Young children's expectation of competence in word learning*

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ABSTRACT

The study investigates a social–pragmatic expectation that may motivate children to search their environment when asked for the referent of a novel label. In one experimental phase, the experimenter presented 40 two-year-olds a bucket containing a novel object and another visible object – either familiar or novel. The experimenter either asked children for the referent of a novel label, or a non-specific question. In a second experimental phase, all children saw a bucket containing a novel object, and two visible objects – one familiar and one novel. We found that, in both phases, children tended to bypass the visible novel object, preferring instead to search inside the bucket for the referent of a novel label. These findings are consistent with an expectation – dubbed the EXPECTATION OF COMPETENCE – that if an adult asks a child for the referent of a name, it is because the adult likely believes that the child knows that name, and thus the child can expect to be capable of finding its referent.

INTRODUCTION

There are numerous explanations as to how children acquire words. Attentional-learning accounts emphasize the role of automatic mechanisms of perception and attention guided by learned associations (Smith, 1999). Lexical constraints accounts postulate the existence of a series of principles that *a priori* drive children's inferences about the meanings of words (Markman, 1989; Golinkoff, Mervis & Hirsh-Pasek, 1994). Social-pragmatic accounts stress the importance of communicative patterns and

children's capacity to infer speakers' intents (L. Bloom, 1998; Akhtar & Tomasello, 2000; P. Bloom, 2000; Baldwin & Moses, 2001).

One arena in which there has been some recent debate among these accounts, especially between the latter two, is in explaining children's tendency to map a novel name onto an unfamiliar, rather than a familiar, object – the so-called DISAMBIGUATION EFFECT (Merriman & Bowman, 1989). A number of lexical principles have been offered to explain this effect. According to the mutual exclusivity bias (ME), children have a default bias to accept only one name per object. Thus, when facing a novel and a familiar object, and asked for the referent of a novel name, ME leads children to reject the name as a second label for the familiar object, assigning it to the novel object (Markman & Wachtel, 1988). According to the novel-name nameless-category principle (N3C), children's tendency is a positive one – to assign names for objects without names (Mervis & Bertrand, 1994). Finally, the lexical-gap-filling principle (LGF) argues that the response derives from the encounter of an unfamiliar object – an encounter that motivates children to find a name for the object (Merriman & Bowman, 1989).

The social–pragmatic account of this effect rests on the presumption that children have certain expectations about people's referential intents. The argument is that children believe that there are conventional forms to express certain meanings, Clark's (1988; 1990) PRINCIPLE OF CONVENTIONALITY, and that when speakers use different forms they likely have different communicative intents, Clark's (1988; 1990) PRINCIPLE OF CONTRAST. Consistent with a Principle of Contrast, Diesendruck & Markson (2001) found that children showed a disambiguation effect not only when asked for the referents of novel labels but also when asked for the referents of novel facts. However, and consistent with a Principle of Conventionality regarding words, children assumed that an absent speaker would know the novel names they had been taught, but would not know the novel facts. Actually, Diesendruck (2005) found that children hold this assumption about the conventionality of words with respect to count, but not proper, nouns, and with respect to speakers who are knowledgeable, rather than ignorant, of the language in which the words were taught.

As hinted above, the various accounts of the disambiguation effect differ not only in terms of the specific mechanisms arguably involved, but also in terms of the particular motivation driving the effect. Specifically, while ME implies a motivation to *avoid* two labels for a single object (though see Markman, Wasow & Hansen, 2003), N3C and LGF imply a SEARCHING motivation, the former driven by the presence of a novel label, and the latter by the presence of a nameless object (see also Mervis & Bertrand, 1994; Momen & Merriman, 2002). As for the social-pragmatic account, *a priori*, the Principles of Conventionality and Contrast allow two labels to be

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applied to the same referent as long as the labels clearly have different meanings. However, given that in the standard disambiguation context no obvious difference in meaning is provided, the two principles may motivate children to avoid a second label for a familiar object. The principles do not dictate, however, that children should go on and choose an alternative referent for the novel label. In order to account for such a motivation, the social–pragmatic perspective may recruit the more general notions of COOPERATION (Grice, 1975) or RELEVANCE (Sperber & Wilson, 1986), which imply that speakers tend to use maximally relevant utterances that require minimal effort to be interpreted correctly. In the disambiguation context, these notions would lead children to infer that there likely is a referent for the novel word in the immediate situation.

