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Children's communicative strategies in novel and familiar word situations

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ABSTRACT

The present studies investigated 3-year-olds' ability to adapt their communication based on their parents' knowledge state when requesting familiar and novel objects. Children participated in a toy retrieval game during which their parent was present or absent during toy introductions. In Study 1, children used more specific requests and cue combinations in the parent-absent group versus parent-present group when requesting familiar labelled objects. In Study 2, a similar game was administered with adaptations to reduce cognitive demands. Children produced more specific requests in the parent-absent group compared with the parent-present group when requesting an unlabelled novel object. The results indicate that three-year-olds have an emergent ability to adapt their communicative behaviours based on their parents' knowledge state.

KEYWORDS

Children's communication; language development; perspective-taking; pragmatic development; requesting behaviour; theory of mind; word learning, common ground

Effective communication requires that a speaker take into consideration the knowledge state of a listener. Often this involves assessing what is old versus new information for the listener and then providing the listener with information that he/she lacks (Clark & Marshall, 1981; Grice, 1975). In recent years, studies have demonstrated that young children can modify their communicative behaviours based on a listener's knowledge state (e.g., Dunham, Dunham & O'Keefe, 2000; O'Neill, 1996; O'Neill & Topolovec, 2001; Nadig & Sedivy, 2002). In the present studies, we pursued this line of research by examining children's ability to modify their communicative behaviours based on the knowledge state of their listener when presented with novel and familiar objects.

One of the first steps in communicating effectively involves the speaker's identification of the knowledge state of his/her communicative partner. Some research has demonstrated that children possess the foundational skills required to assess another's knowledge state, such as the understanding that seeing equals knowing. Indeed, studies have shown that by three years of age, children appear to understand that *seeing* an object leads to *knowledge* about that object (e.g., Pillow, 1989; Pratt & Bryant, 1990). For example, O'Neill, Astington & Flavell (1992) asked 3-, 4- and 5-year-old children to identify which particular puppet had visual knowledge about an object. One puppet was granted visual access while another puppet was denied visual access. The results indicated that children as young as three years correctly identified the puppet that had visual knowledge. These data suggest children can infer that an individual who has not seen an object does not have knowledge about the object. However, the extent to which children truly understand that seeing equals knowing has been the subject of some debate. For example, Taylor (1988) found that 3-year-olds incorrectly predicted that another individual would know the identity of an object even though that individual had been shown only a small, unidentifiable piece of the object. In response to this debate, O'Neill (1996, 2005) has argued that 2-year-old children do not necessarily possess a sophisticated understanding of others' knowledge states. Rather, O'Neill proposes that children rely on the *disengagement + updating* principle when adapting their communicative behaviours. According to this principle, children take into account the presence or absence of their communicative partner in a given situation. Subsequently, children are motivated to update their communicative partner about the new information that was presented to them while their partner was absent from the situation.

Regardless of whether or not children possess sophisticated or merely rudimentary skills to assess another's knowledge state, they will attend to behavioural cues that communicate knowledge or ignorance of another person and will use these cues to guide their word learning (e.g., Birch & Bloom, 2002). For example, Akhtar, Carpenter & Tomasello (1996) found that 2-year-old children successfully monitored which object was new to an experimenter and used this knowledge to map a word to that object. Sabbagh and his colleagues have demonstrated that 4-year-olds will avoid mapping a new word onto an unfamiliar object if a speaker provides signs of ignorance in a word-learning context. That is, preschoolers resist making a link between a new word and a target object if they think that an ignorant speaker may not know the conventional name of the object (Sabbagh & Baldwin, 2001; Sabbagh, Wdowiak & Ottaway, 2003).

A second step in successful communication involves the speaker effectively adapting his/her communicative behaviours based on the knowledge state of the

communicative partner, typically by providing information that the communicative partner lacks. Preschoolers' ability to adapt their communicative behaviours based on their listeners' knowledge state has been researched under a variety of situations and from a variety of different perspectives.

One line of research has focused on children's repairs in miscommunication episodes as evidence for the ability to adapt communicative behaviours. Golinkoff (1986) found that infants as young as 17 months adapted their communicative behaviours (e.g., increased use of gestures, repetition) when their communicative partner displayed misunderstanding of the child's communication (e.g., 'You want what?'). Similarly, Shwe & Markman (1997) demonstrated that 30-month-old children displayed more communicative behaviours when the experimenter misunderstood the child's request than when the experimenter understood the child's request.

Based on this research, it has been proposed that young children treat other individuals as communicative partners who may need clarification of misinterpreted communication (Golinkoff, 1986). However, other researchers have been reluctant to attribute to young children the ability to effectively interpret a communicative partner's misunderstanding and to adapt communication accordingly (O'Neill, 2005; Shatz & O'Reilly, 1990). Instead, researchers have argued that children may simply be following Gricean rules for conversation, such as providing new, relevant and informative communication to their communicative partner (*maxims of quantity and relation*; Grice, 1975). That is, children may provide more information, not because they are aware of their listeners' misunderstanding, but simply because they are motivated to continuously provide new and informative information to their listener in a conversational context. In addition, children may be motivated to adapt their communication and make a communicative repair or clarification simply to achieve a material end goal. This reasoning does not necessarily imply that children are considering their listener's ignorance, misunderstanding or confusion. Rather, children are paying attention to the fact that their listener was absent from the situation when new information was presented and subsequently they convey this information to their listener upon their listener's return.

