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Miriam A. Novack^a, Annette M. E. Henderson^b & Amanda L. Woodward^a

^a The University of Chicago

^b The University of Auckland, New Zealand

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Twelve-Month-Old Infants Generalize Novel Signed Labels, but Not Preferences Across Individuals

Miriam A. Novack

The University of Chicago

Annette M. E. Henderson

The University of Auckland, New Zealand

Amanda L. Woodward

The University of Chicago

By the end of the 1st year, infants expect spoken labels to be extended across individuals and thus seem to understand words as shared conventional forms. However, it is unknown whether infants' willingness to extend labels across individuals is constrained to familiar forms, such as spoken words, or whether infants can identify a broader range of symbols as potential conventions. The present study tested whether 12-month-old infants will extend a novel sign label to a new person. Results indicate that 12-month-olds expect signed object–label relations to extend across agents but restrict object preferences to individuals. The results suggest that infants' expectations about conventional behaviors and linguistic forms are likely broad at 12 months. The implications of these findings for infants' early conceptions of conventional behaviors as well as our understanding of the initial state of the learner are considered.

INTRODUCTION

Words are powerful linguistic tools. Much of the communicative power of words stems from the fact that their meanings are shared by members of a linguistic community. This property, which is one of many consequential properties of words outlined by Clark's principle of conventionality (Clark, 1993), enables speakers to make use of a number of beneficial assumptions about language (see also Sabbagh & Henderson, 2007, 2013). For example, the fact that words are shared allows speakers to expect members of the same language community to respect the same object–label associations (e.g., Buresh & Woodward, 2007; Graham, Stock, & Henderson, 2006; Henderson & Graham, 2005; Henderson & Woodward, 2012; Woodward, Markman, & Fitzsimmons, 1994).

Recent findings suggest that the expectation that words generalize across speakers emerges early in an infant's life (e.g., Buresh & Woodward, 2007; Graham et al., 2006; Henderson & Graham,

2005; Henderson & Woodward, 2012; Woodward et al., 1994). Buresh and Woodward (2007) demonstrated that infants as young as 13 months expect spoken labels to be used consistently by different speakers. In their study, 9- and 13-month-olds were habituated to an event in which an experimenter grasped one of two objects and referred to the object with either a novel word (label condition) or a verbal expression of preference (preference condition). In test events for the label condition, a second experimenter (who was not present during habituation) alternated grabbing each of the two objects while providing the same word label from habituation. In test events for the preference condition, the second experimenter grabbed each object while providing the same verbal expression of preference as did the habituation experimenter. Thirteen-month-olds looked longer when the new speaker violated the established word–object association, but not the preference–object association (see Henderson & Woodward, 2012, for similar results with younger infants). These findings suggest that in the 1st year of life, infants have developed the expectation that words, but not object preferences, are shared forms of behavior.

These prior findings raise the question of how infants determine which human behaviors are conventions. One possibility is that infants learn to identify conventional forms through observing distributional regularities in others' actions, such as noticing that different adults typically use the same words to name referents (see also Diesendruck & Markson, 2011). It is also possible that infants have more abstract expectations that could allow them to interpret even novel, unfamiliar behaviors as potential conventions. Indeed, findings in the early word-learning literature—in particular, research showing that infants can learn a wide variety of intentionally produced symbols as object referents—support this possibility. For example, Namy (2001) demonstrated that 17-month-olds accept a novel gesture, nonverbal sound, and visual pictograms as labels for objects and they extend those nonverbal labels to novel exemplars in a categorization task. In contrast, 26-month-olds were more resistant to novel label forms (Namy, 2008; Namy, Campbell, & Tomasello, 2004; Namy & Waxman, 1998). Woodward and Hoyne (1999) demonstrated a similar developmental pattern that 13-month-olds, but not 20-month-olds, accept a nonlinguistic sound (i.e., a whistle) as a referent for a novel object. Together, the existing research suggests that infants may initially accept a wide range of forms as communicative symbols (see also Namy et al., 2004; Namy, Vallas, & Knight-Schwarz, 2008; Namy & Waxman, 1998, 2002).

