

BRIEF RESEARCH REPORT

**Young children use shared experience to interpret  
definite reference\***

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ABSTRACT

We investigated whether children at the ages of two and three years understand that a speaker's use of the definite article specifies a referent that is in common ground between speaker and listener. An experimenter and a child engaged in joint actions in which the experimenter chose one of three similar objects of the same category to perform an action. In subsequent interactions children were asked to get 'the X' or 'a X'. When children were instructed with the definite article they chose the shared object significantly more often than when they were instructed with the indefinite article in which case children's choice was at chance. The findings show that in their third year children use shared experiences to interpret the speaker's communicative intention underlying her referential choice. The results are discussed with respect to children's representation of linguistic categories and the role of joint action for establishing common ground.

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## INTRODUCTION

When speakers refer to objects, people, or events they have to take into account the salience of the intended referent for the listener and choose an appropriate referring expression. The key source of information for choosing a referential form is the speaker's assessment of the listener's knowledge state, expectations, and their shared conversational history, i.e. their common ground. At the same time, when interpreting referring expressions listeners have to understand how the speaker's referential choice grounds the utterance with respect to the perceptual situation, their shared experience, or previous discourse (Clark, Schreuder & Buttrick, 1983).

Two of the most important and well-known linguistic devices for grounding reference in many languages are definite and indefinite articles. It is widely recognized that the definite article indicates unique identifiability or the common ground status of a referent, whereas the indefinite article does not (Ariel, 1988; Chafe, 1976; Gundel, Hedberg & Zacharski, 1993). For example, when a speaker utters the sentence *I bought the car!*, her choice of a definite description (*the car*) is interpreted by the listener as referring to information that is in common ground between speaker and listener and is thus uniquely identifiable. When the speaker utters the same sentence with an indefinite description (*I bought a car!*) no such reference is implied.

Thus, the proper usage and comprehension of referring expressions such as definite and indefinite articles involves two kinds of cognitive skill: assessing the salience of the intended referent from the perspective of the conversational partner; and understanding that different degrees of salience require a choice between different referential forms. From a developmental point of view these skills are particularly interesting, because they require sophisticated social–cognitive abilities of perspective taking as well as categorical knowledge of articles. But, despite a large body of research on children's acquisition of the communicative functions of definite and indefinite articles (e.g. Emslie & Stevenson, 1981; Karmiloff-Smith, 1979; Maratsos, 1974; Power & Dal Martello, 1986), most studies have not addressed the question of at what point in development children can recruit these abilities for their understanding of articles as referring to information that is (or is not) in common ground.

Maratsos (1974) showed that three-year-olds selectively produce definite or indefinite noun phrases (*the/a pencil*) depending on whether the noun was previously introduced denoting a specific context (*Here is a pencil*) or a non-specific context (*Here are some pencils*). However, the methodology used by the author—sentence imitation task—does not allow drawing conclusions about children's assessment of the salience of the intended referent in common ground. Similarly, Brown (1973) observed that young children produce definite and indefinite articles correctly in their naturalistic speech around the age of three years. For example, children

might say *Where is the car?* if they intend to refer to a specific toy car they want to play with, or they might say *I want a cookie* if they intend to refer to a non-specific instance out of many. However, correctness of production in naturalistic data does not provide conclusive evidence of children's understanding of the functions of the articles. On the one hand, a large proportion of young children's correct uses of articles may be tied to relatively few lexically specific frames like *Where's the X?* or *Want a X* (Pine & Lieven, 1997). On the other hand, naturalistic production data does not allow us to determine the conditions under which children choose a particular referential form. For example, children might only use definite descriptions to refer to things that are salient for themselves without taking into account the listener's knowledge state at all.

Experimental evidence for the idea that children show this kind of egocentric bias in their production of referring expressions comes from elicitation studies using story-telling tasks (e.g. Emslie & Stevenson, 1981; Power & Dal Martello, 1986). In these studies children had to narrate the story of a picture book to another child who did not have visual access to the pictures and thus was unfamiliar with the characters appearing in the book. The general finding was that three- and four-year-old children tended to overuse the definite article for referents that were completely new for the listener. Yet these observations only suggest that three- and four-year-old children have not fully acquired the use of indefinite articles for discourse-new referents. Importantly, they do not show that children at the age of three are incapable of using common ground for the interpretation of definite descriptions.

