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NOTE

The influence of object pre-exposure on two-year-olds' disambiguation of novel labels*

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ABSTRACT

We investigated whether manipulating the perceived novelty of nameless objects would influence two-year-olds' tendency to map novel words to these objects. In Experiment 1, children who had been pre-exposed to target nameless objects were more likely to map novel words onto those objects than children who were not pre-exposed to the objects or children who were pre-exposed to non-target members of the nameless object categories. In Experiment 2, children who were pre-exposed to a nameless object were more likely to assign the novel label to that object than to either a familiar object or an unfamiliar object that had not been pre-exposed. The results of these studies suggest that reducing the novelty of nameless objects increases two-year-olds' tendency to map a novel word to a nameless object.

INTRODUCTION

Consider the following situation: a young child is seated in front of two toys and hears an adult speaker say 'Pass me the *top*.'. If the child does not know

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what a top is, how might she determine what that novel word refers to? Studies have shown that young children are remarkably skilled at exploiting multiple sources of information to establish appropriate mappings between words (e.g. 'ball') and objects (e.g. balls). That is, research has demonstrated that children can rely on socio-pragmatic cues, lexical form class information, object characteristics, and expectations about word reference to form linkages between words and their referents (see Woodward & Markman, 1998; Akhtar & Tomasello, 2000; Bloom, 2000; Hollich, Hirsh-Pasek & Golinkoff, 2000; Baldwin & Moses, 2001 for reviews). In the present studies, we pursued the investigation of one assumption that toddlers possess about word meaning; namely, the expectation that novel words map onto novel objects.

When young children are presented with two objects, one familiar (e.g. a spoon) and one unfamiliar (e.g. a whisk), and are asked for the referent of a novel word, they will consistently map the novel word to the novel object (Hutchinson, 1986; Heiback & Markman, 1987; Markman & Wachtel, 1988; Merriman & Bowman, 1989; Au & Glusman, 1990; Merriman & Schuster, 1991; Golinkoff, Hirsh-Pasek, Bailey & Wenger, 1992). Merriman & Bowman (1989) have labelled this tendency to select the unnamed object the DISAMBIGUATION EFFECT (see also Merriman, Marazita & Jarvis, 1995). Recent studies have demonstrated that this expectation that new words are assigned to novel objects first emerges during late infancy (Mervis & Bertrand, 1994; Evey & Merriman, 1998; Graham, Poulin-Dubois & Baker, 1998; Hollich, Jusczyk & Brent, in press) but that it continues to be quite variable at two years of age (see Merriman *et al.*, 1995 for a review). Indeed, research suggests that two-year-olds' performance on a disambiguation task can be influenced by a number of factors including experimenter feedback (Evey & Merriman, 1998), pre-exposure to the novel objects (Merriman & Bowman, 1989; Merriman & Schuster, 1991), typicality of the familiar object (Merriman & Schuster, 1991), and pre-exposure to similar-sounding words (Merriman & Marazita, 1995; Jarvis & Merriman, 2001). The disambiguation effect for count nouns becomes more reliable during the preschool years but does not extend to proper names or adjectives when children are presented with the contrast between an unfamiliar object and a familiar object (Hall, Quantz & Persoage, 2000). However, when presented with the contrast between a familiar action and a novel action, preschoolers will display a disambiguation effect for a novel action word (Merriman, Marazita & Jarvis, 1993; Golinkoff, Jacquet, Hirsh-Pasek & Nandakumar, 1996).