Another line of research has systematically investigated the influence of a listener's knowledge state on children's communicative behaviours. In one of the first studies to address this question, O'Neill (1996: Study 1) presented older 2-year-old children with a task during which a child had to request their parent's help in retrieving an out-of-reach familiar toy. Children were presented with a familiar toy, which was placed either in a box or a cup located on a high shelf. The parent was either knowledgeable (e.g., witnessed the hiding of the toy) or ignorant of the identity and location of the familiar object (e.g., left the room during the hiding of the toy on one trial or closed his/her eyes and covered his/her ears during a second trial). Following the placement of the toy, the child was prompted to ask for his/her parent's help in retrieving the out-of-reach toy. O'Neill found that children were more likely to gesture to the container, name the container and name the toy in the parent-ignorant condition than in the parent-knowledgeable condition. These results indicate that older 2-year-olds are sensitive to the knowledge state of their listener when communicating with them. O'Neill (1996: Study 2) further investigated younger 2-year-olds' sensitivity to their parents' knowledge state. In this second study, O'Neill adapted the request task so that verbal requesting was not required. The results indicated that, to inform their

parent of a sticker's location in one of two boxes, children were more likely to point, use other gestures and alternate gaze in the parent-ignorant condition than in the parent-knowledgeable condition (see also Dunham et al. (2000) for similar findings).

In a related study, O'Neill & Topolovec (2001) investigated children's understanding of the informative nature of their communicative behaviours. Younger and older 2-year-old children were presented with two sticker containers, which were placed either beside each other or on top of each other. Two different sticker containers that could be easily identified by the children were used (e.g., a pig and a dog). A sticker was placed in one of the two containers. In this situation, a pointing gesture alone would not inform the listener of the sticker's location. However, a verbal descriptor of the container would be informative. The results indicated that older 2-year-olds, but not younger 2-year-olds, were more likely to use the verbal descriptors for informing their listener of the location of the sticker rather than pointing behaviour alone. Thus, older 2-year-old children will adapt their verbal communication so that it is more informative when the situation appears more ambiguous.

To summarize, research demonstrates that children as young as 2 to 3 years are sensitive to others' knowledge states or engagement/disengagement (e.g., absence or presence), and will adapt their non-verbal (e.g., gesture behaviour) and verbal (e.g., requests) communicative behaviours accordingly (Dunham et al., 2000; O'Neill, 1996; O'Neill & Topolovec, 2001; Nadig & Sedivy, 2002; Shwe & Markman, 1997). One of the questions that follows from this research is whether children will adapt their communicative behaviours based on the knowledge states of others in a word-learning context. It is unclear whether children can provide greater amounts of specific information when requesting a *novel* object when their listener is perceived as ignorant. To date, research has only investigated children's ability to adapt their communicative behaviours when requesting familiar objects.

Adapting communicative behaviour based on a listener's knowledge state in a word-learning context, unlike in a familiar object situation, not only requires paying attention to another's knowledge state, but also requires learning about a novel word concurrently. Given that children learn on average five to six new words a day, children are frequently confronted with novel word-referent pairings (Anglin, 1993). In addition, children are repeatedly confronted with a variety of situations wherein they are required to attend to another's knowledge state or engagement/disengagement from a situation. Therefore, the ability to communicate effectively with a partner on a day-to-day basis requires both the ability to learn novel word-referent pairings and to attend to another's knowledge state concurrently. Given that these are demands which children face on a daily basis, the present studies investigated whether children could adapt their communicative behaviour under more complex and demanding word-learning situations. Such a word-learning situation provides the opportunity to assess the robustness of children's ability to adapt communication based on a listener's knowledge state.

STUDY 1

Three-year-old children were administered an adapted version of O'Neill's (1996:

Study 1) toy retrieval task. Children were randomly assigned to one of two groups: *parent-present* (PP) and *parent-absent* (PA). In the PP group, the parents were present in the room during the introduction of toy objects; in the PA group, parents were not present in the room during the introduction of the toys. In both groups, children were presented with four trials: (a) a *novel label* trial; (b) a *familiar label* trial; (c) a *no label-novel object* trial; (d) and a *no label-familiar object* trial. On each trial, children were presented with target and non-target objects, which were both subsequently placed on an out-of-reach shelf, along with distracter objects. Following the placement of the objects and the return of the parent to the room (for children in the PA group), the child was encouraged to ask for their parent's help in retrieving the target object from the out-of-reach shelf.

If children effectively attend to their parents' knowledge state and adapt their communicative behaviours accordingly, we expected that children in the PA group would use significantly more communicative requests compared with children in the PP group when requesting the target object from the out-of-reach shelf.