The standard forced-choice paradigm used to assess the disambiguation effect does not allow a clear-cut definition of the specific motivation driving children's responses. In this paradigm, children are shown familiar and unfamiliar objects (often times one of each), and are asked to give the experimenter the referent of a novel name (e.g. 'Show me the *dax*.'). Children's selection of the novel object could thus be attributed either to a motivation to avoid a second name for the familiar object, or to search for the referent of the novel name.

Aware of this interpretive problem with the standard paradigm, two recent studies used a new methodology in attempts to disentangle children's motivation. In Markman *et al.* (2003), children between 1;3 and 1;8 years of age were shown a familiar object and an opaque bucket containing an object. In different trials, the experimenter asked the children to find the referent of a familiar label, a novel label, or 'to find one' (i.e. a non-specific question). Markman *et al.* found that children were more likely to search inside the bucket when asked for the referent of a novel label than when asked either a familiar label or a non-specific question. Moreover, the same pattern of findings was obtained when a bucket was not presented to children. Markman *et al.* concluded that even before a vocabulary spurt, children already respond in a way consistent with ME. As they point out, however, the findings are also consistent with the social–pragmatic account. Momen & Merriman (2002) used a similar methodology, but instead of presenting children with a familiar object outside the bucket, the experimenter showed children a picture of an unfamiliar object. In their studies, two-year-olds participated in a number of different training conditions, and were only asked novel label questions. Momen & Merriman found that, without explicit training on the mapping of novel names to novel objects, children's tendency was to check inside the bucket before selecting the referent of a novel label. In other words, even though there was a novel object visible to the children, children did not immediately map the novel name onto it – a response unpredicted by either ME, N3C, or LGF.

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The goal of the present study is to provide, and test, a social–pragmatic account of children's promptness to actively search for the referent of a novel name. In particular, we will attempt to define the pragmatic expectation that, while consistent with the general notions of Cooperation and Relevance, might explain this specific motivation. We believe that such an expectation may derive from children's general interpretation of adults' requests, and be especially reinforced by certain communicative patterns children are commonly exposed to.

According to some proponents of the social–pragmatic account, one of its central tenets is that children's expectations about the communicative intents of speakers originate from, or are endorsed by, generalizations about the way adults speak to them (L. Bloom, 1998; Clark & Grossman, 1998; Akhtar & Tomasello, 2000; *cf*. P. Bloom, 2000). An example most relevant to the present topic regards the Principle of Conventionality. In a recent investigation of parents' conversations with young children, Callanan & Sabbagh (2004) found that parents rarely used multiple labels to refer to the same object, and when they did it was usually qualified by clarifying expressions. The authors concluded that parents' labelling tendencies seem to endorse the development of an expectation in children that there is a 'best' name for each object in any given situation. In other words, children might develop an expectation that, given a particular situation, adults will use a specific form to express a certain meaning – an expectation subsumed in Conventionality.

Parents' labelling patterns are consistent with yet other expectations. One common pattern is to refer to objects first and foremost by using basic-level count nouns (Callanan, 1985). Further studies reveal that how parents introduce nouns depends on the familiarity of the nouns to the child. Specifically, Ninio (1983) found that when mothers of seventeen- to twenty-two-month-olds believed that their child knew the name of an object, they often tested the child's knowledge by either asking them production (e.g. 'What is this?') or comprehension (e.g. 'Where's the ball?') questions. In turn, when mothers sensed that their children did not know the name of an object, they often provided it directly, without questioning (e.g. 'This is a truck.'). Masur (1997) systematically studied this 'familiarity' factor, by assessing how mothers talked to their ten- to twenty-one-month-old children about familiar and novel objects. Similar to Ninio (1983), Masur found that familiar names were usually introduced in the form of a comprehension question, whereas novel names were directly provided by the mothers.

One expectation this pattern may endorse in young children is that if an adult asks them for the referent of a name, the name is likely to be familiar to them. Putting it differently, if you are asked for the referent of a name, it is because the questioner believes you know that name, and therefore you

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should believe yourself to be capable of finding its referent. We refer to this expectation as the Expectation of Competence (EC). Note that while EC is exemplified here in the context of labelling, it is quite likely that the expectation is a general one. Namely, children may have an expectation that adults tend to make requests (e.g. questions, actions, tasks) which children are capable of responding to. The existence of naming patterns consistent with this general expectation may, nonetheless, make this expectation particularly salient and strong in naming interactions.