These findings raise the question of whether infants might also assume that these symbols are shared, conventional forms. Alternatively, infants may map nonverbal labels onto objects but restrict social properties of language to the symbolic form of their native language (e.g., spoken words). Initial evidence in support of the first of these possibilities comes from Woodward and Hoyne's (1999) study, in which infants recovered information about novel sound labels when they were produced by a second experimenter. In the current study, we directly assessed infants' propensity to generalize novel label forms across individuals. Specifically, we tested whether 12-month-old hearing infants without experience with a signed language assume the same conventional properties of novel signed labels as they do novel spoken labels.

This question was addressed using the visual habituation paradigm developed by Woodward and colleagues (e.g., Buresh & Woodward, 2007; Henderson & Woodward, 2012). Twelve-month-old infants were habituated to an event in which an experimenter grasped one of two objects and referred to the object with either a verbal expression of preference (preference condition) or a novel nonverbal hand sign (signed-label condition). During test trials, the location of the objects was switched and a second experimenter alternated grasping each of the objects in the same manner as that of the first experimenter. If infants consider signed labels

to be conventional forms, infants in the signed label condition were expected to look longer when the second experimenter labeled the nontarget item, thereby violating the object–label relation established in habituation. The preference condition assessed whether the experimental setup and events would lead infants to generalize action information across agents in the absence of a signed label. Based on prior findings, we predicted that infants in this condition would not generalize across individuals (Buresh & Woodward, 2007; Henderson & Woodward, 2012). Greater attention to new-object test trials compared with old-object test trials in the signed-label condition, but not preference condition, would indicate that infants selectively restrict extension to certain actions (i.e., labeling).

METHOD

Participants

Thirty-two 12-month-old full-term infants ($M_{\text{age}} = 12.4$ months; range = 11.6–13.1 months) were recruited from a database of families managed by a large university in the Eastern United States. Infants were selected based on monolingual exposure to English. Twenty-five infants were reported to be White and Non-Hispanic, 1 was Asian, and 4 were Black/African American. Sixteen infants (7 females; $M_{\text{age}} = 12.4$ months) participated in the signed-label condition, and 16 infants (9 females; $M_{\text{age}} = 12.3$ months) participated in the preference condition. Eight additional infants were tested but not included in the final sample because of failure to complete the procedure due to distress ($n = 4$), experimenter error ($n = 2$), or technical problems ($n = 2$). Infants received a small prize and certificate for participating.

Procedure

Training. All infants began the study with training in which they were introduced to two novel objects (see Henderson & Woodward, 2012). Infants sat on their caregivers' laps at a table and watched as the training experimenter entered the room with two toys: the target object and the distractor object. The objects were plastic toys, one blue and one silver, each approximately 15 cm long and brightly colored.

Infants were randomly assigned to either the preference condition or the signed-label condition. For infants in the signed-label condition, the experimenter first picked up the target object and produced the sign label four times adjacent to the object while saying: “Wow! (Sign) Look at this! (Sign) See what I’ve got? (Sign) Yup. (Sign)” She glanced back and forth from the object to the child as she demonstrated the sign to establish joint attention. After interacting with and labeling the target object, the experimenter directed her attention to the distractor object. The experimenter introduced the distractor object using the same vocalizations and glances to the infant but without producing any labels.

The hand sign used to label the target object can be seen in Figure 1. It was akin to the American Sign Language “J” and was always produced with the right hand. The sign involved a flick of the wrist to the right followed by a circular rotation resulting in the palm facing in. This sign was chosen because it was unfamiliar to the infants and had no obvious relation to either object.

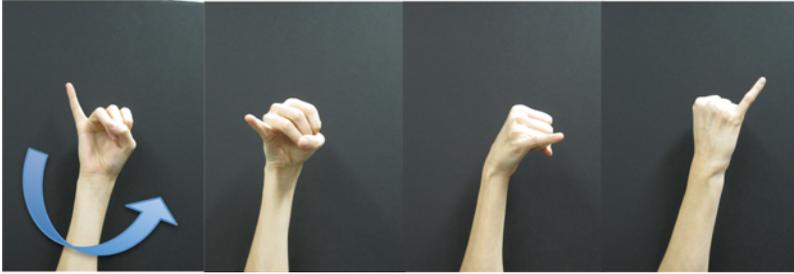


FIGURE 1 The hand-sign label. (Color figure available online.)