Method

Participants

The final sample consisted of 67 three-year-olds. Children were randomly assigned to one of two groups: parent-present (PP; $N = 34$; 17 females, 17 males; age: $M = 3;5.21$ and range = 3;0.20 to 4;3.23) and parent-absent (PA; $N = 33$; 16 females, 17 males; age: $M = 3;6.1$ and range = 3;0.16 to 4;4.4). An additional 13 participants were tested in the PP group but were excluded from the final sample due to: experimenter error ($N = 5$), non-responsiveness ($N = 2$), parent interference ($N = 3$), non-compliance ($N = 2$), and English not as a first language ($N = 1$). An additional eight participants were tested in the PA group but were excluded from the final sample due to: experimenter error ($N = 3$), non-responsiveness ($N = 4$), and non-compliance ($N = 1$). Participants were recruited through various advertisements within a Canadian city (e.g., health clinics, newspaper advertisements). Participants were from middle-class families, with English as their predominant language. Only children with signed parent consent participated.

Materials and apparatus

A plush lion puppet was used throughout the experiment as a means of engaging the child during the task. A yellow 'magic' toy bin measuring 38.1 cm long, 38.1 cm wide and 12.7 cm high with an open top was used to further engage the child in the task. A foot pedal attached to the bin out of the child's sight, activated lights on the box and initiated a short music vignette.

Nine familiar toys were used in the study. A yellow and green plastic telephone was used in the warm-up phase. A toy baby and a dump truck were used during the practice trials. A plush teddy bear and a plastic bicycle were used as distracter toys. A yellow duck, a red plastic airplane, a yellow cast-iron car and a brown and black plush dog were used during the experimental trials as target and non-target objects.

Eight novel toys were used in the study, four of which are shown in Fig. 1. A plastic back massager and a yellow and red playdoh roller were used during the practice

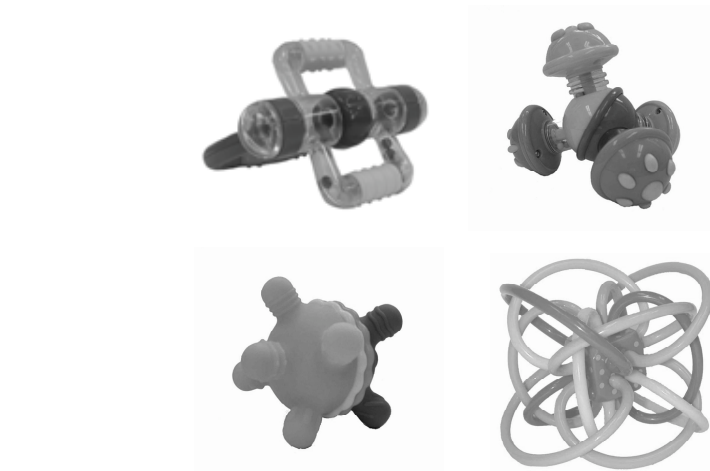


Figure 1 Examples of novel objects

trials. A felt-material multicoloured rattle and a cylinder-shaped, multicoloured bath toy were used as distracter toys. A ball-like object with protrusions, a plastic multicoloured conjoined ring rattle, a plastic, multicoloured rattle and a plastic multicoloured toy that bends into different shapes were used during the experimental trials as target and non-target objects.

Design

Each child received one warm-up trial, two practice trials (one with familiar objects; one with novel objects) and four experimental trials (familiar label; novel label; no label-familiar; and no label-novel). The order of presentation of the familiar and novel objects during the practice trials was counterbalanced across all participants. For the experimental trials, the order of presentation of the familiar label, novel label, no label-novel, and the no label-familiar trials was counterbalanced across all participants. Furthermore, the toys used as target objects (toys belonging to the puppet) were counterbalanced across participants. For example, half the participants received the dog as a target toy and the other half received the car as the target toy. In addition, the particular toys presented on each trial were counterbalanced across all participants. For example, half the participants received the dog and car during the familiar label trial, while the other half received the dog and car during the no label-familiar trial. The order of presentation of the target and non-target toys was alternated for each trial, resulting in the target toy being presented first on half the trials, and the non-target toy being presented first on the other half of the trials for each participant. The location from left to right of the target toy, non-target toy and the two distracters on the shelf were randomized by trial. The same toy (the telephone) was used in the warm-up phase for all participants. In addition, the same four toys (the bear, the bike,

the felt-material rattle and the cylinder-shaped bath toy) were used as distracter objects for all participants.

Procedure

During testing, the child was seated beside their parent and across the table from the experimenter. A shelf was located behind the experimenter and directly in front of the child and parent. Parents in the PA group watched the session while they were absent from the testing room via a one-way mirror in the adjacent observation room. All parents were instructed not to say anything during the testing session and not to aid their child by giving verbal or non-verbal cues (e.g., gazing at the target toy). Parents were asked to act in a neutral but attentive fashion towards their child when waiting for their child's requesting behaviour. Specifically, they were asked to gaze directly at their child while waiting for their child's communicative request(s) in order to avoid giving non-verbal cues, such as indicating non-verbal knowledge of the target toy's location through the use of eye gaze. In addition, parents were given detailed instructions about their role in the testing procedure. More specifically, parents were informed: (a) when to retrieve the out-of-reach toy, and (b) when to leave and enter the room if in the PA group. Based on these detailed instructions to the parents, it is unlikely that parents provided nonverbal cues to their children during the testing situation. In any event, participants were excluded from the final sample if it became evident that their parents were providing any cues.