In the context of the disambiguation task, EC is what provides the pragmatic motivation for children to search for the referent of a novel label. Specifically, when asked to find a *dax* in the presence of a familiar and a novel object, Conventionality leads children to expect the speaker to use the familiar name to refer to the familiar object. Contrast leads children to infer that by using *dax* the speaker likely has a different object in mind. Finally, EC leads children to believe that they are supposed to know what a *dax* is. Given that there is only one novel object in view, they are compelled to choose that object as the referent of *dax*. In the context of the 'bucket' task described earlier, EC is what motivates children to search inside the bucket for the referent of a novel label. If there is a familiar object outside the bucket – as in Markman *et al*.'s (2003) Study 1 – then Conventionality and Contrast lead children to reject that object as a possible referent of the novel label, and EC drives them to search for an alternative referent. If there is a novel object outside the bucket – as in Momen & Merriman's (2002) Study 1 – then Conventionality and Contrast do not apply, but upon recognizing that they do not know the name of the visible object, EC drives children to search for an alternative referent whose name they might know.

The present study investigates whether young children hold EC. The study combines some of the procedures used by Markman *et al*. (2003) and Momen & Merriman (2002), but introduces some variations to allow us to contrast EC with other possible response motivations – namely, ME, N3C, and LGF. Half of the children participated in a Familiar-Visible condition, which was basically a replication of Markman *et al*.'s (2003) Study 1 procedure. In this condition, the experimenter showed children pairs consisting of a visible familiar object and an opaque bucket containing a novel object. The other half of the children participated in a Novel-Visible condition, which was identical to the Familiar-Visible condition except that the visible object was itself novel to the children. This condition was similar to Momen & Merriman's (2002) Study 1, except that children received little training and were not only asked novel label questions. In particular, in both conditions, children were asked Novel Label questions on half of the trials, and Non-specific questions on the other half (i.e. questions in which children were simply asked to 'give one'). After concluding a series of

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8 trials, children from both conditions participated in an identical scenario, in which the experimenter showed them a visible familiar object, a visible novel object, and an opaque bucket containing a novel object. In this 4-trial scenario, the experimenter only asked children Novel Label questions.

The main prediction was that if children hold EC, then they should search inside the bucket in response to a request for the referent of a novel label not only when a familiar object is visible next to the bucket but even when a NOVEL object is visible. Moreover, from a social–pragmatic perspective, the potential difference in children's responses in the Familiar-Visible and Novel-Visible conditions would be attributable to differences in the motivations induced by the two conditions. As described above, while in the former condition children would have both an avoidance and a searching motivation, in the latter they would only have a searching motivation. In other words, the difference between the conditions serves as an estimate of the power of Conventionality and Contrast to drive children away from a familiar object as the referent of a novel label. Neither N3C nor ME predict that children should search inside the bucket when a novel object is visible outside. According to these accounts, children might be motivated to search only if next to the bucket there is a familiar object, but not if there is an adequate – novel – candidate referent for the novel label. Lastly, the final scenario with two objects and a bucket contrasts most directly the EC and the LGF proposals. According to the former, again children should be motivated to search inside the bucket for the 'appropriate' referent of the novel label. In turn, having a familiar and a novel object visible outside the bucket presumably increases the salience of children's lexical gap, motivating them to choose the visible novel object as the referent of the novel label. That is, LGF – as well as ME and N3C – predicts no searching inside the bucket, much less selecting the object inside the bucket, in the final stage.

METHOD

Participants

The initial sample of participants consisted of 48 children. Eight children were eventually dropped from the study due to refusal to participate or complete the experimental task. The final sample consisted of 40 children, 23 girls and 17 boys, with an average age just above two years ($M = 2;1$, $S.D. = 2$ months, $range = 1;6–2;4$). Children were recruited from local daycare centres in central Israel. All children were native Hebrew speakers from Jewish middle-class to upper middle-class families. Signed parental consent was obtained for each child prior to his or her participation in the study.