More recent findings suggest that the use of concrete shared experience to build up common ground can guide young children's interpretation of others' referential intentions. Liebal, Behne, Carpenter, and Tomasello (2009) have shown that 14- and 18-month-old infants can use shared experience established via joint action to interpret ambiguous communicative acts like pointing. Similarly, Moll, Richter, Carpenter, and Tomasello (2008) demonstrated that 14-month-old infants interpret an adult's ambiguous request for one of several objects (*Wow, look, can you give it to me, please?*) as referring to that object, which they had shared in a 'special' way in previous interactions (with the other objects having been shared in a 'normal' way).

Moreover, there is also evidence that around 18 months infants begin to use shared linguistic information to identify referents. Ganea and Saylor (2007) found that 15- and 18-month-old infants understand the referential intention of ambiguous requests in the context of a finding game, in which an adult experimenter was looking for an absent object (*I want to find the shoe*) and subsequently directed the child to a room (*I know where it is. It is in here*), in which the target object and a distractor object were located. When the experimenter asked *Can you get it for me?*, 18-month-old as well

as 15-month-old infants correctly identified the target referent. When a different experimenter who had not talked about the object before made the same request (*Can you get it for me?*) both age groups chose the target object only with chance performance, indicating that 15- and 18-month-old infants determined the speaker's intended referent considering their shared conversational history and its referential content. In a similar vein, Saylor and Ganea (2007) demonstrated that 14-month-olds interpret ambiguous requests containing definite descriptions (*Where is the ball?*) by tracking a speaker's physical experience with potential referents. When choosing between two objects that were both denoted by the definite description of the request (e.g. two balls), infants reliably chose the object the speaker had played with before. In a control condition these authors established that children were reacting to the verbal request of the speaker when making their choice, rather than choosing the referent based on some low-level mechanism like picking the object most recently seen.

Despite their importance in demonstrating that young children use the speaker's physical or conversational history with particular referents when interpreting the referential intention of ambiguous verbal requests, the studies of Ganea and Saylor (2007) and Saylor and Ganea (2007) do not allow drawing conclusions about children's understanding of particular linguistic devices (e.g. definite articles) as verbal cues to identify referents. In order to demonstrate that young children use a particular linguistic element as a signal to select a referent that has been highlighted in the speaker's and listener's common ground one would need to show that children's choice of the salient referent is a function of the type of referential expression being used by the speaker.

Taken together, previous studies have either focused on the specificity function of articles, neglecting the role of common ground, or have focused on young children's social-cognitive skills for interpreting ambiguous utterances without assessing the role of particular linguistic devices in this process, such as definite and indefinite articles. In the current study, therefore, we asked whether young children at the ages of two and three years identify common ground referents as signified by definite descriptions, and whether children's interpretation of ambiguous verbal requests depends on the type of referential expression (definite vs. indefinite reference), using a methodology that draws on social interaction between children and their conversational partners.

## METHOD

### *Participants*

Thirty-six three-year-olds (3;0–3;5 years, mean age = 3;2 years; 17 girls) and thirty-six two-year-olds (2;3–2;8 years, mean age = 2;5 years; 18 girls) were

included in the final sample. An additional thirteen children were tested, but not included in the analysis due to technical problems with the recordings ( $n=3$ ), experimenter's error ( $n=1$ ), because they were uncooperative ( $n=4$ ), or because they had a missing datapoint ( $n=5$ ). All children were tested in local daycare centers. Children grew up in monolingual German-speaking homes and had no reported history of speech or language impairment.

### *Materials*

The study was designed as a forced-choice reference disambiguation task. Each child interacted with the experimenter (E) who instructed the child to select one of three similar objects of the same category, one of which had previously been used in a joint activity between the child and E ('shared object'). The four sets of target objects consisted of three toy pans, three spoons, three pencils, and three scissors (see [Figure 1](#)). The corresponding German terms used to label the objects consisted of two feminine and two masculine gender nouns: *Pfanne* 'pan' (FEM.), *Schere* 'scissors' (FEM.), *Löffel* 'spoon' (MASC.), and *Stift* 'pencil' (MASC.). For the two-year-olds the item *Pfanne* 'pan' was replaced by the item *Topf* 'pot' (MASC.), because pilot data revealed that some two-year-olds ( $n=3$ ) were unfamiliar with the word *Pfanne* 'pan'. The objects of each set differed by a particular dimension in order to be uniquely identifiable. Pans/pots and spoons differed by size (small, mid, big), scissors differed by color (blue, red, yellow), and pencils differed by patterning (dotted, sparsely striped, densely striped). The target instructions contained either a definite or an indefinite referential form, e.g. *Can you get the/a X?* The verbal instructions presented to the child were scripted to ensure consistency across test sessions and to control for the number of occurrences of a particular article with the target object label.