Researchers have proposed a number of different explanations for the disambiguation effect (see Merriman *et al.*, 1995 for a review). Some researchers have couched their explanations for this phenomenon in pragmatic terms (e.g. Gathercole, 1989). For example, Diesendruck & Markson (2001) argue that children assign the novel word to the novel object in disambiguation tasks as they are motivated to avoid lexical overlap as a

general communicative strategy. Other researchers have interpreted this phenomenon as reflecting default assumptions about word meaning. For example, Markman has proposed that young word learners are guided by a MUTUAL EXCLUSIVITY (ME) constraint and thereby assume that objects can have only one name (Markman & Wachtel, 1988; Markman, 1989; see also Merriman & Bowman, 1989; Merriman, 1991). In contrast, Golinkoff, Mervis & Hirsh-Pasek (1994) argue that children adhere to the NOVEL NAME-NAMELESS CATEGORY PRINCIPLE (N3C), which states that novel words map to previously unnamed objects (see also Hollich *et al.*, 2000). Finally, Merriman and his colleagues have proposed that young children's disambiguation may be guided by a FEELING OF NOVELTY (FN) principle, which is the assumption that novel labels should be assigned to objects that seem *new* to the child (Merriman *et al.*, 1993; Merriman *et al.*, 1995). In contrast to the ME and N3C principles, this principle suggests that it is the 'newness' and not necessarily the nameability, that influences children's tendency to map the novel word to the novel object. Thus, the more novel an object is, the more likely children should be to assign the novel label to that object.

In the present study, we pursued the investigation of two-year-olds' assumption that novel words map to novel objects with particular focus on predictions made by the FN principle. More specifically, we examined whether manipulating the perceived 'newness' of novel objects would influence two-year-olds' tendency to map novel words to novel objects in a disambiguation task. To date, two studies have demonstrated that reducing the token novelty of unfamiliar objects by pre-exposing them can lead to either a reversal of the disambiguation effect or a reduction in its potency (Merriman & Bowman, 1989; Merriman & Schuster, 1991). For example, Merriman & Bowman (1989, Expt. 1) found that two-year-olds tended to assign novel words to non-pre-exposed FAMILIAR objects, rather than to pre-exposed UNFAMILIAR objects. Although these findings suggest that the FN principle may account for two-year-olds' performance on disambiguation tasks, one methodological issue with these studies prevents a clear acceptance of this conclusion. In both studies, children were not exposed to the familiar object kinds until the disambiguation task. As such, it is possible that children were not actually mapping the novel labels to the familiar objects, but were demonstrating a preference to interact with the 'new' familiar object (see also Markman, 1991 for a similar discussion).

In Experiment 1, we examined whether pre-exposing children to either a target nameless object or nontarget members of the nameless object category during a pre-exposure phase subsequently influenced children's tendency to select a nameless object as the referent of a novel word in a disambiguation task. Children were presented with either target nameless objects (the Object-Exposure group), nontarget exemplars of the nameless object

category (the Category-Exposure group), or unrelated familiar objects (the Unrelated-Exposure group) during a pre-exposure phase. During this phase, the experimenter taught the children in the Object-Exposure group and the Category-Exposure group a property of each target object or object set (e.g. turkey baster: 'you can squeeze this'). Following pre-exposure, children were presented with a series of word-mapping trials. On each trial, children were given a familiar object (e.g. a cup), and one of the nameless objects (e.g. a turkey baster) and allowed to play with both of them for a short interval. Following this play interval, children were asked to find the referent of either a familiar label or a novel label.

Our study differs from previous work on three dimensions. First, we included two control conditions: the Unrelated-Exposure group and the Category-Exposure group. The comparison of the Unrelated-Exposure group to the Object-Exposure group allowed us to assess whether pre-exposing children to the target objects influenced their subsequent word mapping. The comparison of the Category-Exposure group to the Object-Exposure group allowed us to assess the role of token novelty versus type novelty. That is, we could compare whether pre-exposing children to a member of the same kind versus pre-exposing children to a specific object differentially affects their subsequent word mapping. Second, we pre-exposed objects either one at a time (Object-Exposure group) or one category at a time (Category-Exposure group), rather than in a group as in previous studies (i.e. Merriman & Bowman, 1989). This allowed us to ensure that children had attended specifically to each object that was pre-exposed. Third, and most importantly, we allowed children to play with both the unfamiliar object and the familiar object for a short interval before the word-mapping trials. This allowed us to reduce the likelihood of children subsequently showing a preference for a salient object when asked to map the novel words. It is important to note, however, that while this manipulation reduced the salience of the objects, within the context of the experiment, the familiar object had still been seen less than the pre-exposed nameless object.