In the preference condition, the training experimenter's actions were closely matched to those in the signed-label condition, except that instead of producing the signed label, she provided a verbal expression of preference. She first picked up the target object and said, "Oh wow, I really like this one! This one's my favorite! This is the one I really like," in a positive tone of voice and with positive facial expressions. Just as in the signed-label condition, the experimenter glanced between the infant and object to establish joint attention. Then the experimenter directed her attention toward the distractor object. She also lifted the distractor object and in a disinterested voice said, "This one's pretty colorful. It's pretty fun, huh? This one's pretty neat." In both conditions, the experimenter ensured that the infant was attentive to the demonstration. If the infant looked away, she stopped and called for the infant's attention before continuing.

In both conditions, the experimenter left the room for approximately 5 s in between each of three identical training rounds. Following the last training round, the training experimenter returned to the room with a second female experimenter (the test experimenter), who was wearing a different-colored T-shirt. The two experimenters played a peek-a-boo game with the infant to familiarize him or her with both actors.

Habituation–Dishabituation. Following training, the parent and infant were shown to the habituation room. Infants sat on their parent's lap in front of a small stage that was equipped with a screen that could be raised to block the stage, or lowered to reveal it. A camera hidden at the bottom of the stage recorded the infant's gaze. The recording was relayed to another room in which a trained coder, who was unaware of the infant's condition and could not see the experimental events, coded online when the infant was looking at the event using a computer program to calculate trial length and the habituation criterion (Casstevens, 2007).

At the start of each habituation trial, the screen was lowered to reveal the training experimenter with both objects (see Figure 2). The actor first got the infant's attention by saying "Hi." In the signed-label condition, the actor then looked at the target object, leaned toward it while saying, "Ooo," then glanced at the infant and produced the signed label. She then brought the object close to her face while saying, "Hmm," and produced the sign a second time while looking at the infant. Habituation trials in the preference condition were identical in form and vocalization, except that the experimenter did not sign the label after each vocalization (i.e., she picked up the object saying, "Hi, ooo, hm"). In both conditions, once the experimenter had finished speaking, she maintained her final position of holding the object close to her face until the end of the trial, which occurred when the infant looked away for 2 s or when 120 s had elapsed.

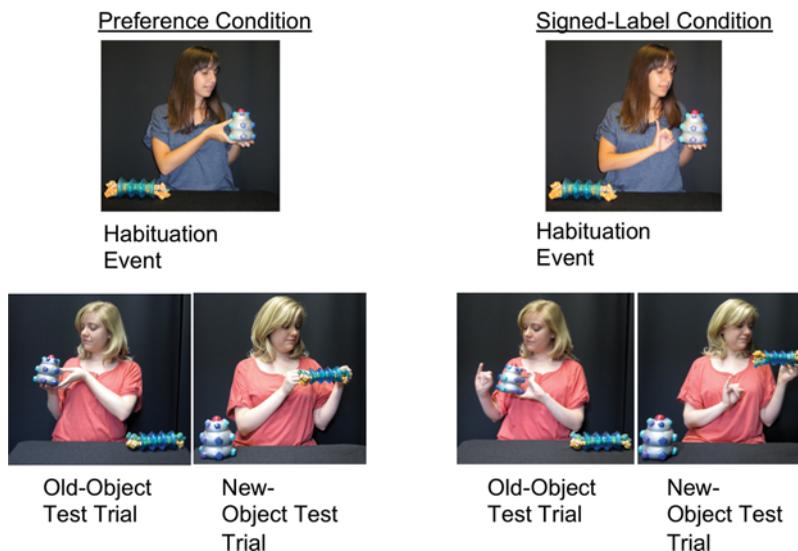


FIGURE 2 Habituation and test events for each condition. (Color figure available online.)

At the conclusion of each habituation trial, the screen was raised to block the stage and the experimenter replaced the target object for the next trial. The habituation events were repeated until infants' looking times during 3 consecutive trials summed to less than 50% of the sum of the first 3 trials, or until 14 trials had passed. Once the habituation criterion was met, or when 14 trials had passed, infants saw 1 additional habituation trial to establish a baseline measure for posthabituation levels of attention.