### *Design and counterbalancing*

The type of reference (definite vs. indefinite) was presented between subjects. In each age group, eighteen children were assigned to the definite reference condition and eighteen children to the indefinite reference condition. There were two different orders of trials in each condition: order A (trial pans – trial spoons – trial pencils – trial scissors) and order B (trial pencils – trial scissors – trial spoons – trial pans). Participants were randomly assigned to one of the two conditions and orders. We counterbalanced the position (left, middle, right) and type of the shared object, resulting in eighteen different arrangements. We ensured that the shared object did not occur in the same position in consecutive trials and not more than twice in the same position across all trials. All children



Fig. 1. Sets of objects used in the experimental trials. Objects of each set differed by a particular dimension.

were tested individually in a quiet room. Each session lasted for about 15 minutes and was videotaped with three cameras.

### *Procedure*

*Warm-up phase.* The purpose of the warm-up phase was to introduce the play context and to create ambiguous referential situations. First, children were presented with a chimpanzee animal puppet and were told that together with E they were going to cook food and draw a picture for the puppet. Children were then shown the toy kitchen with two pans located on one shelf and two spoons located on another one, and E pointed out that there were also dirty dishes in the sink (a spoon and a pan) and they would have to clean them up later. Next, children were shown a cabinet containing four toothbrushes and four hairbrushes. One toothbrush and one hairbrush were located separately from the others on a different shelf of the cabinet. E referred to all of the objects by saying *Look, here are the things for brushing teeth and combing hair.*

Next, E and the child sat at the table with the puppet. E announced that they would now brush the puppet's teeth and instructed the child by saying *Can you get the/a toothbrush?* Children that were assigned to order A received this instruction with the definite article and children that were assigned to order B with the indefinite article. The same procedure was repeated for the hairbrushes. Children who were instructed with the definite article for the toothbrush (order A) were now instructed with the indefinite article for the hairbrush and vice versa. If children asked for clarification (*Which*

one? or *This one?*), E ignored the question and pretended to be busy with dressing the puppet. If children asked for clarification a second time, E responded by saying *The one you think*. Importantly, E did not look towards or point at the location of the objects while giving the instruction. The order of the warm-up trials was identical for both conditions.

*Test phase.* There were four experimental trials. All experimental trials began with a joint action between the child and E involving the target object. Subsequently, the child was asked to make an object choice. For the instruction, E used either a definite article or an indefinite article with the target object label. E used each article twice per instruction. In the next paragraph we give a detailed description of the procedure for order A. The details of the procedure were identical for order B.

The child and E went to the toy kitchen and E announced that they would wash the dishes (pan and spoon in the sink) together. E did the washing and the child did the drying. When they were finished E instructed the child to put the pan and the spoon with the other two pans or spoons on the shelf. Subsequently, the child and E went back to the table and asked the puppet what kind of food she wanted. E pretended that the puppet whispered the answer in his ear and said *She wants an egg! I have to go and get one, but we also need the/a pan. Can you go and get the/a pan?* E did not look towards or point at the location of the objects, but went to a box located in the opposite direction of the kitchen (approx. 3 m away) and searched inside until the child had chosen a pan and brought it to the table. If children asked for clarification (*Which one?*), E ignored the question and kept searching inside the box. If children asked for clarification a second time, E responded by saying *The one you think*. Following the pan trial, the puppet announced that she would also like yoghurt for dessert. E responded to the child *I have to go and get one, but we also need the/a spoon. Can you go and get the/a spoon?* If the child asked for clarification, E responded in the same way as described for the pan trial.

Next, E suggested drawing a picture for the puppet and got the three pencils (placed in a wooden holder) and one piece of paper from the box. The child and E sat opposite of each other at the table. The pencils were placed on E's side of the table. E selected the target pencil and said *Let's draw a house together. I'll start*. After drawing part of the house E handed the pencil to the child and said *It's your turn*. When finished drawing the house, E took the pencil, placed it back in the holder, and said *Let's also draw a tree*. Then E put the pencil holder within the reach of the child and said to the child *I will get another piece of paper from the box and you can get the/a pencil*. If the child asked for clarification, E responded as described above.

After drawing the tree, E suggested cutting out each picture they had drawn and went to the box to get the scissors (placed in a wooden holder).