If the FN principle is indeed guiding children's word-mapping performance, then reducing the novelty of the nameless object (the Object-Exposure group) should reduce children's tendency to map the novel word onto the nameless object relative to children who have not received this pre-exposure (the Unrelated-Exposure group) or were pre-exposed to the object category (Category-Exposure group). Alternatively, it is possible that that teaching children about an object property during the pre-exposure phase could be viewed by the children as evidence of experimenter's referential intent. Studies have demonstrated that children can rely on socio-pragmatic cues such as a speaker's gaze direction (e.g. Baldwin, 1991, 1993; Moore, Angelopoulos & Bennett, 1999), and a speaker's affective and behavioural cues (e.g. Tomasello & Barton, 1994) to map words onto referents. If children

did view the experimenter's attention to a nameless object during the pre-exposure period as evidence of her intention to refer to that object and they can track these intentions over time, then children in the Object-Exposure group should show an increased tendency to map the word onto the nameless object than children who have not received this pre-exposure (the Unrelated-Exposure group).

EXPERIMENT 1

METHOD

Participants

Eighty-four two-year-old children participated in this study. Children were recruited from daycares, preschools, and health clinics and were all from homes in which English was the primary language spoken. Four additional children were excluded from the final sample for one of the following reasons: not responding to the test questions ($n=3$), or parental reinforcement during the test trial ($n=1$). Children were randomly assigned to one of three conditions, each including 28 participants: the Object-Exposure group (mean age = 2;7; *S.D.* = 0·19), the Category-Exposure group (mean age = 2;7, *S.D.* = 0·24) or the Unrelated-Exposure group (mean age = 2;8, *S.D.* = 0·17).

Materials

The test stimuli were six unfamiliar and six familiar objects. The familiar test objects were as follows: a cup, a miniature chair, a baby bottle, a toothbrush, a toy car, and a spoon. The unfamiliar test objects/test object categories were as follows: a turkey baster, a honey dipper, a clothes line pulley, a corkscrew, a bottle top, and an apple corer. The members of the unfamiliar test object categories were identical except for colour. To ensure that children in this age range would not have labels for these objects, we conducted a pre-test with a group of 10 four-year-old children (5 males and 5 females, mean age = 4;6, *S.D.* = 0·25). We presented this group of children with 18 unfamiliar objects, one at a time, and asked them to provide the name of the object. At least nine of the ten children were unable to generate a label for each of the six objects we included in this experiment.

The functions used to describe unfamiliar objects during the pre-exposure phase (Object-Exposure group and Category-Exposure group) were as follows: turkey baster: 'squeeze it', honey dipper: 'tap it', clothesline pulley: 'roll it', corkscrew: 'spin it', bottle top: 'turn it', apple corer: 'twirl it'. The labels used to request each unfamiliar object during the test trials were (in the order listed above): fep, pagon, blicket, dax, widget, mido. Six additional familiar objects were used in the Unrelated-Exposure group: a teddy bear, a stuffed duck, a stuffed monkey, a stuffed cat, a small plastic elephant, and a

small plastic horse. For all children, a monkey puppet was used to pose the test questions, and a small cafeteria tray was used to present the objects to the child when the test question was asked.

Procedure

Testing took place either in the research lab or within the child's daycare centre. The experimenter sat directly across from the child, either at a small rectangular table or on the floor. All children participated in a pre-exposure phase and twelve test trials. The entire procedure was divided into two blocks which each consisted of a pre-exposure phase followed by six word-mapping trials. For both familiar and unfamiliar objects, the objects to be included in each block of testing were counterbalanced across children.