Following baseline, the location of the two objects was switched and two familiarization trials were administered. In the signed-label condition, the screen was lowered and the training experimenter said, "Hi, where is it? (Sign) Did they switch? (Sign) Where'd it go? (Sign)" The event for the preference condition was identical except that no signed label was produced with the vocalization. After speaking, the experimenter looked down at her lap, motionless, until the infant looked away and the screen was raised. This first familiarization trial allowed the infant to notice the change in location of the two objects. The second experimenter from the peek-a-boo game (the test experimenter) then replaced the first experimenter, and a second familiarization trial was run in the same manner as the first. This second familiarization trial allowed the infant to focus on the change in actor.

Following the two familiarization trials, the infant saw six test trials in which the test experimenter alternated grasping either the target object (old-object trials) or the distractor object (new-object trials). On old-object test trials, the test experimenter picked up the target object while she produced the same vocalizations (and for the signed-label condition, the same signed label) that the first experimenter produced in the habituation event. On new-object test trials, the test experimenter picked up the distractor object while she produced the same vocalizations (and signed label for infants in the signed-label condition) that the first experimenter had produced toward the target object in habituation. The order of the test events (new object or old object first), toy designated as the target object (blue or silver), location of the target object at habituation (right

or left), and identity of the first and second experimenter were all counterbalanced across condition. Infant sex was roughly counterbalanced across conditions.

Following the test trials, parents completed the MacArthur Communicative Development Inventory (MCDI): Words and Gestures (Fenson et al., 1994). Parents also indicated whether their child had experience with “baby signs”—that is, made-up gestures that are sometimes taught to infants to enable communication.

Reliability Coding

All events were recoded offline using the digitized video recording by a second trained coder who was also blind to condition. Agreements were defined as the online and offline coders detecting the same look away as ending a trial. Coders were in agreement on 94% of the test trials. Fisher’s exact tests revealed that the distribution of disagreements was unsystematic across test-event types ($p > .58$, two-tailed).

RESULTS

Infants’ average looking times are summarized in Table 1. Preliminary analyses revealed that infants’ looking times across conditions did not differ with respect to sex, target object (blue or silver), or first test type (old object or new object). Therefore, subsequent analyses collapsed across these dimensions.

We first analyzed infants’ attention during the habituation phase. Because habituation is an infant-controlled procedure, infants received varied numbers of habituation trials, ranging between 6 and 14. Infants in the two conditions did not differ in the number of trials in which they reached habituation (signed-label condition, $M = 8.31$, $SE = 0.77$; preference condition, $M = 9.06$, $SE = 0.84$), $t(30) < 1$, $d = 0.24$, $r = .12$. To evaluate whether infants in the two conditions differed in attentiveness during habituation, we analyzed infants’ looking on the first 3 trials (on which they typically set their habituation criterion) and the last 3 (on which they met the habituation criterion; see Oakes, 2010). A 6 (habituation trial: first, second, third, third to last, second to last, last) \times 2 (condition: signed-label, preference) repeated-measures analysis of variance (ANOVA) demonstrated a significant main effect of trial, $F(5, 26) = 12.26$, $p < .001$, $\eta_p^2 = .70$, indicating that infants’ attention decreased across habituation trials, and no other

TABLE 1
Average Looking Times in Seconds for Infants in the Signed-Label and Preference Conditions Across Habituation and Test Trials

Condition	Habituation trials		Test trials		
	Sum of first three trials	Sum of last three trials	Baseline	Old object	New object
Signed Label	36.52 (4.31)	14.68 (0.92)	6.51 (1.57)	5.05 (0.59)	8.90* (1.21)
Preference	38.52 (5.00)	18.34 (0.84)	7.02 (2.09)	7.13 (0.88)	7.27 (1.16)

Note. Mean standard errors are provided in parentheses.

*Different from the other test event, $p < .05$.

reliable effects. Four infants in the preference condition and two infants in the signed-label condition failed to habituate in 14 trials. Infants in the two conditions also did not differ with respect to their looking times in the first, $t(30) < 1$, $d = 0.26$, $r = .13$, or second, $t(30) = 1.08$, $p = .29$, $d = 0.38$, $r = .18$, familiarization trials.

