preposition "over" (a *path* word), infants must form a non-linguistic category of "over," despite variation in agent or object.
- Pruden and colleagues (2004) found that infants younger than 10 months are unable to abstract an invariant path (i.e., trajectory of agent) and infants younger than 13 months are unable to abstract an invariant manner (i.e., way in which agent moves) from dynamic events in which the familiarization events were presented *sequentially*, one at a time.
- According to structure-mapping theory (Gentner, 1983), circumstances that allow for simultaneous comparison between events may help infants detect the similarities and differences in events. In fact, research shows that comparison aids both preschoolers (Gentner & Namy, 2004) and infants in categorization tasks (Oakes & Ribar, 2005).
- These studies continue our exploration of infants' abilities to abstract path and manner from motion events. We investigated the role that comparison may play in abstracting path (Study 1) and manner (Study 2) in 7- to 9-month-old infants.

METHOD

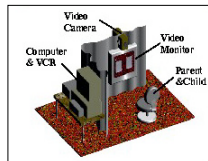


Figure 1. Preferential Looking Paradigm.

PROCEDURE

- The Preferential Looking Paradigm (Figure 1).
- The procedure consisted of a salience phase, familiarization phase, and test phase.

SALIENCE PHASE

- The salience phase measures any *a priori* preference the infants' might have for the test clips.
- Two clips are presented simultaneously for 12 s.
- One of these clips includes an in-category test event, while the other is an out-of-category test event.

FAMILIARIZATION PHASE

- Infants are familiarized to four events. Each of these clips shows an exemplar from the category being tested.
- Importantly, infants viewed two events *simultaneously* during each 12 s familiarization trial.

TEST PHASE

- Two test trials, each 12 s long, are shown and looking times to each clip are recorded.
- These test trials present the exact clips from the salience phase.

STIMULI

- Animated motion events of a purple starfish performing a path and manner relative to a stationary green ball.
- Six paths were used: "over," "under," "past," "around," "in front," and "behind"; six manners were used: "jumping jacks," "spinning," "bending forward," "twisting," "side bending" and "toe touching."
- No linguistic stimuli accompanied any of these events.

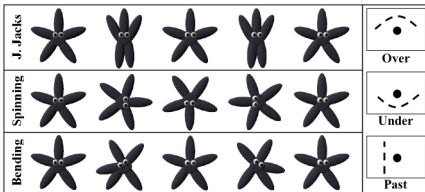


Figure 2. Examples of manners and paths used in stimuli. This figure illustrated as series of static postures, the manners were performed as continuous motions (fig. are from Pulverman and Golinkoff, 2004).

STUDY 1

Does comparison help infants abstract the invariant path across multiple manners?

PARTICIPANTS

- Eighteen 7- to 9-month-olds participated ($M = 8.41$, $SD = 1.02$; 11 males and 7 females).
- All children were from monolingual English speaking homes and were full-term births.

EXAMPLE OF STIMULI

Familiarization Phase: Infants in the *path* condition "over" saw four exemplars of the starfish performing the same *path*, "over," across four distinct *manners*. Exemplars were shown in pairs (i.e., simultaneous presentation) to allow infants to compare across events.

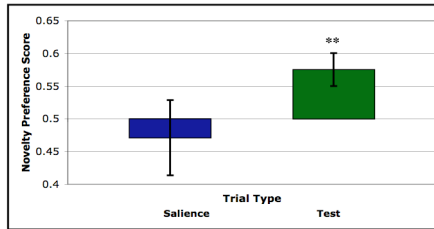
For example, infants in the *path* condition "over" saw the following clips during each familiarization phase: (Trial 1) "jumping jacks over" and "toe touching over," (Trial 2) "side bending over" and "spinning over," (Trial 3) "toe touching over" and "side bending over," and (Trial 4) "spinning over" and "jumping jacks over."

Test Phase: Two test events were presented simultaneously: (1) a novel exemplar from the familiar category (i.e., novel *manner* and a same *path*), and (2) a novel exemplar from a novel category (i.e., novel *manner* and novel *path*).

For example, infants in the *path* condition "over" would at test see "twisting over" (i.e., novel *manner* and same *path*) and "twisting under" (i.e., novel *manner* and novel *path*).

RESULTS

- Novelty-preference score = novel exemplar from novel category / (novel exemplar from familiar category + novel exemplar from novel category)
- No effects of condition or sex for either the salience or test phase (lowest p -value = .36).
- Infants did not show a significant preference for either event during salience, $t(17) = -.502$, $p > .05$.
- At test, infants show a significant preference for the novel event, $t(17) = 2.974$, $**p < .01$.



STUDY 2

Does comparison help infants abstract the invariant manner across multiple paths?

PARTICIPANTS

- Eighteen 7- to 9-month-olds ($M = 8.24$, $SD = .89$; 9 males and 9 females).
- All children were from monolingual English speaking homes and were full-term births.

EXAMPLE OF STIMULI

Familiarization Phase: Infants in the *manner* condition "twisting" saw four exemplars of the starfish performing the same *manner*, "twisting," across four distinct *paths*. Exemplars were shown in pairs (i.e., simultaneous presentation) to allow infants to compare across events.

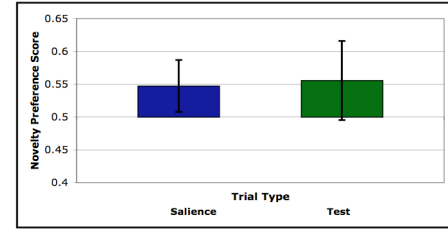
For example, infants in the *manner* condition "twisting" saw the following clips during each familiarization phase: (Trial 1) "twisting over" and "twisting in front," (Trial 2) "twisting around" and "twisting past," (Trial 3) "twisting in front" and "twisting around," and (Trial 4) "twisting past" and "twisting over."

Test Phase: Two test events were presented simultaneously: (1) a novel exemplar from the familiar category (i.e., same *manner* and a novel *path*), and (2) a novel exemplar from a novel category (i.e., novel *manner* and novel *path*).

For example, infants in the *manner* condition "twisting" would at test see "twisting under" (i.e., same *manner* and novel *path*) and "toe touching under" (i.e., novel *manner* and novel *path*).

RESULTS

- Novelty-preference score = novel exemplar from novel category / (novel exemplar from familiar category + novel exemplar from novel category)
- No effects of condition or sex for either the salience or test phase (lowest p -value = .09).
- Infants did not show a significant preference for either event during salience, $t(17) = 1.19$, $p > .05$.
- At test, infants did not show a significant preference for either event, $t(17) = .92$, $p > .05$.



GENERAL DISCUSSION

- When given the opportunity to directly compare events during familiarization, 7-month-old infants show the ability to abstract an invariant *path* across varying *manners*.
- There is no evidence of comparison helping infants abstract the invariant *manner* across multiple *paths*. Tests are currently underway with infants between 10- and 12-months of age.
- A developmental trajectory appears such that *path* is abstracted prior to *manner*.
- By 7 months infants are capable of extracting elements from dynamic events that eventually get labeled by relational terms.
- These results suggest that comparison aids infants' category formation.

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