Object-Exposure group. In the first block, each child was pre-exposed to three of the six unfamiliar objects, one at a time, and shown a property of each (e.g. turkey baster: 'look, you can squeeze this'). After the experimenter had demonstrated the property of one object, she handed it to the child and the child was allowed to play with it for approximately 30 seconds. This procedure was then repeated for the remaining two objects. In this and all other groups, on the rare occasion that a child asked the experimenter for the name of an object (i.e. by saying, 'What's this?'), she simply said 'mmmm', without indicating that she knew the name of the object.

Following pre-exposure to the three unfamiliar objects, the child was presented with a series of six word-mapping trials, using the three unfamiliar objects seen during the pre-exposure phase and three of the familiar objects. On each trial, the child first was presented with a familiar object (e.g. cup), and one of the unfamiliar objects he or she had seen during pre-exposure (e.g. turkey baster). The child was then allowed him to play with this pair of objects for a period of approximately 15 seconds. The objects were then placed on a tray and the child was asked to find the referent of either a familiar label ('Show Monkey the *cup*'), or a novel label ('Show Monkey the *fep*'). Each unfamiliar object and each familiar object was requested once, and the familiar and unfamiliar object pairings were randomized such that no pairing occurred twice in the six trials.

The second block of pre-exposure and test trials followed immediately, using the remaining three unfamiliar objects, and the remaining three familiar objects.

Category-Exposure group. In the first block of trials, children were pre-exposed to two exemplars from three categories of unfamiliar objects. The experimenter showed the child an object belonging to a specific category of objects (e.g. a black turkey baster), and demonstrated a function of that object (e.g. 'You can squeeze this'). The experimenter then showed the child a second object (e.g. a white turkey baster), alerted the child to the fact that the

two objects were from the same category ('Look, these are the same'), and demonstrated the function of the second object ('You can squeeze this'). The child was allowed to play with the pair of objects for approximately 30 seconds. The experimenter then pre-exposed the remaining two categories of objects, using the same procedure.

Following pre-exposure to the three sets of unfamiliar objects, the child was presented with six word-mapping trials. On each trial, the child was presented with a familiar object (e.g. cup), and a NOVEL EXEMPLAR of one of the unfamiliar categories he or she had seen during pre-exposure (e.g. a brown turkey baster). He or she was allowed to play with this pair of objects for approximately 15 seconds. The objects were then placed on a tray in front of the experimenter, and the child was asked for the referent of either a familiar label ('Show Monkey the *cup*'), or a novel label ('Show Monkey the *fep*'). The second block of pre-exposure and test trials followed immediately.

Unrelated-Exposure group. In the first block, the child was pre-exposed to three familiar objects one at a time (e.g. a stuffed monkey), and was allowed to play with each object for approximately 30 seconds. These familiar objects were not used in any subsequent test trials. The objects presented and procedure used for the word-mapping trials were identical to those used with the object-exposure group and the category-exposure group.

Children's responses, consisting of pointing at, touching, or picking up an object, were recorded.[1] In all groups, the particular familiar and unfamiliar objects that were included in each testing block were counterbalanced across children. The order of object pre-exposure, unfamiliar and familiar object pairing, and object test trial presentation and request were first randomized across children. These orders were then yoked across groups to ensure that any conceivable effect of order or pairings would be constant across all three conditions.

RESULTS AND DISCUSSION

The primary question of interest was whether interacting with either a target novel object or nontarget members of the novel object category during a pre-exposure phase subsequently influenced children's tendency to select a novel object as the referent of a novel word in a disambiguation task. To assess this question, we first computed the percentage of correct choices for the novel

[1] Given that children were tested in daycare centers, it was difficult to videotape their responses in order to obtain reliability measures. The only data recorded was the object children selected in response to each object request; the researcher recorded children's responses as they occurred during the procedure. Because the coding required is relatively simple, we did not deem it necessary to do reliability coding on this data. We note that this is in keeping with other studies using this methodology (e.g. Merriman & Schuster, 1991).

