The influence of language input on 3-year-olds' learning about novel social categories

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A B S T R A C T

There is considerable variability in the social categories that children essentialize and the types of expectations children form about these categories, suggesting children's essentialist beliefs are shaped by environmental input. Prior studies have shown that exposure to generic statements about a social category promotes essentialist beliefs in 4.5- to 8-year-old children. However, by this age children form essentialist beliefs quite robustly, and thus it is unclear whether generic statements impact children's expectations about social categories at younger ages when essentialist beliefs first begin to emerge. Moreover, in prior studies the generic statements were delivered by an experimenter and carefully controlled, and thus it is unclear whether these statements would have the same impact if they occurred in a somewhat less constrained setting, such as parents reading a picture book to their child. The current study addressed these open questions by investigating whether generic statements delivered during a picture-book interaction with their parents influenced 3-year-olds' expectations about members of a novel social category. Our results showed that children who heard generic statements during the picture-book interaction used social-group membership to make inferences about the likely behavior of a novel category member, whereas children who were not exposed to generic statements did not. These findings suggest that as early as 3 years of age, children's expectations about social categories are influenced by generic statements that occur during brief parent-child interactions.

1. Introduction

Recent evidence suggests that from a young age, children attend to social categories and use them to make inductive inferences about group members (Jin & Baillargeon, 2017; Liberman et al., 2016; Powell & Spelke, 2013; Pronovost & Scott, 2021; Rhodes et al., 2015). By at least age 3, children begin to form essentialist beliefs about categories, assuming that category members share an underlying essence that makes them inherently similar to one another and different from members of other groups (Birnbaum et al., 2010; Diesendruck & haLevi, 2006; Gelman, 2003, 2004; Rhodes & Gelman, 2009; for a review see Rhodes & Moty, 2020). Although children's essentialism was initially investigated in the context of natural kinds such as animal categories (Atran et al., 1997; Gelman & Wellman, 1991; Waxman et al., 2007), children have also been shown to essentialize social categories such as gender, language, ethnicity, and race (Gelman et al., 1986; Rhodes & Gelman, 2009; Rhodes et al., 2014; Taylor, 1996; Taylor et al., 2009; for

a review see Rhodes & Mandalaywala, 2017). For instance, some studies have found that young children in the United States believe that there are objectively correct ways to categorize individuals based on gender and that there is a discrete boundary between gender categories (e.g., you are either a boy or a girl, there is no in-between; Diesendruck et al., 2013; Diesendruck et al., 2015; Gelman, 2003; Gelman et al., 2004; Rhodes & Gelman, 2009; Rhodes et al., 2014; Taylor et al., 2009). Young children also infer that members of the same gender category will share fundamental properties beyond their directly observable characteristics (Gelman et al., 1986; Taylor, 1996; Taylor et al., 2009; Waxman, 2012), and believe that these gender categories are natural (Diesendruck et al., 2013; Gelman & Kalish, 1993; Kinzler & Dautel, 2012; Rhodes et al., 2014; Rhodes & Gelman, 2009), all hallmarks of essentialist thought.

Although the tendency to engage in essentialist thought emerges early, the social categories that children essentialize, and the beliefs they form about those categories, vary with age and culture (e.g., Birnbaum et al., 2010; Diesendruck et al., 2013; Rhodes & Gelman, 2009; Smyth

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et al., 2017; for reviews see Pauker et al., 2020, Rhodes & Mandalaywala, 2017). For instance, Rhodes and Gelman (2009) found that the tendency to essentialize gender declined with age for US children living in an urban liberal community, but not for children living in a more conservative community. Similarly, there is considerable variability within and between cultures in the extent to which children essentialize race and the age at which essentialist beliefs about race emerge (Birnbaum et al., 2010; Mandalaywala et al., 2019; Rhodes & Gelman, 2009; Rhodes & Mandalaywala, 2017; Smyth et al., 2017). These studies suggest that children's essentialist beliefs about social categories are influenced by environmental input.