Warm-up phase In this phase, the child was introduced to the puppet, Leon the Lion, and to the magic toy bin. The experimenter explained to the child that whenever one of the puppet's toys (a target toy) is placed inside the toy bin, the bin lights up and plays music. Each time the child placed a toy belonging to the puppet inside the toy bin, the experimenter initiated the lights and music. Alternatively, each time the child placed a toy not belonging to the puppet (a non-target toy) inside the bin, the lights and music were not initiated.

Practice trials Following this initial warm-up phase, the child was introduced to the toy-retrieval game during two practice trials. These consisted of two trials, one with two familiar toys (target and non-target), and another with two novel toys (target and non-target). First, the parent, if in the PA group, was asked to leave the testing room; following the parent's exit (if required), the child was introduced to one toy that belonged to the puppet (the target toy). When the target toy was placed in the toy bin, the bin lit up and played music. The child was also introduced to a second toy that did not belong to the puppet (the non-target toy). When the non-target toy was placed in the toy bin, nothing happened. These two toys were subsequently placed on the high shelf, visible but out of reach from the child. If the child was in the PA group, the parent was then welcomed back into the testing room. Next, the puppet returned and said, 'Hey! (Child's name), I can't reach my toy. Can you help me get my toy down from there?' The experimenter prompted the child to ask for their parent's help ('Get mummy/ daddy to help you'). The child was given approximately three seconds to produce one or more requests spontaneously. Following the child's communicative behaviour(s) and the parent's retrieval of the toy, the child was given the opportunity to place the toy in the bin, which subsequently lit up and played music.

Experimental trials During these trials, the child was first introduced to four toys that did not belong to the puppet (the distracter toys: the bear, the bike, the bath toy, the rattle). The parent, if in the PA group, was not present during this time. The experimenter demonstrated that when these distracter toys were placed in the toy bin, the bin did not light up or play music, clearly illustrating that the distracter toys did not belong to the puppet. The distracter toys were used during the experimental trials. That is, the two novel distracter toys were placed on the shelf during the two familiar toy trials (familiar label and no label-familiar trials). Conversely, the two familiar distracter toys were placed on the shelf during the two novel toy trials (novel label and no label-novel). Therefore, for each experimental trial, there were two familiar and two novel toys on the shelf (one target toy, one non-target toy and two distracter toys). The distracter toys were intended to make retrieval of the correct toy relatively ambiguous, given that all the toys were visible to the child and parent on the shelf. Children were highly motivated to ask for the retrieval of the target toy from the shelf, given the reinforcing act of placing the target toy into the magic bin (which lit up and played music), once the toy was retrieved. Indeed, it was very rare that a child would request the retrieval of a non-target toy or a distracter toy.

Following the introduction of the distracter toys, the four experimental trials were administered. Each trial began with the parent leaving the room if in the PA group; in the case of the first trial, the parent was already absent from the room following the introduction of the distracter toys. The procedure was the same as that used for the practice trials, in that the child was introduced to two toys: (1) one toy belonging to the puppet (the target toy), and (2) one toy not belonging to the puppet (the non-target toy). The four experimental trials included: (a) a novel label trial; (b) a familiar label trial; (c) a no label-novel object trial; and (d) a no label-familiar object trial. For (a), the experimenter paired a novel target toy with a novel word ('Look at this *mido*'). For (b), the experimenter paired a familiar target toy with a familiar word ('Look at this *dog*'). For (c), no label was paired with a novel target toy ('Look at *this*'). For (d), no label was paired with a familiar target toy ('Look at *this*'). Each sentence in each trial was repeated six times. During the novel label and familiar label trials, the child was asked to produce the target word ('Can you say the word *mido*?' or 'Can you say the word *dog*?').

Once the toys had been introduced, the target, non-target and distracter toys were placed on the high shelf. Following the introduction of the target and non-target toys, the parent was welcomed back into the testing room, if in the PA group. The child was then prompted to ask for their parent's help in retrieving the target toy. Following the child's request(s), the parent retrieved the target toy, and the child was given the opportunity to place the target toy back inside the toy bin, which subsequently lit up and played music. For the novel label trial, after the toy was retrieved from the shelf, the child was asked whether s/he remembered the novel label ('What is this called?').