TABLE 1. *Experiment 1: mean percentage of correct choices on the novel and familiar word-mapping trials as a function of group*

Group	Familiar word trials	Novel word trials
Object-Exposure	98·81 (4·34)	91·67 (11·57)
Category-Exposure	98·81 (4·34)	79·52 (22·37)
Unrelated-Exposure	99·41 (3·15)	83·33 (16·98)

and familiar word-mapping trials for the three groups of children. The means are presented in Table 1. We then compared the mean percentage of correct choices objects to chance-levels (50%) for each group, using one-sample t-tests. All of the one-sample t-tests were significant, $p < 0{\cdot}001$; that is, children in all three groups correctly selected both the familiar referents and the novel referents at a level significantly above chance.

To examine possible group differences on performance on the word-mapping trials, we performed a (3) group × (2) word-mapping trial type mixed factor ANOVA on these data. This analysis yielded significant main effects of group, $F(2, 81) = 2{\cdot}23$, $MSE = 163{\cdot}55$, $p < 0{\cdot}05$ and word-mapping trial type, $F(1, 81) = 52{\cdot}74$, $MSE = 159{\cdot}83$, $p < 0{\cdot}001$. The group by word-mapping trial by type interaction was also significant, $F(2, 81) = 3{\cdot}47$, $MSE = 159{\cdot}83$, $p < 0{\cdot}05$. Examination of this interaction, using protected t-tests revealed no significant differences between the three groups on the familiar word-mapping trials (all t-tests non-significant). Significant group differences did emerge, however, on the novel-word mapping trials. Children in the Object-Exposure group were significantly more likely to map the novel word onto the nameless objects than children in the either the Category-Exposure group or the Unrelated-Exposure group, $t(81) = 3{\cdot}39$, $p < 0{\cdot}05$ and $t(81) = 2{\cdot}33$, $p < 0{\cdot}05$, respectively. Children in the Category-Exposure group and the Unrelated-Exposure group did not differ from one another in the number of correct novel word-mappings, $t(81) = 1{\cdot}06$, $p > 0{\cdot}05$. These findings indicate that pre-exposing children to the target nameless objects, but not to the nontarget members of the nameless object category, enhanced their tendency to map novel labels to these objects.

Children in all three groups mapped the novel word to the novel object at above-chance levels, suggesting that children in this age range have a clear expectation that novel words are assigned to unnamed objects. Contrary to predictions made by the FN principle, however, pre-exposing children to either the specific novel object or the novel object category did not decrease their tendency to map the novel words to the novel object. In fact, children in the Object-Exposure group were more likely than children in either the Category-Exposure group or the Unrelated-Exposure group to map the

novel word to the novel object. These results indicate that teaching children about a property of a target nameless object, but not about the nontarget exemplars of the nameless object category, increased their willingness to assign a novel label to that object, consistent with the prediction that children may view the experimenter's actions during the pre-exposure phase as evidence of referential intent.

EXPERIMENT 2

In Experiment 2, we conducted a more direct contrast of the relative influence of experimenter cues and feelings of novelty of children's tendency to map novel words to novel objects. We presented children with three objects on the word-mapping trials: one unfamiliar object that had been pre-exposed, a novel object that had not been pre-exposed, and a familiar object. We expected that if the feeling of novelty influences performance in a disambiguation task, children would be more likely to select the nameless object that had not been pre-exposed when asked for the referent of a novel word. In contrast, if children do view the experimenter's actions during the pre-exposure phase as evidence of evidence of referential intent, children would be more likely to select the pre-exposed nameless object when asked for the referent of a novel word.

METHOD

Participants

Sixty children, aged 2;0 to 3;0 participated in this study. Participants were recruited through advertisements in local papers, television stations, and health clinics and were all from homes in which English was the primary language spoken. An additional 8 children were tested but excluded from the final sample due to one of the following reasons: experimenter error ($n=3$), or inattentiveness and/or uncooperative behaviour during the testing procedure ($n=5$). Participants were randomly assigned to one of two conditions: the Object-Exposure group ($n=30$, 16 males and 14 females, mean age = 2;6, *S.D.* = 0·26) and the Unrelated-Exposure group ($n=30$, 16 males and 14 females, mean age = 2;6, *S.D.* = 0·30).