One source of environmental input that may contribute to the formation of essentialist beliefs is generic statements (e.g., Gelman et al., 2004; Gelman & Roberts, 2017; Gelman et al., 2010; Rhodes et al., 2012, 2018; Segall et al., 2015; for review see Rhodes & Moty, 2020). Generic statements convey information about entire categories (e.g., "boys like to play football") rather than specific category members (e.g., "Tom likes to play football"). Such statements may contribute to the formation of essentialist beliefs because they imply that individuals in the category will share a given characteristic. Generic statements also indicate informative and meaningful ways in which to group individuals (Rhodes et al., 2018) and signal categories that are inductively powerful (Brandone & Gelman, 2009; Gelman et al., 2008; Gelman & Roberts, 2017; Noyes & Keil, 2019; Segall et al., 2015), which may lead children to assume that category membership is inherent, stable, and that members of a given social category will share many properties. For instance, hearing "boys like to play football," may lead a child to infer that Sam, a boy, will also like to play football even though they have never seen Sam display an interest in this sport. Adults produce more generic statements for groups that they view as having greater inductive potential, potentially signaling to children that the described category is important (Brandone & Gelman, 2009; Gelman et al., 2008; Gelman & Roberts, 2017; Segall et al., 2015). Thus, hearing a generic statement may not create essentialism, but instead may signal to children when essentialist thought is appropriate (Leshin et al., 2021).

Consistent with this view, several empirical studies have demonstrated the impact of generic statements on older children's and adults' essentialist beliefs (Gelman et al., 2010; Leshin et al., 2021; Rhodes et al., 2012, 2018). For instance, in a study by Rhodes et al. (2012) an experimenter read a picture book about a novel social category, Zarpies, to 4.5-year-old children. Children were read the picture book four times across two different sessions. Each page presented a picture of a person displaying a unique physical or behavioral property. A single line of text accompanied each page using the language specified by the participant's condition. Some children heard generic statements about the social category (e.g., "Look at this Zarpie! Zarpies hate ice cream."), some heard sentences about a specific category member (e.g., "Look at this Zarpie! This one hates ice cream."), and some were provided with no social-group label (e.g., "Look at this one! This one hates ice cream"). After completing the picture book, children's essentialist beliefs were assessed by observing whether children provided intrinsic explanations for a Zarpie's behavior (e.g., "Why does this Zarpie hate ice cream?"; explanation task), whether children expected a baby Zarpie to display Zarpie properties despite being raised by non-Zarpies (inheritance task), and whether children inferred that all Zarpies would share the same characteristics (induction task). Children who heard generic sentences were more likely to endorse essentialist beliefs about Zarpies: they were more likely to view Zarpie category members as sharing a deep, underlying inherent nature that makes Zarpie members highly similar to one another, but distinctly different from other categories. Children who heard the specific sentences or no social-group label were less likely to endorse essentialist beliefs about Zarpies.

Recent work by Leshin et al. (2021) replicated these findings with a larger sample collected online. Children ages 4.5 to 8 years old completed an online version of the picture-book task from Rhodes et al. (2012) in which they heard generic statements or specific statements

about Zarpies read aloud to them by a recorded narrator. Unlike in Rhodes et al. (2012), children only went through the picture book once. Following the picture book, children's essentialist beliefs were assessed using explanation and induction tasks similar to those used by Rhodes et al. (2012), as well as a task that measured whether children viewed the category boundary between Zarpies and non-Zarpies as discrete. Children that heard the generic statements were more likely than children in the specific condition to endorse intrinsic explanations for the Zarpie's behavior, to perceive Zarpie properties as heritable, and to perceive the Zarpie category as rigid and inflexible (one is either a Zarpie or not a Zarpie).