Coding

A coder who was blind to the hypotheses of the study, coded the following communicative behaviours from the videotapes. Gestures and verbal requests were coded using a coding scheme adapted from O'Neill (1996), and O'Neill & Topolovec (2001). Five communicative responses were coded: (a) *gestures*; (b) *definite requests*; (c) *non-*

specific requests; (d) *target word production*; and (e) *cue combinations*. Gestures consisted of any non-verbal behaviour, whereby a child extended his/her arm and gestured towards the target object. Definite requests were coded if the request referred to the location or identity of the target object by using deictic terms (e.g., 'that', 'that one', 'there') or descriptors ('Get the green and blue one'). Because gestures and definite requests were similar in degree of specificity, they were summed into one category, *specific requests*, for analytic purposes. A non-specific request was coded for any request that did not provide information regarding the identity or location of the target object (e.g., 'Mummy, go get the toy' or 'Mummy, help me'). Production of the target word was coded if it was used in any context (e.g., 'Get the dog', or just saying 'dog'). A cue combination was coded if the child used any two types of communicative behaviours simultaneously (e.g., saying 'Get the toy' while pointing). A distinct request was coded if a 1-second pause in the flow of the child's communication occurred. Therefore, a request such as 'gimme, gimme, gimme' without a pause, would be considered one communication request and would be counted only once.

Accuracy of requests If children requested a non-target or distracter toy on the practice and experimental trials, they were corrected by the experimenter saying: 'No, that's not Leon's toy. Ask for mummy's help to get down Leon's toy'. Children were then given another opportunity to provide a communicative request. It was assumed that children effectively learnt the toy retrieval game during the practice trials, and were asking for the correct (target toy) throughout the four experimental trials. Indeed, only 6 of the 67 children tested initially asked for an incorrect object on one of the experimental trials.

Reliability A second coder, blind to the hypotheses of the study, coded 20% of the data for reliability purposes. Reliability scores were computed for each communicative behaviour by using Cohen's Kappa correlation coefficient analyses. A Kappa correlation coefficient of 0.85 or above was considered acceptable for reliability purposes in this study. Reliability scores were computed for gesture behaviour ($\kappa = 0.94$), cue combinations ($\kappa = 0.92$), target word production ($\kappa = 1.0$), definite requests ($\kappa = 0.88$), and non-specific requests ($\kappa = 0.96$). Given that the Kappa correlation coefficients were found to be at an acceptable level, the coders were considered reliable.

Results

Four sets of analyses were conducted to examine children's use of communicative behaviours across groups. First, control analyses were conducted to examine children's use of communicative behaviours during the practice trials. Second, communicative behaviours produced on each experimental trial were compared across groups. The communicative behaviours that were analysed include: specific requests, non-specific requests and cue combinations. Third, analyses were conducted to examine whether two successive requests differed in specificity from each other. Finally, children's ability to produce and remember the novel word for the novel word trial was examined.

Practice trials

We first examined the data from the practice trials to determine whether children

Table 1 Study 1: mean frequency (and standard deviation) of specific requests, cue combinations and non-specific requests for each experimental trial by parent present (PP) and parent absent (PA) groups

	<i>Specific requests</i>		<i>Cue combinations</i>		<i>Non-specific requests</i>	
	<i>PP</i>	<i>PA</i>	<i>PP</i>	<i>PA</i>	<i>PP</i>	<i>PA</i>
Familiar label	0.47 (0.79)	1.03 (1.1)	0.32 (0.54)	0.64 (0.65)	1.35 (1.2)	1.30 (1.2)
No label-familiar	0.76 (1.0)	1.12 (0.96)	0.44 (0.61)	0.73 (0.72)	1.18 (0.94)	1.18 (0.95)
Novel label	0.82 (1.4)	0.85 (0.87)	0.32 (0.64)	0.48 (0.62)	1.38 (1.3)	1.24 (0.87)
No label-novel	0.88 (1.3)	1.18 (1.3)	0.50 (0.75)	0.58 (0.66)	1.12 (0.88)	1.58 (1.3)

effectively learnt the task of requesting the out-of-reach target object. A pooled total of all requesting behaviours was calculated and then summed across the two practice trials. Children in the PP group ($M = 4.24$, $SD = 2.43$) did not differ from children in the PA group ($M = 4.06$, $SD = 2.03$) in the number of requesting behaviours performed, $t(65) = 0.32$, $p > 0.05$. Given that children produced more than four requests summed across the two practice trials, the warm-up and practice trials were considered effective in teaching the children the toy retrieval task.

Communicative behaviours

Given our hypothesis that children in the PA group would produce more communicative requests compared with children in the PP group, the summed frequencies of children's use of specific requests, non-specific requests and cue combinations for each trial were analysed by conducting planned independent sample *t*-tests for each trial; see Table 1 for means by trial and group. Children's use of the target word as a communicative request was infrequent and therefore is not reported in the analyses.

Children in the PA group used significantly more specific requests compared with children in the PP group for the familiar label trial, $t(65) = 2.44$, $p < 0.05$. No significant differences between groups were found for children's use of specific requests on the novel label, $t(65) = 0.90$, $p > 0.05$; no label-novel, $t(65) = 0.97$, $p > 0.05$; and the no label-familiar trials, $t(65) = 1.47$, $p > 0.05$.