The principle analyses concerned infants' responses on test trials. We evaluated whether infants in the signed-label condition responded systematically to new-object test trials as compared with old-object test trials, and if so, whether this pattern of response was selective for that condition. Because six infants failed to reach the habituation criterion within 14 trials, the analyses were conducted using both the full sample and a partial sample composed only of those infants who fully habituated. When considering the full sample, we accounted for the relatively longer looking times from infants who failed to habituate by using a measure of average looking time during habituation as a covariate. With the full sample, a 2 (test trial type: new-object, old-object) \times 2 (condition: signed-label, preference) mixed-design analysis of covariance with infants' average looking time on habituation trials as the covariate revealed a significant interaction of test trial type and condition, $F(1, 29) = 4.81$, $p = .036$, $\eta_p^2 = .14$. There were no other significant effects. A 2 (trial type: new-object, old-object) \times 2 (condition: signed-label, preference) mixed-design ANOVA using only the infants who met the habituation criterion also revealed a significant two-way interaction between test trial type and condition, $F(1, 23) = 4.29$, $p = .049$, $\eta_p^2 = .15$. No other effects were significant.

To further explore the interaction between condition and test trial type, we conducted planned-comparison paired t tests within each condition using the full sample. Infants in the signed-label condition looked significantly longer to new-object test trials ($M = 8.90$, $SE = 1.21$) than to old-object test trials ($M = 5.05$, $SE = 0.59$), $t(15) = 3.50$, $p = .003$, $d = 1.00$, $r = .45$. In contrast, infants in the preference condition did not look reliably longer toward either type of test trial, $t(15) = 0.09$, $p = .93$, $d = 0.034$, $r = .017$ (see Table 1).¹ Individual patterns of response were consistent with these results: Twelve of 16 infants in the signed-label condition looked longer at new-object test trials than they did at old-object test trials, $p < .01$ (Wilcoxon Signed Ranks Test), compared with only 7 of the 16 infants in the preference condition, $p = .76$.

Analyses looking at infants' recovery of attention from baseline yielded converging results. Paired-sample t tests comparing infants' looking time at the baseline trial and the first pair of test trials showed that infants in the signed-label condition recovered from baseline when they saw a new-object test trial, $t(15) = 2.27$, $p = .038$, $d = 1.72$, $r = .51$, but not an old-object test trial, $t(15) < 1$, $d = 38.2$, $r = .99$. In contrast, infants in the preference condition recovered from baseline when they saw an old-object test trial, $t(14) = 3.70$, $p = .002$, $d = 1.98$, $r = .70$, but not a new-object test trial, $t(14) = -1.77$, $p = .098$, $d = 0.94$, $r = .42$.² In summary, these results further suggest that infants viewed the novel hand sign, but not the object preference, as a form of behavior that should generalize across speakers.

¹We also conducted paired t tests within the subsamples of infants who habituated in 14 trials. As with the full sample, infants in the signed-label condition ($n = 14$) who habituated looked reliably longer toward new-object test trials than to old-object test trials, $t(13) = 3.55$, $p = .004$, $d = .99$, $r = .44$. Also as in the full sample, infants in the preference condition who habituated ($n = 12$) did not look reliably longer toward either type of test trial, $t(11) < 1$, $d = .10$, $r = .05$.

²One infant in the preference condition had a baseline looking time greater than 2 standard deviations from the mean and was therefore removed from the recovery analysis.

In a final set of analyses, we tested whether infants' relative preference for new-object trials over old-object trials (defined by total looking time on new-object trials/total looking time on all test trials) varied as function of infants' vocabulary (measured by parents' responses on the MCDI), specifically for infants in the signed-label condition. Correlations between these two measures demonstrated that infants' looking patterns were not related to the number of words in their receptive vocabulary ($r = -.21, p = .43$), their productive vocabulary size ($r = -.13, p = .63$), or their production of communicative gestures ($r = -.33, p = .27$). To attempt to evaluate whether experience with "baby signs" was related to infants' responses, infants were split into two groups based on whether they had any previous experience with baby signs.³ Paired-sample *t* tests revealed significantly longer looking on new-object trials than on old-object trials in the experienced group ($n = 6$), $t(5) = 3.66, p = .01, d = 2.99, r = .83$, and a marginal difference in this direction in the inexperienced group ($n = 10$), $t(9) = 2.03, p = .07, d = 1.28, r = .54$. Although the test trial difference was numerically larger for infants with baby sign experience, the current findings do not provide strong evidence that experience with baby signs was necessary for the observed effects. Although previous experience seeing baby signs may strengthen the assumption that novel signs should be shared forms, at the group level, 12-month-olds generalized signed labels across speakers regardless of their experience with baby signs.