These studies suggest that by 4.5 years of age, exposure to generic statements about a category increases children's tendency to hold essentialist beliefs about that category. However, children this age already form essentialist beliefs quite robustly (Birnbaum et al., 2010; Diesendruck et al., 2013; Diesendruck & Haber, 2009; Diesendruck & haLevi, 2006; Gelman et al., 1986; Hirschfeld, 1995; Kinzler & Dautel, 2012; Leshin et al., 2021; Rhodes et al., 2012; Rhodes et al., 2014; Roberts & Gelman, 2015; Segall et al., 2015; Taylor, 1996; Taylor et al., 2009). This raises the question of whether generic statements affect children's beliefs about social categories at younger ages, when essentialist beliefs first begin to emerge. Generic language is present in many of the world's languages (Gelman & Tardif, 1998; Leslie, 2008) and there is evidence that young children hear generic statements from a young age in natural interactions with their parents (Gelman et al., 2005; Gelman et al., 2008; Gelman & Tardif, 1998; Pappas & Gelman, 1998). For instance, parents of 20- to 23-month-olds produce generics in a variety of natural settings such as eating, playing with toys, mealtime, and picture-book reading (Gelman et al., 1998; Gelman & Tardif, 1998). The frequency of generics tends to increase with age in these natural interactions. By preschool age, 92 % of mothers produced at least one generic statement in a similar 15- to 20-minute picture-book interaction (Pappas & Gelman, 1998). Additional evidence suggests that young children hear generic statements specifically about social categories (Gelman et al., 2004; Rhodes et al., 2018). These studies suggest there is potential for generic language to influence young children's social-category based beliefs.

Although the differences between generic and non-generic statements are subtle, evidence suggests that children as young as 2.5 years of age can distinguish between them (Gelman & Raman, 2003; Graham et al., 2011; Graham et al., 2016). Children begin to produce generic statements themselves between 2 and 3 years of age, and their production of generic statements increases with age (Gelman, 2003; Gelman, 2004; Pappas & Gelman, 1998). Moreover, recent work by Rhodes et al. (2018) showed that 2.5-year-olds use generic statements to form novel social categories and identify new category members. In this study, children saw six individuals that wore the same clothing color, an arbitrary perceptual feature. In the learning phase, children either heard a generic statement ("Look this is a Zarpie! Zarpies whisper when they talk."), a specific statement ("Look this is a Zarpie! This Zarpie whispers when she talks."), or a no-label statement ("Look at this one! This one whispers when she talks.") about each individual. In the test phase, children were shown pairs of individuals. One individual in the pair wore a color that matched the individual in the learning phase, and the other individual wore a contrasting color. Children that heard the generic or specific statements in the learning phase were asked, "Can you point to the Zarpie?" whereas children that heard the no-label statements were asked, "Let's find some more! Which of these two is the same as we saw before?" Children who heard the generic statements selected the category match significantly more often than children who heard the specific or no-label statements, suggesting that children used generic language to determine whether individuals belonged to a particular social category.

Together, this evidence suggests that 2.5- to 3-year-old children comprehend and produce generic statements and use them to identify novel categories. It is therefore possible that generic statements begin to

influence children's beliefs about social categories as early as 3 years of age. To date no study has directly tested this possibility. Although Rhodes et al. (2018) showed that generic statements help 2.5-year-olds form social categories, they did not examine whether children formed expectations about the behaviors and properties of category members. Thus, the primary goal of the present study was to investigate whether generic statements influence 3-year-olds' tendency to expect properties associated with a single category member to apply broadly to other category members, one tenet of essentialist thinking.

A secondary goal of the present study was to begin to explore the conditions under which language input impacts young children's essentialist beliefs. Although the children in Rhodes et al. (2012) heard the picture-book sentences four times over two sessions (64 sentences), the children in Leshin et al. (2021) heard them only once (16 sentences). Leshin et al.'s (2021) findings thus suggest that hearing 16 generic statements in a single interaction was sufficient to produce essentialist beliefs in 4.5- to 8-year-old children. It is unclear whether this quantity of generic statements would be sufficient to produce essentialist beliefs in younger children, or whether greater exposure to generic input would be required to have the same effect at younger ages. Moreover, in prior studies that examined the impact of generic statements on children's essentialist beliefs, the language input was delivered by an experimenter and carefully controlled. Thus, another open question is whether children's essentialist thinking would be similarly impacted by generic language that occurred in a somewhat less constrained setting, such as parents reading a picture book to their child.