Design

Children were randomly divided into two conditions ($n=20$ in each): Familiar-Visible (FV) and Novel-Visible (NV). There was no significant age difference between children in the two conditions. The study involved 3 phases, and the two conditions differed only with regards to the second phase. The first phase was a Familiarization Phase and it consisted of 3 trials. In this phase children were familiarized with the notion that the bucket always contained an object. The second phase was the Two-Objects Phase, and it consisted of 8 trials. In this phase children were presented with a visible object – either familiar in the FV condition or novel in the NV condition – and an opaque bucket containing a novel object. In this phase, on half of the trials children were asked a Novel Label question and on the other half they were asked a Non-specific question. The final phase was the Three-Objects Phase, and it consisted of 4 Novel Label trials. In this phase, all children were presented with a familiar visible object, a novel visible object, and a bucket containing a novel object.

Materials

A blue, opaque, plastic bucket was used throughout the study as a container for objects. Altogether, 15 familiar objects were used in the experiment. Pilot testing with a separate group of toddlers identified these as objects for which children regularly recognize the name. They were: flower, plate, cup, marker, car, dog, ball, watch, balloon, book, airplane, teaspoon, doll, pacifier, and bottle. In addition, 26 novel objects were used. These were objects for which toddlers in the pilot testing did not consistently associate a name. Most of the novel objects were actual objects (e.g. a dumpling maker, a funnel, a honey-dipper), and a few had been manufactured in our laboratory for previous studies (e.g. an oddly-shaped pink sponge). The novel labels used were Hebrew-sounding meaningless two-syllabic combinations. They were: Tirpal, Likat, Dushee, Zelam, Teega, Shigon, Rilma, and Zavi. Half of them were used in the Two-Objects Phase and the other half in the Three-Objects Phase.

Procedure

Children were seen individually by a female experimenter at their homes ($n=24$), in a quiet area of their daycare ($n=15$), or in a university laboratory ($n=1$). In order to gain children's confidence and make them comfortable, the experimenter spent at least half-an-hour with each child in free-play, before starting the experimental procedure. Once a child felt comfortable with the experimenter, the experimenter invited the child to join her at the place where the materials had been set up. All interviews were conducted in Hebrew.

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Familiarization phase. This phase was identical for children in the two conditions. The goal of this phase was to familiarize children with the idea that the bucket always contained an object, and that some times the object in the bucket was the object to be selected in response to the experimenter's request, while other times the visible object was the target of the experimenter's request. This phase consisted of three trials. In the first trial, the experimenter showed children the bucket, and placed a flower (a familiar object) inside it as children watched. The experimenter then asked children, 'Show me the flower.' The second and third trials were more similar to the experimental trials in that they involved two objects: one visible and one inside the bucket. In the second trial, the experimenter placed a plate (familiar object) on the table, and an unfamiliar object inside the bucket. She called children's attention to the objects by tapping on the table, and then asked them, 'Show me the plate.' In this trial, children had to simply pick the visible object. In the third trial, the experimenter placed an unfamiliar object on the table, and a marker (familiar object) inside the bucket. The experimenter asked children, 'Show me the marker.' In this trial, children had to pick the object that was inside the bucket. This switch in response was crucial in order not to bias children to always pick the object inside the bucket. After each of the trials, the experimenter gave children both objects, emphasizing that no matter what children chose, they would always get a chance to play with all objects.

Two-Objects Phase. This phase consisted of eight trials, in which the experimenter placed an object visible to the child on the table, and a novel object inside the bucket. In the FV condition, the visible object was always familiar, whereas in the NV condition, the visible object was always novel. In all trials, the experimenter brought the visible object and the bucket simultaneously to the table. When the experimenter brought out the bucket, she intently shook it so that children would notice that it contained something. Children did not see the novel object being placed inside the bucket, and could not see inside the bucket from their seat. The experimenter placed the visible object and the bucket containing an object next to each other, and within reach of the child. The right/left placement of the object and the bucket was counterbalanced between trials. Once the visible object and the bucket were placed, the experimenter tapped on the table to capture children's attention, and while looking at the child, asked either the Novel Label or the Non-specific question. On four of the trials children were asked a Novel Label question, and on the other four children were asked a Non-specific question. In the Novel Label trials, the experimenter asked, 'Can you bring me the [novel label]? Give me the [novel label].' In the Non-specific trials, the experimenter asked, 'Can you bring me one thing? Give me something.' We purposefully avoided using phrases such as, 'Where is [X]?' or 'Find [X]', because we felt that these phrases might

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suggest that the referent is hidden, thus leading children to search in the bucket. Order of question type was random across children, with the constraint that the same question type never occurred on more than two consecutive trials.