Children in the PA group produced significantly more cue combinations than children in the PP group for the familiar label trial, $t(65) = 2.15$, $p < 0.05$. No significant differences between the PA and PP groups were found for children's use of cue combinations in the novel label, $t(65) = 1.05$, $p > 0.05$; no label-novel, $t(65) = 0.44$, $p > 0.05$; and no label-familiar trials, $t(65) = 1.76$, $p > 0.05$.

No significant differences between the PA and PP groups were found for the use of non-specific requests for the familiar label, no label-familiar, novel label and no label-novel trials; all $ps > 0.05$.

Sequence of communicative behaviours

If a child produced more than one request, the second request was coded as: (a) specific, (b) less specific, or (c) more specific. Children rarely produced more than two requests and therefore, three successive requests were not analysed. Chi-square analyses revealed no significant group differences for the change in specificity of requests from a first to a second request for the familiar label, no label-familiar, novel label and no label-novel trials, all p s $>$ 0.05. The majority of children's second requests were as specific as their first request. That is, across trials and conditions, children produced a second request that was as specific as their first request 64% of the time.

Recall of target word

Children were asked to produce the novel label following completion of the novel label trial as a test of whether children could remember and produce the novel word. A 2 (parent-present, parent-absent) \times 2 (yes, no) Chi-Square analysis indicated that similar numbers of children in the PA group (25%) and in the PP group (36%) remembered the novel word, $\chi^2(1, 49) = 0.70, p > 0.05$. However, the majority of children could not remember the novel word after the novel object was retrieved from the shelf.

Discussion

As predicted, 3-year-old children adapted how they communicated based on the knowledge state of their listener. That is, children were more likely to use specific requests and cue combinations when their parent was unaware of which object was the target object compared with when their parent was aware of which object was the target object. However, children only adapted their communicative behaviours when requesting familiar labelled objects. No significant differences in requesting behaviour were found between the PA and PP groups when the object to be retrieved was new to the child or familiar but unlabelled.

It is possible that when children were presented with a novel object, their ability to attend to others' knowledge states and adapt their communicative requests was compromised. Indeed, on the novel object trials, children were required to: (a) learn about a novel word-referent link (the novel label trial) or simply a novel object (the no label-novel trial); (b) remember the word-referent link (the novel label trial) or simply remember the novel object (the no label-novel trial); (c) attend to their listeners' knowledge state; and (d) adapt their communicative behaviours accordingly. Such extensive cognitive processing may be too demanding for three-year-old children. In comparison, on the familiar labelled object trials, children were not required to learn a novel word-referent link or learn about a novel object. As a result, children were only required to: (a) attend to their listener's knowledge state and (b) adapt their communicative behaviours accordingly.

In order to further examine children's ability to adapt their communicative behaviours based on their parents' knowledge state in novel object situations, a follow-up study was conducted in which the cognitive demands of Study 1 were reduced. A similar toy request game was administered in Study 2 with several adaptations in order to reduce children's cognitive processing demands including: shortened task durations, an elicited production task to reinforce novel label learning, explicit mention of the

parent's knowledge state, and reduction of the number of objects placed on the shelf. In addition, comparisons between the PA and PP groups were conducted with only the children that remembered the novel label, with the assumption that these children also remembered which object was the target object. Only two experimental trials were administered, a novel label trial and a no label-novel trial.

If cognitive processing demands were influencing the results from Study 1, we expected that children would produce significantly more communicative behaviours in the PA group compared with the PP group for the novel label and no label-novel trials in this simplified context.

STUDY 2

Method

Participants

The final sample consisted of 38 three-year-olds. Children were randomly assigned to one of two groups: parent-present (PP; $N = 18$; 9 females, 9 males; age: $M = 3;2.18$ and range = 3;1.60 to 3;4.11) and parent-absent (PA; $N = 19$; 9 females, 10 males; age: $M = 3;2.00$ and range 3;0.00 to 3;3.16). An additional five participants were tested in the PP group but were excluded from the final sample due to: shyness ($N = 3$); non-compliance ($N = 1$); and English not a first language ($N = 1$). An additional three participants were tested in the PA group but were excluded from the final sample due to: experimenter error ($N = 1$); shyness ($N = 1$); and non-compliance ($N = 1$). In addition, only children who remembered the novel word following completion of the novel label trial were included in the final sample. In the PP group, 18 of 25 children tested remembered the novel word and were included in the analyses. In the PA group, 19 out of 33 children tested remembered the novel word. As in Study 1, participants were recruited through various advertisements within a Canadian city. Participants were from middle-class families, with English as their predominant language. Only children with signed parent consent participated.

Materials and apparatus

All familiar objects were identical to those used in Study 1 with the addition of one object, a small white shoe. The same familiar toy objects from Study 1 were used in the warm-up and practice trials. A yellow car and a small white shoe were used during the experimental trials as target and non-target objects. No distracter toys were used in the experimental trials.

The same novel toys from Study 1 for the warm-up and practice trials were used. A ball-like object with finger-like protrusions and a plastic multicoloured conjoined ring rattle were used during the experimental trials as target and non-target objects. No distracter toys were used in the experimental trials.