The current study sought to address these open questions by investigating whether 36-month-olds could learn about the characteristics of a novel social category during a brief picture-book interaction with their parents and whether they would then use this newly acquired knowledge to make inferences about novel category members. Children and one of their parents first viewed a picture book about a novel social category, Zarpies, adapted from Rhodes et al. (2012). Parents were instructed to read the sentences in the book aloud and discuss the pictures with their child as they would at home. Across participants, we varied whether the sentences included in book were generic sentences about the social category ("Look at this Zarpie! Zarpies love to eat flowers"; generic condition) or sentences that referred to a specific individual and contained no social-group label ("Look at this one! This one loves to eat flowers"; no-label condition).

Following the picture-book task, we assessed whether children would use social-category membership to make inductive inferences about the likely behaviors of a novel member of the Zarpie category. Prior studies with older children have found that children's inductive inferences are affected by hearing generic statements about a social category (Gelman et al., 2010; Leshin et al., 2021; Rhodes et al., 2012). We focused on this aspect of essentialism because the capacity to make inductive inferences about social (e.g., Pronovost & Scott, 2021) and non-social categories (e.g., Graham et al., 2004; Graham et al., 2016; Welder & Graham, 2001) is established by infancy, and thus the 36-month-olds tested in the present study should be capable of making such inferences. However, the inductive inference tasks that have been used with older children have used lengthy verbal questions such as, "Look at this Zarpie. This Zarpie hates ice cream. Do you think that this Zarpie also hates ice cream, like this Zarpie?" (Gelman et al., 2010; Rhodes et al., 2012). Such questions might be problematic to use with 36-month-olds because children this age have more limited verbal abilities and they also tend to answer "yes" to yes/no questions (e.g., Fritzley & Lee, 2003; Okanda & Itakura, 2010). We therefore chose instead to test children's inductive inferences about Zarpies using a nonverbal violation-of-expectation task. These tasks take advantage of children's tendency to look longer at events that violate, as opposed to confirm, their expectations (e.g., Luo & Baillargeon, 2005; Stahl & Feigenson, 2015; Wang et al., 2004) and thus can be used to investigate children's expectations about the likely behavior of social-category members without asking verbal questions. Several recent studies have

successfully used violation-of-expectation tasks to examine social-group based inferences in infancy (e.g., Jin & Baillargeon, 2017; Liberman et al., 2016; Powell & Spelke, 2013; Pronovost & Scott, 2021). Violation-of-expectation tasks and other similar looking-time measures have also been successfully used with 2.5- to 5-year-old children (e.g., Glenwright et al., 2021; He et al., 2011; Scott et al., 2012).

In the violation-of-expectation task in the current study, children saw videos of novel Zarpies displaying behaviors that were either consistent or inconsistent with the behaviors that had been depicted in the picture book and their looking time to each video was measured. If children learned something about how Zarpies typically behave during the picture-book interaction and expected a novel Zarpie to behave similarly, then they should look longer at the Zarpie-inconsistent than the Zarpie-consistent events.

We predicted that exposure to generic statements in the picture book would cause children in the generic condition to use Zarpie group membership to make inferences about the likely behavior of a novel Zarpie. Thus, we predicted that children in the generic condition would look longer at the Zarpie-inconsistent than Zarpie-consistent events in the violation-of-expectation task. In contrast, based on prior research with older children (Leshin et al., 2021; Rhodes et al., 2012), we predicted that children in the no-label condition would not use Zarpie group membership to make inferences about the behavior of the Zarpies in the videos and hence should look equally to the two types of events. We also explored whether other aspects of parents' talk, above and beyond the sentences they read in the book, influenced children's expectations about Zarpies and their behavior.