Until the child made a selection, the experimenter kept gazing at the child, thus avoiding looking at either the visible object or the bucket. Once children made a selection, the experimenter recorded their response, emptied the bucket, and allowed children to play with both objects for approximately 30 seconds. She then removed the objects and the bucket, and brought out a new pair.

Three-Objects Phase. At the conclusion of the Two-Objects Phase, children from both conditions participated in the same final phase, which consisted of four trials. In this phase, the experimenter brought out a familiar object, a novel object, and a bucket containing yet a different novel object. The right/center/left placement of the objects and the bucket was random across participants, and counterbalanced across trials such that no item was placed more than twice in either location. After calling children's attention to the table, the experimenter looked at the child, and asked a Novel Label question in the same way as in the previous phase. Each trial ended exactly as in the previous phase.

Coding

The two main dependent variables were the number of times children SEARCHED inside the bucket, and the number of times children SELECTED the object inside the bucket. *Search* was defined as an active looking inside the bucket. Given the distance between the children and the bucket, such behaviour was quite salient because children had to stand up a bit, or recline over the table so they could see what was inside the bucket. Each trial was scored as either involving a search or not, thus the total search score for each question type in each phase could vary from 0 to 4. *Selection* was defined as pointing to or grabbing the object inside the bucket, accompanied by either looking at or handing the object to the experimenter. Here too, each trial was scored as either one in which children selected the object inside the bucket or not, thus the total selection score for each question type on each phase could vary from 0 to 4.

RESULTS

Preliminary analyses

Chi-square analyses revealed no differences between conditions in terms of children's searching or selection tendencies in the Familiarization Phase, with all children performing close to ceiling. These analyses indicate that

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TABLE 1. *Mean number of trials (S.D.s) in which children searched inside the bucket (0 to 4) or selected the object from the bucket (0 to 4) across conditions and question type in the Two-Objects Phase*

	Question type	
Response type/Condition	Non-specific	Novel label
Search		
Familiar Visible	1·9 (1·1)	3·8 (0·5)
Novel Visible	1·9 (1·1)	2·8 (1·0)
Selection		
Familiar Visible	1·9 (1·1)	3·9 (0·4)*
Novel Visible	1·6 (1·0)	2·8 (1·0)*

* = significantly different from chance (chance = 2), at $p < 0.01$.

there were no *a priori* differences between conditions in terms of children's intrinsic curiosity or understanding of the task.

Preliminary ANOVAs on the Two-Objects Phase revealed no significant effect of gender or testing location on either the number of times children searched inside the bucket, or on the number of times children selected the object inside the bucket. There was no correlation between children's age in days and either of the dependent measures. Given these results, these variables were not included in the main analyses.

Analyses of the Two-Objects Phase

Our first hypothesis was that not only in the FV condition, but also in the NV condition, children would be more likely to SEARCH inside the bucket in response to a Novel Label question than in response to a Non-specific question. To address this hypothesis, we conducted a repeated-measures ANOVA with question type (novel label versus non-specific) as a within-subjects variable and condition (FV versus NV) as a between-subjects variable (see Table 1 for means and S.D.s).

This analysis revealed a significant effect of question type, F (1, 38) = 41·29, $p < 0.001$, such that children were more likely to search in the bucket in response to a Novel Label question than in response to a Non-specific question. The analysis also revealed a significant effect of condition, F (1, 38) = 5·51, $p < 0.05$, such that searching in the bucket was more common in the FV than in NV condition. Finally, there was a significant interaction between question type and condition, F (1, 38) = 4·59, $p < 0.05$. In order to examine this interaction, and more directly test our hypothesis, separate paired t-tests were conducted within each condition. We found a significant effect of question type in the FV condition, t (19) = 7·93, $p < 0.01$.

Most importantly, we also found a significant effect in the NV condition, $t(19) = 2.55$, $p < 0.05$. In other words, as predicted by the social-pragmatic account, children in the NV condition were more likely to search inside the bucket in response to a Novel Label question than in response to a Non-specific question.

The source of the interaction was actually revealed in the complementary t-tests, i.e. tests comparing between conditions for each question type separately. These tests revealed a significant effect of condition on the Novel Label questions, $t(38) = 3.95$, $p < 0.001$, indicating that children were more likely to search inside the bucket for the referent of a novel label when the visible object was familiar than when it was novel. The analyses also showed no effect of condition on the Non-specific questions, $t(38) = 0.14$, $p > 0.5$, suggesting that there was no difference between conditions in children's tendencies to search inside the bucket.