DISCUSSION

Previous work has demonstrated that by 9 months, infants expect words to be shared across individuals (Buresh & Woodward, 2007; Henderson & Woodward, 2012). The present research investigated whether this expectation is restricted to spoken labels by introducing infants from monolingual English-speaking homes to events in which actors used signed labels to refer to an object. When infants viewed an experimenter producing a novel signed label for a referent object, they generalized this information to a second experimenter. That is, infants looked longer when she violated the label–referent relation established by the first experimenter than when she acted in accord with this relation. In contrast, when infants saw the first experimenter produce referential actions that expressed a preference, they did not generalize this information to the second experimenter. These results suggest that 12-month-old infants also expect novel signed labels to extend across individuals. Although previous research has established that infants younger than 2 years readily learn a variety of nonverbal symbols as object referents (e.g., Namy, 2001; Woodward & Hoyne, 1999), the present research represents the first evidence that infants anticipate social consequences of those labels.

The experimenters' actions were closely matched in both conditions, differing only in whether they included a signed label or an expression of preference. Infants were equally attentive to these two kinds of events during the habituation trials, and infants in the two conditions were equally attentive overall during the test trials. Thus infants' differential responding on test trials in the preference and signed-label conditions seems not to derive from general differences in attentiveness. Might infants' responses have been driven by more specific differences in attention created by the two kinds of experimental events? Perhaps the signed labels drew infants'

³Parents recorded experience with baby signs but often did not clarify whether infants could only comprehend or could comprehend and produce a particular sign. Sign vocabularies ranged from 2 to 18 signs, with an average of 7.33 signs in infants' vocabularies.

attention to the object more strongly than did the referential actions in the preference condition, for example. Prior findings have shown that hands holding objects and joint attention cues, which were present in both conditions, strongly direct infants' attention to objects (e.g., Woodward, 1998, 2003). We know of no evidence that an arbitrary hand movement near an object increases attention to the object, and it seems possible it could distract attention from the object. Finally, in a prior set of experiments that used this paradigm (Buresh & Woodward, 2007), infants' attention to the object did not predict whether infants would generalize information across actors, but the presence of a conventional form (in that case, a word) did. These considerations lead us to conclude that lower-level factors are unlikely to account for our findings. Instead, we conclude that infants' responses reflected different expectations about how signed labels and expressions of preference pattern across individuals.

The contrasting findings in the preference and signed-label conditions provide evidence that 12-month-olds distinguish between behaviors that are shared conventional forms and those that are not, even given the fact that referential cues (i.e., vocalizations and triadic glances between the infant and referent) were present in both conditions. This result converges with prior findings showing that infants as young as 9 months of age do not expect expressions of preference to be shared across individuals (Buresh & Woodward, 2007; Henderson & Woodward, 2012; see Henderson & Graham, 2005, and Graham et al., 2006, for findings with older infants). Together, these findings contrast with the proposal that infants adopt a broad "pedagogical stance," which leads them to interpret any communicative signal given during joint attention as generalizable across individuals and contexts (Csibra & Gergely, 2006; Gergely & Csibra, 2005, 2006; Gergely, Egyed, & Kirly, 2007). The current study contributes to prior findings suggesting that infants have a more nuanced understanding of others' intentional actions, recognizing that the information provided during joint attention is only sometimes generalizable.

