



Finding the Invariant Path and Manner in Motion Events: Do Labels Help?

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BACKGROUND

•To learn motion verbs children must discover actions within events, detect components of actions labeled in the world's languages, and form categories of action components. Research suggests that infants can parse events into actions (Baldwin et al., 2001), and can notice and discriminate components of actions, such as path and manner (Casasola et al., 2003; Pulverman and Golinkoff, 2004).

•In recent research from our laboratory, we explored infants' ability to find the invariant path or manner in a non-linguistic task using motion events (Pruden et al., 2004). This research indicates that infants younger than 10-months-old are unable to abstract out the invariant path and infants younger than 13-months-old are unable to abstract out the invariant manner.

•Research in object categorization shows that linguistic labels play a special role in categorization in infants as young as 9 months (Balaban & Waxman, 1997). These studies show that when infants are given a linguistic label it increases their attention to the objects and facilitates categorization.

•The studies presented here continue our exploration of infants' abilities to abstract out path and manner from motion events. We investigated the role that labels may play in abstracting out both path (Study 1) and manner (Study 2) in infants who were previously unable to do so.

METHOD

PROCEDURE

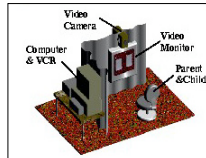


Figure 1. Preferential Looking Paradigm.

•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 seconds.

•One of these clips includes an in-category (familiar) test event, while the other is an out-of-category (novel) test event.

FAMILIARIZATION PHASE

•Infants are familiarized to four 12 second clips while hearing a novel verb label repeated four times.

•Each of these clips shows an exemplar from the category being tested.

TEST PHASE

•Two test trials, each 12 seconds 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 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".

•Importantly, a novel verb label accompanied these events during the familiarization phase.

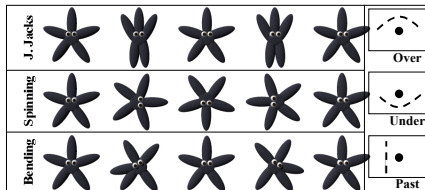


Figure 2. Examples of manners and paths used in stimuli. Though illustrated as series of static postures, the manners were performed as continuous motions (figure from Pulverman and Golinkoff, 2004).

STUDY 1

Can infants find the invariant path across multiple manners when given a novel verb label?

PARTICIPANTS

- Twenty-three 7- to 9-month-olds participated ($M = 8.52$, $SD = .78$; 12 males and 11 females).
- All children from mono-lingual English speaking homes and were full-term at birth.

EXAMPLE OF STIMULI

✓Familiarization Phase: Infants in the *path* condition "over" saw four consecutive exemplars of the starfish performing the same *path*, "over", across four distinct *manners*. For example, they saw "spinning over" followed by "twisting over", "bending over", and "jumping jacks over."

✓During each familiarization trial, infants heard the novel label "javing" repeated 4 times. Over the course of the familiarization phase, infants heard the novel verb label "javing" a total of 16 times.

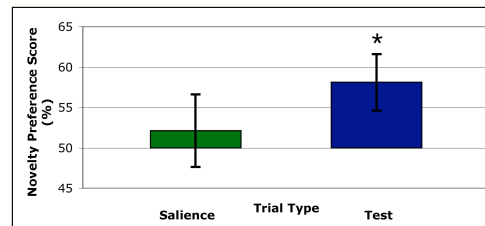
✓Test Phase: Infants were presented with two test events simultaneously: (1) a familiar test event, with the same *path* and a novel *manner* (i.e., a novel exemplar from the familiar category), and (2) a novel test event, with a novel *path* and novel *manner* (i.e., a novel exemplar from a novel category). For example, infants at test would see the event clips "touching toe under" (i.e., novel *manner* and novel *path*) and "touching toe over" (i.e., novel *manner* and same *path*).

✓No linguistic stimuli accompanied the events shown during salience and test phases.

RESULTS

•Initial analyses indicated that there were no effects of condition or sex on novelty preference scores. Therefore, these factors were eliminated from subsequent analyses.

•Planned comparisons (one-sample t-tests compared to a chance value of 50) were used to assess whether infants had a preference for either clip during the salience and test phases.



GENERAL DISCUSSION

- ✓ When given a common label during familiarization, infants previously unable to find the invariant *path* amidst differing *manners* were now able to find the invariant *path*.
- ✓ A common label did not help 7-month-olds find the invariant *manner* amidst varying *paths*.
- ✓ Thus, it appears that even very young infants, when given a common label, can isolate and abstract the invariant properties even when other features of the display are changing.
- ✓ A developmental trajectory appears such that *path* is detected prior to *manner*.
- ✓ The introduction of a novel label facilitated the abstraction of the invariant action during familiarization trials.

STUDY 2

Can infants find the invariant manner across multiple paths when given a novel verb label?

PARTICIPANTS

- Thirteen 7- to 9-month-olds ($M = 8.65$, $SD = .69$; 6 males and 7 females).
- All children from mono-lingual English speaking homes and were full-term at birth.

EXAMPLE OF STIMULI

✓Familiarization Phase: Infants in the *manner* condition "spinning" saw four exemplars of the starfish performing the same *manner*, "spinning", across four distinct *paths*. For example, they saw "spinning over", "spinning under", "spinning past", and "spinning behind."

✓During each familiarization trial, infants heard the novel label "javing" repeated 4 times. Over the course of the familiarization phase, infants heard the novel verb label "javing" a total of 16 times.

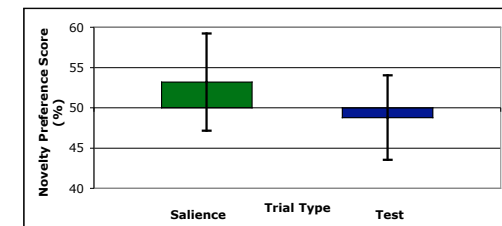
✓Test Phase: Infants were presented with two test events simultaneously: (1) a familiar test event, with the same *manner* and a novel *path* (i.e. a novel exemplar from the familiar category), and (2) a novel test event, with a novel *manner* and novel *path* (i.e., a novel exemplar from a novel category). For example, infants at test would see "spinning around" (same *manner*, novel *path*) and "twisting around" (novel *manner*, novel *path*).

✓No linguistic stimuli accompanied the events shown during salience and test phases.

RESULTS

•Initial analyses indicated that there were no effects of condition or sex on novelty preference scores. Therefore, these factors were eliminated from subsequent analyses.

•Planned comparisons (one-sample t-tests compared to a chance value of 50) were used to assess whether infants had a preference for either clip during the salience and test phases.



REFERENCES

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