A secondary hypothesis had to do with potential differences in children's tendency to SELECT the object inside the bucket. Notice that *a priori*, children in the NV condition could be prone to search inside the bucket, but once they realized that inside the bucket there was another object for which they did not know the name, they could decide to pick the visible novel object. To address this hypothesis, we conducted a repeated-measures ANOVA with question type (novel label versus non-specific) as a within-subjects variable and condition (FV versus NV) as a between-subjects variable, on the number of times children selected the object inside the bucket (see Table 1 for means and S.D.s).

The results of this analysis were very similar to the results of the analysis on children's search behaviour. We found a significant effect of question type, $F(1, 38) = 60.28$, $p < 0.001$, such that children were more likely to select the object inside the bucket in response to a Novel Label question than in response to a Non-specific question. The analysis also revealed a significant effect of condition, $F(1, 38) = 10.70$, $p < 0.01$, such that selections of the object inside the bucket were more common in the FV than in NV condition. Finally, there was a significant interaction between question type and condition, $F(1, 38) = 4.39$, $p < 0.05$. Separate paired t-tests within each condition revealed a significant effect of question type in both the FV condition, $t(19) = 8.72$, $p < 0.01$, and the NV condition, $t(19) = 3.44$, $p < 0.01$. That is, children in the FV and NV conditions were more likely to pick the object inside the bucket in response to a Novel Label question than in response to a Non-specific question.

As with the search behaviour, also with the selection measure, the source of the interaction between question type and condition was revealed in analyses of each question type separately. Specifically, we found a significant effect of condition in the Novel Label questions, $t(38) = 4.54$, $p < 0.001$, but no effect in the Non-specific questions, $t(38) = 0.76$, $p > 0.05$.

Last but not least, children's tendencies to select the object inside the bucket, in each condition and in response to each question type, were compared to chance (chance = 2). These analyses revealed that in the Non-specific questions, neither children in the FV, t (19) = 0·62, $p > 0·05$, nor children in the NV conditions, t (19) = 1·8, $p > 0·05$, selected the object inside the bucket more than would be expected by chance. In turn, in the Novel Label questions, both children in the FV, t (19) = 22·58, $p < 0·01$, and children in the NV conditions, t (19) = 3·29, $p < 0·01$, selected the object inside the bucket more than would be expected by chance.

Taken together, the findings from the Two-Objects Phase show that despite the visible presence of an adequate candidate referent – a novel object – for a novel label, children in the NV condition nonetheless searched inside the bucket, doing so significantly more often than when simply asked to pick an object. Moreover, and non-trivially, after finding a novel object inside the bucket, these children went on to select it as the referent for the novel label, doing so more often than when simply asked to pick an object, and more often than one would expect by chance. These findings are consistent with the notion that children hold an Expectation of Competence, and are inconsistent with them having either a Mutual Exclusivity Bias or a N3C Principle.

Analyses of the Three-Objects Phase

The Three-Objects Phase was identical in the two conditions: children were exposed to four trials, in each they saw a familiar visible object, a novel visible object, and a bucket containing a novel object, and in each they were asked to pick the referent of a novel label. Our hypotheses, thus, had to do with general response patterns rather than differences between conditions. In order to assess whether there were nonetheless differences between conditions – differences that could be attributed to children's differential experiences in the preceding Two-Objects Phase – we first compared children's search and selection responses between the two conditions. As expected, we found no difference in either of these measures (ps > 0·5). In other words, children's experience in the Two-Objects Phase did not differentially affect their responses in the Three-Objects Phase.

The main hypotheses had to do with how often children would search and select the object inside the bucket in response to the novel label. Given the presence of a visible novel object and a visible familiar object, we reasoned that by ME, N3C, and LGF, children would have no reason to select the object inside the bucket. In turn, according to EC, in this phase too children would be motivated to select the object inside the bucket.

Consistent with the latter, children very commonly SEARCHED inside the bucket in response to the experimenter's Novel Label questions, doing so

on 2·5 out of the 4 trials. Moreover, a paired t-test revealed that children were more likely to SELECT the object inside the bucket ($M = 2\cdot5$) than they were to select the visible novel object ($M = 1\cdot4$), t (39) = 3·12, $p < 0\cdot005$. Note that given that there were always three objects in each trial, the above two measures were not complementary. Comparison of this response pattern to chance also supported our hypothesis. Presumably, given that there were three objects per trial, chance responding would render a mean of 1·33 selections of each object. We adopted the more conservative measure of chance = 50% – i.e., 2 selections – considering only the two novel objects as plausible alternatives. Even then, we found that children's 2·5 selections of the object inside the bucket was significantly more than would be expected by chance, t (39) = 2·52, $p < 0\cdot05$. These findings confirm those from the Two-Objects Phase, and show that even when the novelty of the novel visible object was enhanced by presenting it next to a familiar object, children nonetheless overlooked it as the preferred referent of a novel label, choosing instead the object inside the bucket.