Even so, the current findings leave open several questions concerning the extent to which infants understood the signed label as a meaningful conventional form. Our findings indicate that infants expect different individuals to use a signed label similarly, but they do not reveal whether infants understood the signed label as the name for the referent, rather than as some other kind of conventional action—for example, the conventional use of the object. Understanding the signed label as a name would require understanding it as a behavior that is used to communicate information, expecting it to extend to items in the same category, and expecting it to contrast in meaning with other signs (see Henderson & Woodward, 2012, for a discussion of this issue). The current data do not provide insight into these aspects of infants' sign understanding. By 12 months of age, infants acquiring spoken language show evidence of understanding spoken words in these ways (e.g., Pruden, Hirsh-Pasek, Golinkoff, & Hennon, 2006; Voulomanos, Onishi, & Pogue, 2012; Waxman, 2013). Further, prior research suggests that by 18 months of age, infants expect novel communicative forms, like signs or pictographs, to extend to members of a kind (e.g., Namy, 2001). More research is needed to determine whether younger infants assume that novel signs are meaningful in all the ways that words are.

The current findings also raise the question of how infants identified the signed label as a potential conventional form. The sign was produced with clear behavioral indications that the experimenter intended to communicate with the infant. The experimenter engaged the infant in joint attention and indicated the object while producing the sign. However, these same cues were present in the preference condition, so although they may have been necessary for infants' interpretation of the sign as conventional, these cues alone must not have been sufficient. It seems

likely, therefore, that the form of the sign contributed to infants' interpretation of it as conventional. The sign was designed to involve a set of arbitrary and distinctive features, was produced consistently, and had no obvious instrumental function. Further research is needed to investigate which of these cues indicated the hand sign as a convention, as well as the other sources of information infants may use to identify conventional behaviors.

The finding that 12-month-old infants treat novel communicative signals as shared forms highlights questions about the initial state of the language learner. This result raises the possibility that the origin of an understanding of conventions exists prior to and independent of learning a specific language. Early on, infants may have broad expectations about conventional behaviors, which could then shape their linguistic development. Alternatively, very early language learning may inform infants' initial understanding of conventionality, which may, in turn, be extended to novel symbols, like the signed label used in the current study. Although we found no evidence of a relation between these aspects of early language and infants' responses to the hand signs in the current study, this issue requires further investigation. Studies with younger infants and with larger groups of infants at different ages are needed to provide clearer evidence concerning the role of early language learning in supporting infants' understanding of the conventional nature of communicative signs.

Further, the current findings leave open the possibility that infants considered hand signs as potential conventions because of prior experience with meaningful manual gestures. Parents produce gestures when talking with their infants (Rowe, Özçaliskan, & Goldin-Meadow, 2008), and infants spontaneously produce communicative gestures before they are 12 months old (Bates, 1979). Although naturally occurring gestures do not comprise a conventional system in the way that linguistic forms do, they are used to convey information during communicative exchanges, and this fact may have supported infants' openness to them as conventional forms. Consistent with this possibility, our findings provided a hint that experience with baby signs might have led to stronger responding in the signed-label condition. However, given the small number of infants in our sample who had baby sign experience, we do not feel that we are able to draw conclusions about this very specific form of experience. Furthermore, previous research suggesting that infants accept pictograms and artificial sounds as referential labels (Namy, 2001; Woodward & Hoyne, 1999) indicates that infants may not need any previous exposure with novel forms to view them as conventional.

With respect to the previous work on nonverbal symbols, a final set of open questions concerns the later trajectory of infants' understanding of conventional communicative forms. These prior findings have shown that 13- to 18-month-old infants accept a wide range of novel signals, including manual signs, pictographs, and artificially produced whistles, as labels during communicative interactions, while by 24 months, infants are resistant to accepting labels that deviate from familiar forms (Namy, 2001; Woodward & Hoyne, 1999). It seems likely that the tendency to accept novel forms as labels and the tendency to view these forms as conventional may travel together in later development. For one, it seems possible that as infants become less likely to accept novel forms as labels, they may also become less likely to assume that novel forms are shared across individuals. Conversely, evidence that a novel form is used across individuals may lead older infants to overcome their resistance and accept it as a label. Additional research is needed to test these predictions.

These open questions notwithstanding, the current findings indicate that by 12 months of age, infants are poised to look for conventional forms in others' actions. By this age, infants not only

treat novel behaviors as communicative forms (e.g., Namy, 2001; Woodward & Hoyne, 1999), but also understand the socially shared nature of these forms. These findings shed new light on infants' early and nuanced understanding of the nature of others' intentional actions.

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