Procedure

A similar toy retrieval game was conducted as in Study 1 with the following adaptations. First, the entire testing session consisted of the warm-up phase and two practice trials

(both identical to those described in Study 1), and two experimental trials (novel label trial, and the no label-novel trial). The familiar label and no label-familiar experimental trials were not included. Second, for each experimental trial, two toys rather than four were placed on the out-of-reach shelf, one familiar toy and one novel toy. Since only the novel object trials were administered, the novel toy was always the target toy to be retrieved, and the familiar toy was always the non-target toy. Third, the script was adapted so that prior to the prompt for requesting their parent's help, the parent's knowledge state was explicitly stated to the child. In the PP group, the experimenter said: 'Remember, your mum does know which one is Leon's toy', while nodding her head. In the PA group, the experimenter said: 'Remember, your mum doesn't know which one is Leon's toy', while shaking her head. Fourth, in the novel label trial, subsequent to showing the child the target and non-target toys, an elicited production task was added to reinforce the learning of the novel label. The child was required to name the familiar and novel objects alternately. If the child could not name the novel object, the experimenter named the object twice. The child was then required to name the familiar and novel objects again. The experimenter continued to request that the child name the two objects until the child was able to produce the novel label without assistance.

Coding

The coding procedures were identical to those of Study 1.

Accuracy of requests

As in Study 1, children rarely requested a non-target toy instead of the target toy. Indeed, only 2 of the 37 children across the PP and PA groups initially asked for an incorrect toy during one experimental trial.

Reliability

A second coder, blind to the hypotheses, coded 20% of the participants for reliability purposes. Reliability scores were computed for gesture behaviour ($\kappa = 0.95$), cue combination ($\kappa = 0.94$), target word production ($\kappa = 1.0$), definite ($\kappa = 0.97$) and non-specific requests ($\kappa = 0.99$). Given that the Kappa correlation coefficients were at an acceptable level for each communicative behaviour, the coders were considered reliable.

Results

Three sets of analyses were conducted to examine whether children's use of communicative behaviours varied between groups. First, control analyses were conducted to examine children's use of communicative behaviours during the practice trials. Second, communicative behaviours during the experimental trials were analysed as a function of group. The communicative behaviours that were analysed include: specific requests, non-specific requests and cue combinations. Finally, analyses were conducted to examine whether two successive requests differed.

Table 2 Study 2: mean frequency (and standard deviation) of specific requests, cue combinations and non-specific requests for each experimental trial by parent present (PP) and parent absent (PA) groups

	<i>Specific requests</i>		<i>Cue combinations</i>		<i>Non-specific requests</i>	
	<i>PP</i>	<i>PA</i>	<i>PP</i>	<i>PA</i>	<i>PP</i>	<i>PA</i>
Novel label	1.06 (1.4)	1.25 (1.5)	0.50 (0.62)	0.68 (0.67)	1.17 (0.92)	1.25 (1.2)
No label- novel	1.06 (1.1)	2.20 (2.0)	0.56 (0.62)	0.90 (0.72)	1.33 (1.2)	0.90 (0.64)

Practice trials

As in Study 1, we examined the data from the practice trials to determine whether children effectively learnt the task. Summed across practice trials, children in the PP group ($M = 4.56$, $SD = 3.63$) did not differ from children in the PA group ($M = 5.90$, $SD = 4.26$) in the total number of requesting behaviours performed, $t(36) = 1.06$, $p > 0.05$. As in Study 1, children on average produced more than four requests summed across the two practice trials, which indicates that the warm-up and practice trials were effective in teaching the children the toy retrieval task.

Communicative behaviours

The summed frequency of children's use of specific requests, non-specific requests and cue combinations for each trial were analysed by conducting independent samples t -tests, comparing the PA and PP groups for each communicative behaviour and for each trial; see Table 2 for means by trial and group. Children's use of the target word was infrequent and therefore is not reported in the analyses.

Children in the PA group produced significantly more specific requests than children in the PP group for the no label-novel trial, $t(36) = 2.13$, $p < 0.05$. No significant difference between the PA group and the PP group was found for the use of specific requests in the novel label trial, $t(36) = 0.41$, $p > 0.05$.

No significant differences were found in the use of gestures and cue combinations between the PP and PA groups for both the novel label and no label-novel trials, all $ps < 0.05$. In addition, no significant differences were found for the use of non-specific requests between the PP and PA groups for the novel label and no label-novel trials, $ps > 0.05$.

Sequence of communicative behaviours

Chi-square analyses revealed no significant differences between the PA and PP groups for the change in specificity of requests from a first to a second request for the novel label, and no label-novel trials, all $ps > 0.05$. Across trials and conditions, children produced a second request as specific as the first request 59% of the time.