Materials

Twelve unfamiliar objects and six familiar objects were used in both the Object-Exposure group and the Unrelated-Exposure group. As in Experiment 1, the familiar objects used in both groups included a cup, a miniature chair, a baby bottle, a toothbrush, a toy car, and a spoon. The unfamiliar objects included the same six unfamiliar objects used in

Experiment 1, with the addition of a garlic press, an odd foam shape, an oddly-shaped hole punch, a magnet, a sink plunger, and a water filter. These latter six objects were also pre-tested with the group of four-year-olds (described in Experiment 1) to ensure that children were not familiar with the names of these objects. The functions used to describe these additional objects during the pre-exposure phase (Object-Exposure group) were as follows: garlic press: 'open it', odd foam shape: 'bend it', oddly shaped hole punch: 'push it', magnet: 'pull it', sink plunger: 'squish it', water filter: 'shake it'. The same six additional familiar toys used in the Unrelated-Exposure groups of Experiment 1 were also used in the Unrelated-Exposure condition of Experiment 2. A monkey puppet was used to pose the test questions, and a small cafeteria tray was used to present the objects to the child when the test question was asked. The same functions and labels used in Experiment 1 were used for the unfamiliar objects.

Procedure

Testing took place in the research laboratory. The experimenter sat directly across from the child at a small rectangular table. As in the first experiment, all children participated in a pre-exposure phase and twelve test trials. The entire procedure was divided into two blocks, which each consisted of pre-exposure to three objects, and six word-mapping trials.

Object-Exposure Condition. In the first block, the experimenter pre-exposed the child to three of the unfamiliar objects one at a time, and demonstrated a property of each (e.g. a turkey baster: 'Look, you can squeeze it'). After the experimenter had demonstrated the property of one object, she handed it to the child and the child was allowed to play with it for approximately 30 seconds. She then repeated this procedure with the remaining two objects.

Following pre-exposure to the three unfamiliar objects, the child was presented with a series of six word-mapping trials. On each trial, the child was presented with a familiar object (e.g. a cup), one of the unfamiliar objects he or she had seen during pre-exposure (e.g. a turkey baster), and a non-pre-exposed unfamiliar object. He or she was then was allowed to play with all three objects for approximately 15 seconds. The objects were then placed on a tray in front of the experimenter, and the child was asked for the referent of either a familiar label ('Show Monkey the *cup*'), or a novel label ('Show Monkey the *fep*'). The referents of the novel and familiar labels were each requested once, and the familiar and unfamiliar object groupings were randomized such that no grouping occurred twice in the six trials. The second block of pre-exposure and test trials followed immediately, using the remaining unfamiliar and familiar objects.

Unrelated-Exposure Condition. The pre-exposure phase of each trial block was identical to that of Experiment 1. On the word-mapping trials, the

TABLE 2. *Experiment 2: mean percentage of object choices on the novel and familiar word-mapping trials as a function of group*

	Group			
	Object-Exposure		Unrelated-Exposure	
Object	Familiar word trials	Novel word trials	Familiar word trials	Novel word trials
Pre-exposed novel object	1·67 (5·09)	46·67 (19·28)	0	38·33 (18·13)
Non-pre-exposed novel object	2·22 (7·24)	39·44 (24·17)	1·67 (5·09)	46·11 (19·91)
Familiar object	96·11 (10·43)	13·89 (15·21)	98·33 (5·09)	15·56 (25·50)

experimenter presented each child with three objects: two unfamiliar objects, and one familiar object and asked the child for the referent of a novel or familiar word.