E placed the scissors on his side of the table and explained that they would cut out the pictures together and that E would start on one side of the house picture while the child was holding the other side. Then, E selected the target scissors. After finishing cutting his side, E handed the scissors to the child. When the child had finished her side of the paper E put the scissors back in the holder and placed it within the child's reach. Subsequently, E collected the paper shavings and 'accidentally' the tree picture that was turned upside down in order to throw it away. While going to the trash bin, E pretended to recognize his mistake and said *Oh wait, here is the picture with the tree. I almost threw it away. Let's cut it out. Can you get the/a (pair of) scissors*. Again, E did not look towards or pointed at the scissors, but looked at the tree picture when giving the instruction. If the child asked for clarification, E responded as described above.

### *Scoring and reliability*

For each experimental trial we coded the position and the particular type of the object that the child chose and whether this was the shared object or a non-shared object. In addition, we coded whether children asked for clarification or not, because this kind of measure might reveal whether children treat indefinite expressions as more ambiguous than definite expressions in the current context. The first author coded the data of all children from videotape, and for reliability measures a second rater coded 25% of the data (all trials of 18 randomly selected children). Inter-rater reliability was calculated using Cohen's weighted kappa (Fleiss & Cohen, 1973). Reliability between coders reached  $\kappa = .99$  for object choice and  $\kappa = .91$  for clarification questions.

### *Statistical analysis*

The response variable was binary, indicating for each trial whether the child had chosen the shared object or not. We used a General Linear Mixed Model (Baayen, 2008) to analyze the data, because in addition to fixed factors, such as CONDITION and AGE, the design of the study made it necessary to include random factors into the analysis, which could have confounded the results and beyond which we wanted to draw generalizations (e.g. the particular category or type of target object). Handling these factors in standard linear models as covariates, for example, is problematic, because they add unwanted complexity for parameter estimation and might lead to unstable models (Gelman & Hill, 2007).

We included the factors AGE and CONDITION, their interaction, and four factors possibly confounding the results as fixed effects (GENDER of the child, ORDER in which trials were presented, GRAMMATICAL



GENDER of the noun, and POSITION of the shared object), as well as three random effects (subject ID, ITEM, and TYPE of the shared object, i.e. whether it was the dotted pencil, densely striped pencil, etc.).

Initially, we compared the full model comprising all fixed and random effects with a null model comprising only the random effects using a likelihood ratio test. We ran the models in *R* (version 2.15.1; R Core Team, 2012) using the function *lmer* of the package *lme4* (Bates, Maechler & Bolker, 2012). The comparison of the full model with the null model revealed a significant difference (likelihood ratio test,  $\chi^2 = 24.75$ ,  $df = 7$ ,  $p < .001$ ). Next, we derived *p*-values for the individual main effects and interactions either from the output provided by the function *lmer* or using likelihood ratio tests by comparing the full model with a reduced model lacking only the factor of interest but comprising all other factors.

## RESULTS

### *Main analysis*

The analysis of the model revealed that the factor CONDITION had a significant effect on children's object choice ( $\beta = -1.47$ ,  $SE = 0.38$ ,  $z = -3.85$ ,  $p < .001$ ) as well as the factor AGE ( $\beta = -1.05$ ,  $SE = 0.38$ ,  $z = -2.77$ ,  $p < .01$ ). There was no significant interaction between the factors CONDITION and AGE ( $\beta = 0.86$ ,  $SE = 0.54$ ,  $z = 1.58$ ,  $p = .11$ ) and none of the other factors had a significant effect on children's object choice (GRAMMATICAL GENDER:  $\beta = 0.18$ ,  $SE = 0.33$ ,  $z = 0.56$ ,  $p = .58$ ; GENDER:  $\beta = 0.11$ ,  $SE = 0.27$ ,  $z = 0.42$ ,  $p = .67$ ; ORDER:  $\beta = 0.51$ ,  $SE = 0.27$ ,  $z = 1.86$ ,  $p = .06$ , POSITION:  $\chi^2 = 4.24$ ,  $df = 2$ ,  $p = .12$ ).

In a second analysis, we derived mean proportions of choosing the shared object across all four trials for each child in order to perform comparisons against chance level. Three-year-old children chose the shared object with a mean score of .61 in the definite condition ( $SE = 0.06$ ) and .29 in the indefinite condition ( $SE = 0.04$ ). Two-year-olds chose the shared object with a mean score of .39 in the definite condition ( $SE = 0.06$ ) and .26 in the indefinite condition ( $SE = 0.06$ ). Comparisons of these mean scores against chance level (.33) using Mann–Whitney *U* tests revealed that only the three-year-olds' choice of the shared object in the definite condition differed significantly from chance ( $T = 161$ ,  $p < .001$ ).