DISCUSSION

The most conclusive finding of the present study is that no matter what objects were visible to children, and independently of the curiosity that impels them to search inside the bucket, children habitually searched inside the bucket for a referent of a novel label. Even when the visible object was novel, and when its novelty was bolstered by the presence of a familiar object next to it, the two-year-olds in the present study nonetheless did not accept it as a referent of a novel label, preferring instead to search for a better referent. While the results of the FV condition replicate those of Markman *et al.*'s (2003) Study 1, and the results of the NV condition replicate those of Momen & Merriman's (2002) Study 1, neither ME, nor LGF, nor N3C can account for the overall response pattern. According to all these accounts, children would be expected to choose a visible novel object as the referent of a novel label, without having to search for an alternative. In contrast, the pattern of findings is precisely the one predicted by EC.

According to EC, upon hearing an adult request the referent of a novel label, children expected to be able to find such a referent. When the visible object had a familiar name, the Principles of Conventionality and Contrast led children to deny it as a possible referent. EC then drove children to search inside the bucket as a potential location for the aimed referent. When the visible object did not have a known name, the recognition of this fact, combined with EC, led children to search in the bucket. The present findings support this analysis in revealing that children's tendency to search inside the bucket was stronger in the FV than in the NV condition. That is,

it seems that the avoidance of the familiar object in the FV condition motivated by conventionality and contrast, added to the EC-based motivation to search for the referent of a novel label.

Children in the present NV condition and in the Three-Objects Phase not only tended to search inside the bucket, but they in fact tended to select the object inside the bucket as the most likely referent of the novel label. In principle, children could have looked inside the bucket, realized that therein also sat an object for which they did not have a name, and then decided to select randomly between that novel object and the visible novel object. One possible explanation for children's response tendency is that they may have inferred that the reason the bucket was present, was to hide the target object. That is, children may have reasoned that if the experimenter bothered to place an object inside the bucket, that object likely had a different status for the experimenter than the object outside the bucket (see Diesendruck, Markson, Akthar & Reudor, 2004, for a similar argument and supporting evidence). Importantly, children's responses to the Non-specific questions showed that they were quite willing to pick the object outside the bucket. Moreover, as revealed in the familiarization trials, children had no difficulty rejecting the object inside the bucket as the referent of a label when the label was the familiar name of an object outside the bucket, and the object inside the bucket was novel. In other words, children stick to the object inside the bucket only when they could not make a definitive decision about the experimenter's intent.

The findings are relevant not only to an account of children's responses in the 'bucket' task, but also more generally to a social-pragmatic account of the disambiguation effect. In this revised social-pragmatic account, children's selection of a novel object instead of a familiar object as the referent of a novel label derives from the workings of three pragmatic principles. The Principle of Conventionality (Clark, 1988) tells children that within a linguistic community, there are conventional forms to express certain meanings. For instance, if I know that a given familiar object is called 'cup', I assume that speakers of English also know that, and thus – everything else being equal – I expect speakers of English to use the word 'cup' if they intend to refer to that object. The Principle of Contrast (Clark, 1988) postulates that if a speaker uses a form other than the conventional one, then he/she probably has a different meaning in mind. In the example, given that the experimenter asked me for a 'dax', I infer that he/she must not be intending to refer to the cup, but rather to 'something else'. The Expectation of Competence tells children that they are supposed to be able to identify that 'something else', presumably from the set of objects available in the immediate context. EC thus leads children to select the novel object in the disambiguation task. The present finding that by the age of two years children already abide by EC implies that it

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helps children's acquisition of words even at these early stages of the process.