In both groups, children's responses, consisting of pointing at, touching, or picking up an object, were recorded. The unfamiliar objects selected to serve as pre-exposed novel objects and non-pre-exposed novel objects were counterbalanced across all of the participants in the Object-Exposure group. In the testing phases of both conditions, the order of object pre-exposure, unfamiliar and familiar object grouping, and object test trial presentation and request were first randomized across participants. These orders were then yoked across groups.

RESULTS AND DISCUSSION

The primary question of interest was whether pre-exposing children to a specific nameless object would influence their tendency to map a novel word to that object, when faced with a choice between the pre-exposed nameless object, a novel nameless object, and a familiar object. To assess this question, we first computed the percentage of correct choices for familiar word-mapping trials and the percentage of correct choices of the PRE-EXPOSED NAMELESS OBJECT[2] for the novel word-mapping trials for the two groups of children.[3] The means are presented in Table 2. We then compared the mean

[2] Clearly, there were no pre-exposed objects in the Unrelated Exposure group. However, participants in the Unrelated Exposure group were yoked to participants in the Pre-exposure group, allowing us to make this comparison.

[3] We only tested the chance probability of selecting the pre-exposed novel object as this was the comparison of theoretical interest. Furthermore, the mean percentage of choices of the pre-exposed novel object, the non-preexposed novel object and the familiar object are linearly dependent and thus, the comparisons would be nonorthogonal.

percentage of correct choices to chance-levels (33%) for each age group, using one-sample t-tests. Within the Object-Exposure group, children chose both the familiar referents on the familiar word trials and the pre-exposed nameless objects on the novel word trials at above chance-levels (both t-tests $p<0{\cdot}01$). In contrast, children in the Unrelated Exposure group chose the familiar referents but not the nameless objects (that had been pre-exposed in the Object-Exposure group) at above chance-levels $t(29)=70{\cdot}25$, $p<0{\cdot}001$ and $t(29)=1{\cdot}61$, $p>0{\cdot}05$, respectively.

To examine the possible group differences on performance on the word-mapping trials, we performed a (2) group × (2) word-mapping trial type mixed factor ANOVA on these data. This analysis yielded a significant main effect of word-mapping trial type, $F(1, 58)=435{\cdot}38$, $MSE=206{\cdot}34$, $p<0{\cdot}001$ and a significant group by word-mapping trial type interaction, $F(1, 58)=4{\cdot}05$, $MSE=206{\cdot}34$, $p<0{\cdot}05$. Examination of this interaction, using protected t-tests, revealed no significant differences between the two groups on the percentage of correct familiar word-mappings, $t(58)=0{\cdot}60$, $p>0{\cdot}001$. In contrast, children in the Object-Exposure group were significantly more likely to map the novel word onto the pre-exposed novel object than children in the Unrelated-Exposure group, $t(58)=2{\cdot}26$, $p<0{\cdot}01$.

Contrary to the predictions made by the FN principle, children who were pre-exposed to unfamiliar objects were more likely to choose the pre-exposed object as the referent of a novel word than children who were not pre-exposed to any of the unfamiliar objects. Consistent with the results of Experiment 1, pre-exposing children to a nameless object increased the likelihood that children will choose that object in a subsequent disambiguation task, an issue discussed further in the General Discussion.

GENERAL DISCUSSION

In the present experiments, we examined the role of relative novelty in guiding two-year-olds' tendency to map novel words to novel objects in a disambiguation task. Children were pre-exposed to either target nameless objects (Expts. 1 and 2), nontarget exemplars of nameless object categories (Expt. 1), or unrelated familiar objects (Expts. 1 and 2). The results of Experiment 1 indicate that children who had been pre-exposed to a specific nameless object were more likely to assign a novel word to that object than children who had been pre-exposed to the nontarget members of the nameless object category (but not the specific token) or children who had been pre-exposed to unrelated familiar objects. The results of Experiment 2 indicate that children who had been pre-exposed to the nameless object were more likely to assign the novel label to that object when faced with a choice amongst a familiar object, a novel nameless object and a pre-exposed nameless object than children who were not pre-exposed to the nameless

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object. These findings suggest that reducing the relative novelty of an unfamiliar object actually increased children's tendency to map a novel word to that object, contrary to predictions made by the FN principle. Recall that adherence to this principle would direct children to choose the referent of a new word on the basis of how UNFAMILIAR a certain entity feels. In both studies, we found that children were more likely to map the novel word to the nameless object when it had been pre-exposed.