### *Additional analysis*

Children asked for clarification in 17% of all trials ( $N = 48$ ). Initially, we counted the proportion of children who asked for clarification in at least one experimental trial. In the definite condition 44% of the three-year-olds ( $n = 8$ ) and 50% of the two-year-olds ( $n = 9$ ) asked for clarification at least once. In the indefinite condition 33% of the three-year-olds ( $n = 6$ ) and

28% of the two-year-olds ( $n = 5$ ) asked for clarification. A chi-squared test revealed that there were no significant differences between age groups and conditions with respect to clarification questions ( $\chi^2(1, N = 28) = 0, p = 1$ ). We also asked whether there was a correlation between children's mean-scores in choosing the non-shared object and the frequency with which they asked clarification questions. The results indicated no significant correlation ( $r_s = 0.045, p = .707$ ). Furthermore, we determined the proportion of clarification questions per trial number: 35% of all clarifications were asked for on the first trial ( $n = 17$ ), 21% on the second trial ( $n = 10$ ), 23% on the third trial ( $n = 11$ ), and 21% on the fourth trial ( $n = 10$ ), showing that children were equally likely to ask for clarification with respect to trial number.

#### DISCUSSION

The main finding of the current study is that young children interpret definite expressions, but not indefinite expressions, as signifying referents that are grounded in shared experiences with their conversational partners. Previous research has shown that infants well below the age of two years are capable of interpreting a speaker's referential intention underlying ambiguous communicative acts on the basis of shared experiences (e.g. Moll *et al.*, 2008) or the speaker's previous experience with an object (Saylor & Ganea, 2007). However, these studies did not address the question of whether children made use of specific linguistic devices as cues for particular salient referents.

More recent studies that directly compared young children's understanding of different referring expressions suggested that 12-month-old English-learning infants are able to use the possessive pronoun *my*, but not the definite article *the*, as a cue to establish a link between a speaker and an object when they had the chance to observe PHYSICAL CO-PRESENCE between the speaker and the target referent (Saylor, Ganea & Vazquez, 2011). In the current study, children had to take into account the JOINT ACTIONS between them and the speaker to interpret her referential intention. Our findings are in line with other studies showing that shared experiences like joint actions are a powerful source for young children to establish common ground with a communicative partner and to interpret ambiguous verbal requests (e.g. Liebal *et al.*, 2009). In addition, our results show that children's interpretation of the referential intention of these requests is different for definite and indefinite descriptions, with definite descriptions indicating salience in common ground. This ability seems to emerge during children's third year.

Our results are in line with findings from analyses of article usage in children's spontaneous speech. In a sample of English-learning children

analyzed by Rozendaal and Baker (2010), the authors showed that in the age range of 2;9–3;3 children begin to use significantly more definite articles for mutually known referents. Thus, both production and comprehension data provide evidence that young children have acquired some fundamental knowledge of grounding definite reference with respect to the listener's knowledge state around the age of three years. However, the data of Rozendaal and Baker (2010) also reveal that around their third birthday children's use of articles is still far from the adult-like usage regarding the referent's status in common ground. At this age, children still omit articles in approximately 50% of their nominal constructions when talking about new referents unknown to their conversational partners.

Interestingly, there is some evidence that by the end of their third year young children have formed an abstract representation of an article category (Kemp, Lieven & Tomasello, 2005). Knowing that the definite and the indefinite article are different members of the same grammatical class might foster children's understanding that speakers may choose between them intentionally to express different communicative functions. Nevertheless, the children in our study could still have performed the task only by knowing that the definite article indicates common ground status of a referent and without representing definite and indefinite articles on some higher level. Due to the between-subjects design of our study, it remains unclear whether the children understood that the speaker intentionally chose between different referential forms of the same grammatical class to indicate the salience of the intended referent.

With respect to children's interpretation of indefinite expressions, we observed that children did not show a preference for choosing a non-shared (i.e. 'new') object when an indefinite article was used. Instead, they were equally likely to pick out any of the three objects, indicating that for the two- and three-year-olds the indefinite article does not encode the notion of 'newness' of a referent. This result becomes plausible when we consider that young children receive very little evidence in their input that new or unknown referents for the listener require an indefinite referential expression (Rozendaal & Baker, 2008).

In addition to this, current theories of referring expressions argue that the notion of newness associated with indefinite expressions is the result of pragmatic inferences rather than part of the indefinite article's meaning itself (Gundel, Hedberg & Zacharski, 2012). These so-called scalar implicatures are notoriously difficult for children to grasp and are not acquired until late in development (Noveck, 2001). Thus, future research will have to address more directly children's understanding of the speaker's intentional choice between definite and indefinite descriptions to determine the onset of these pragmatic skills.

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