This full account is grounded on two premises of a social-pragmatic view of word learning; namely, that children infer the meanings of words based on both an understanding of people's minds AND expectations about how adults communicate endorsed by patterns prevalent in children's experiences (L. Bloom, 1998; Akhtar & Tomasello, 2000; *cf*. P. Bloom, 2000). The Principle of Conventionality, which children seem to abide in a differentiated manner by the age of 3 years (Diesendruck & Markson, 2001; Diesendruck, 2005), seems to derive from parents' object naming tendencies (Callanan & Sabbagh, 2004). The Principle of Contrast, in turn, may have its origins not so specifically on naming patterns, but more generally on how people act, and the presumed intentions underlying their actions. In particular, it may be related to children's presumption that people's selection of actions derive from rational plans to fulfill unique goals, a presumption that seems to be in place prior to age two (Gergely, Bekkering & Kiraly, 2002). Finally, while EC may originate from general expectations children develop about the kinds of requests adults tend to direct to them, arguably, it is particularly reinforced by the manner in which parents tend to refer to familiar versus novel objects (Ninio, 1983; Masur, 1997).

This account of early word learning is consistent with a number of findings on infant cognition. On the one hand, studies demonstrate that infants have sophisticated pattern-recognition capacities, which help them abstract regularities from linguistic inputs (e.g. Saffran, Aslin & Newport, 1996; Gomez & Gerken, 1999). On the other hand, there is now a vast literature revealing understanding of intentions from a young age. By their second birthday, children already show sensitivity to people's intentions (Meltzoff, 1995; Woodward, 1998), desires (Repacholi & Gopnik, 1997), and states of knowledge (O'Neill, 1996). More important for the social-pragmatic account, children seem to recruit their sensitivity to intentions (Baldwin, 1991; Tomasello & Barton, 1994), and states of knowledge (Akhtar, Carpenter & Tomasello, 1996; Diesendruck *et al*., 2004), in their inferences about the referents of words. Of special relevance to EC, recent evidence indicates that two-year-olds start even explicitly manifesting an awareness of their own knowledge of words (Marazita & Merriman, 2004). In sum, the mind-reading capacities stipulated by the social-pragmatic account of the disambiguation effect seem well in place by two years of age.

Recent studies, however, have challenged the necessity of an understanding of intentions to account for the disambiguation effect, by revealing the effect in individuals with presumably limited mind-reading capacities. For instance, children with autism (Preissler & Carey, 2005), and even dogs (Kaminsky, Call & Fisher, 2004), have been found to select a novel object

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rather than familiar objects, in response to a novel label. A possible response to this challenge is that while the disambiguation effect seen in typically developing children indeed results from their understanding of intentions and communicative experiences, the effect seen in children with autism and certain animals result from different mechanisms – for instance associative learning or novelty preference. For example, in Preissler & Carey's (2005) studies on children with autism, participants performed 16 baseline trials on the mapping of words to referents before the testing trials in which they eventually revealed the disambiguation effect. That is, they had intensive training on associating words to referents in this specific experimental context. For the sake of comparison, people with Williams Syndrome, who despite moderate mental retardation have nonetheless relatively spared mind-reading capacities, show a similar response pattern after only two familiarization trials (Stevens & Karmiloff-Smith, 1997). A second example is that while the wondrous dog Rico indeed seemed to recognize the referents of over 200 words (Kaminsky *et al.*, 2004), his selection of novel objects in response to novel labels may have resulted from sheer novelty preference (Markman & Abelev, 2004). It would be important to investigate whether Rico would continue to select the novel object if he had been previously familiarized with the novel objects. Evidently, further studies are needed in order to address this social–pragmatic rejoinder more decisively.

CONCLUSIONS

The present study set out to investigate the motivations underlying children's tendency to select novel objects in response to novel labels – the so-called disambiguation effect. We postulated that commonly reported tendencies parents manifest when naming familiar and novel objects to their children, might endorse a certain expectation in children, which in turn provides a motivation to select novel labels in disambiguation contexts. In particular, we investigated whether two-year-olds have an expectation that if an adult asks them for the referent of a novel name, they should believe themselves capable of finding such a referent – an expectation we dubbed the Expectation of Competence. The findings of the study were consistent with children having EC. In particular, children commonly by-passed logically plausible and physically visible candidate referents of novel labels, in favour of searching for – and eventually selecting – an object hidden inside a bucket. None of the lexical principles argued to explain children's disambiguation responses would predict this pattern of responses. The present study not only provides a more detailed analysis of the disambiguation phenomenon, but also more generally illustrates how children's

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experience-related communicative expectations, together with their understanding of intentions, might account for how children infer the meanings of words.

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