Our findings that pre-exposing novel objects increases subsequent novel-word mapping performance contrasts with those of Merriman and colleagues who found that reducing the token novelty of unfamiliar objects decreased children's subsequent tendency to map novel words to these objects (Merriman & Bowman, 1989; Merriman & Schuster, 1991). There are a number of key differences between our tasks and those used by Merriman and his colleagues that may account for these discrepancies in findings. First, we pre-exposed objects one at a time, rather than in a group as in previous studies (i.e. Merriman & Bowman, 1989). Second, and perhaps more importantly, we allowed children to play with the objects for a short interval before the word-mapping trials, thereby reducing the likelihood of children subsequently showing a preference for a salient object when asked to map the novel words. Note, however, that in both Experiment 1 and Experiment 2, one object was still relatively more novel than the others. Thus, if children's novel word-mapping was motivated by a feeling of novelty, they should have mapped the novel label to the familiar object (Expt. 1) or the non-pre-exposed nameless object (Expt. 2). Finally, children in the previous studies were on average younger than the children in the present study. It is possible that this age difference might account for the discrepancies between the studies, however we feel that the aforementioned differences may explain the discrepancies more adequately.

Why might pre-exposing novel objects actually increase children's tendency to map words to these objects? Our results suggest that teaching children about an object property during the pre-exposure phase was viewed by the children as intentional behaviour towards that object. That is, children's registration of the experimenter's intentional behaviour directed towards the pre-exposed object was later used by the children to map a novel name onto that same object. Interestingly, the experimenter's attention to the category of novel objects did not assist children in mapping a word to an object from that same category. This suggests that the facilitative effect of the experimenter's attention is specific to particular objects, rather than object categories.

The proposal that children viewed the experimenter's attention to the novel object as an indication of intentional behaviour is consistent with a large body of research indicating that children can rely on a number of non-linguistic cues to assist them in linking object words with their referents.

For example, studies have documented that children can rely on socio-pragmatic cues such as a speaker's gaze direction (e.g. Baldwin, 1991, 1993; Moore *et al.*, 1999), a speaker's affective and behavioural cues (e.g. Tomasello & Barton, 1994), and the relative novelty of objects in the discourse context (e.g. Akhtar, Carpenter & Tomasello, 1996) to map words onto referents. Our findings contribute to this literature in the following ways: first, our findings demonstrate that attentional or social cues can offer incremental support to two-year-olds' expectation that novel words map onto novel objects. Second, our findings demonstrate that children can track a speaker's intentions over a period of time. Recall that, when children were asked for the referent of a novel label, children who were pre-exposed to the function of a novel object were more likely to map the novel label onto the pre-exposed object. Thus, it appears that two-year-olds can use intentional cues provided by a speaker outside of the naming context to guide subsequent word learning. Put differently, when a speaker treats an unfamiliar object differently and are later asked to select the referent of a new word, children interpret the pre-exposure as evidence that novel word refers to that object. Third, our findings demonstrate that the incremental effect of these cues is specific to particular objects. Recall that when the experimenter pre-exposed the nontarget members of the nameless object category, but not the specific test object, there was no facilitative effect on later word-mapping trials.

When considered with other research, the results of the present studies provide insights into the varying influence of object novelty on young children's performance on disambiguation tasks. Thus, it may be that object novelty or salience may play an initial role in young children's disambiguation of novel labels, as was the case in Merriman and colleagues' studies. However, when salience is reduced or removed, as in the present studies, children will rely on other cues to guide their word-referent mappings. Our results demonstrate that singling out a nameless object prior to word-mapping trials facilitates children's subsequent tendency to map a novel label to that object.

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