Discussion

In Study 2, the task demands were reduced and the listener's knowledge state was explicitly mentioned to the child. In contrast to Study 1, children did not adapt their cue combinations based on their parents' knowledge state. However, when their parent was ignorant of the target toy's identity, children provided significantly more specific requests on the no label-novel object trial. No such difference between the PA and PP groups was found for children's use of specific requests for the novel label trial. Therefore, under more simplified conditions, children appear to have some ability to interpret the knowledge state of their partner effectively and to adapt their communicative behaviour accordingly when requesting novel objects.

GENERAL DISCUSSION

In the present studies, we examined preschoolers' ability to adapt their communicative behaviours based on their parents' knowledge state when requesting novel and familiar objects. As predicted, three-year-olds in Study 1 used more cue combinations and specific requests when their parent was unaware of which familiar toy was to be retrieved from the out-of-reach shelf. However, children did not provide more detailed or informative communication for requesting novel labelled, and novel and familiar unlabelled out-of-reach objects when their parent was unaware of which toy should be retrieved. When the cognitive demands were reduced in Study 2, children in the parent-absent group provided more specific information when requesting a novel unlabelled object, but not when requesting a novel labelled object. Therefore, when a novel word-referent link was introduced, children did not adapt their communicative behaviours accordingly.

Why did children have difficulty adapting their communicative behaviour when requesting a novel labelled object? It is conceivable that cognitive processing demands of learning a novel word, paying attention to another's knowledge state concurrently, and subsequently adapting their communicative behaviours were too challenging for children to provide effective communication in the novel label trial. It is possible that children's processing resources were used to learn the word-referent link effectively, and therefore they did not attend to their listener's knowledge state. Unlike the novel label trial, on the familiar label and no label-novel trials, children were not required to learn a novel word-referent link. As a result, it is conceivable that children were able to devote their cognitive resources to remembering another's knowledge state and adapting their communicative behaviours accordingly.

Consistent with the results of previous research, the present study illustrates that preschool-aged children can adapt how they communicate based on the knowledge state of their listener when the object to be requested is familiar (e.g., Dunham et al., 2000; O'Neill, 1996; O'Neill & Topolovec, 2001). The results of the current study add to this literature by demonstrating that preschoolers adapt their communicative behaviours in a more complex situation, wherein the object to be retrieved is labelled and visible from an array of other toys on a high shelf. Recall that in previous research, the target object was always placed in one of two opaque containers (Dunham et al.,

2000; O'Neill, 1996; O'Neill & Topolovec, 2001). In the present studies children were required to remember which of the four objects was the target object to be retrieved and to inform their ignorant communicative partner of the identity of the target object. This situation may be more typical in everyday functioning, wherein children request something that is visible to both themselves and their listener (e.g., requesting food that is on the dinner table).

Two explanations for children's tailoring of their communicative performance based on their listeners' knowledge state have been proposed. First, it has been argued that by the age of three and four years, children effectively assess and attend to others' knowledge states, and subsequently adapt their communicative behaviours. Indeed, a body of research indicates that children can effectively interpret another's awareness of a situation based on having sensory (e.g., visual, tactile, auditory) access to that situation (Marvin, Greenberg & Mossler, 1978; Mossler, Marvin & Greenberg, 1976; O'Neill et al., 1992; Pillow, 1989; Pratt & Bryant, 1990). Thus, it is plausible that preschoolers in the present studies appreciated that their parent was unaware of the target toy's identity and understood that they needed to provide their parent with information regarding which toy was to be retrieved. Similarly, when their parent was knowledgeable, preschoolers understood that their parent was aware of the target toy's identity and appreciated that they did not need to provide as much information in order for their parent to retrieve the target toy successfully.

The above interpretation of our findings would ascribe to three-year-olds a sophisticated understanding of mental states, which many researchers have argued is not appropriate. An alternative explanation is that children may simply possess only rudimentary skills for assessing others' knowledge states. O'Neill (1996, 2005) has postulated that the lack of physical co-presence between the child and his/her communicative partner plays a vital role in children's ability to adapt their communicative behaviours based on their partners' knowledge state. First, children track the disengagement of their communicative partner from a given situation. Second, children are motivated to update and inform their communicative partner about the missed information upon their partner's return to the situation (*disengagement + updating*; O'Neill, 1996, 2005). Based on this argument, children in the present studies effectively tracked their parent leaving the room and being absent during the introduction of the target, non-target and distracter objects. Next, children were motivated to inform their parent of the target object's identity and location upon their parent's return to the testing room. Indeed, during the task, several children in the parent-absent condition were excited to show their previously absent parent that by placing the target toy inside the 'magic box' the box lit up and played music.

In summary, these studies were the first to examine three-year-old children's ability to adapt their communicative strategies based on the parents' knowledge state in novel object situations. Previous findings were replicated whereby children adapted their communication based on the mental state of their listener when requesting familiar labelled objects. The present studies further revealed that children provided more specific information to their ignorant listener when requesting a novel unlabelled object. However, children did not adapt their communicative strategies when requesting an object that had previously received a novel word-referent pairing. Future research should investigate the underlying cognitive mechanisms (e.g., memory, executive

functioning) that may influence children's abilities to adapt their communicative strategies when requesting novel labelled objects.

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