2. Method

2.1. Participants

The final sample consisted of 83 3-year-old children (44 female, 39 male; $M_{age} = 36.6$ months, range: 35.2–39.3 months). Prior to the study, a power analysis was conducted in G*power (Faul et al., 2007) using effect sizes obtained from a pilot sample of 16 children. The power analysis indicated that assuming a medium effect size, our final sample size would be sufficient to achieve a power level of 0.85 at an alpha level of 0.05 in our critical comparisons. All participants were native English speakers. An additional 26 children were excluded because: the child was unwilling to complete the picture-book task (6) or the violation-of-expectation task (1), the child was highly inattentive and fussy during the picture-book task (1) or violation-of-expectation task (2), parental interference (3), or because the child contributed an insufficient number of useable trials in the violation-of-expectation task (13; see Section 2.4.2). Approximately equal numbers of children were randomly assigned to either the generic condition ($N = 44$) or the no-label condition ($N = 39$).

The children's names were obtained from birth records provided by the California Department of Public Health, as well as from a database of parents who had previously expressed interest in participating in research studies with their children. Parents were offered reimbursement for their transportation expenses, and their child was given a small gift (book or t-shirt) for participating. Parents provided written informed consent for their child's participation. The university's Institutional Review Board approved all procedures.

In lieu of income information, we recorded the highest level of education reported by either parent: 15 completed high school or less, 22 completed an Associate's Degree, 25 completed a Bachelor's degree, 8 completed a Master's degree, and 13 completed a professional degree (e.g., MD, PhD). Parents were asked to indicate their child's race and ethnicity: 51 of the children were identified as White, 3 as Asian, and 7 as Black or African American; 12 parents chose more than one race, 6 chose 'other race', and 4 chose not to respond. 34 of the children were identified as Hispanic or Latino, 45 as not Hispanic or Latino, and 4 parents chose not to respond.

2.2. Stimuli

2.2.1. Picture-book task

Stimuli for this task were adapted from Rhodes et al. (2012) and consisted of an essentialist-belief inducing paragraph and a picture book. The paragraph (Rhodes et al., 2012, Study 3) introduced parents to the novel group, Zarpies, and was designed to induce essentialist beliefs about Zarpies by emphasizing both the similarity amongst group members and their differences from members of other groups (see Appendix A). Because the Zarpies were completely novel to parents, this paragraph helped ensure that parents viewed Zarpies as a distinct, coherent category and that the beliefs that parents held about Zarpies were comparable across the two conditions.

The picture book contained the 16 illustrated pages used in Rhodes et al. (2012) (identical across conditions; see Rhodes et al., 2012 for sample illustrations). Each page featured a Zarpie character performing a unique behavior or showcasing a unique feature (see Table 1 for the full list of properties). The characters in the illustrations varied in terms of age, ethnicity, and sex, and they wore slightly different clothing. However, the characters also wore some category-typical clothing (e.g., a blue hat, pink or brown pants, yellow or green shirt) to assist children in identifying the category (as in Rhodes et al., 2012). Prior research has found that the category-typical clothing assists children in the formation of social categories, even if the similarity in clothing is not explicitly mentioned to children (as in Rhodes et al., 2012; Rhodes et al., 2018). Each illustrated page was preceded by a page with a statement describing the illustration (Table 1). The statement varied based on the participant's condition. In the generic condition, each statement about the novel social group was a generic statement (e.g., "Look at this Zarpie! Zarpies hate ice cream"). In the no-label condition, the statement described the action on the page, but did not label the character as belonging to a social category (e.g., "Look at this one! This one hates ice cream").

Table 1

Sentences used in the picture-book task, separately by condition.

Page	Generic condition	No-label condition
1	Look at this Zarpie! Zarpies love to eat flowers	Look at this! This one loves to eat flowers.
2	Look at this Zarpie! Zarpies have stripes in their hair.	Look at this! This one has stripes in her hair.
3	Look at this Zarpie! Zarpies can bounce a ball on their heads.	Look at this! This one can bounce a ball on his head.
4	Look at this Zarpie! Zarpies like to sing.	Look at this! This one likes to sing.
5	Look at this Zarpie! Zarpies climb tall fences.	Look at this! This one climbs tall fences.
6	Look at this Zarpie! Zarpies flap their arms when they are happy.	Look at this! This one flaps her arms when she is happy.
7	Look at this Zarpie! Zarpies have freckles on their feet.	Look at this! This one has freckles on his feet.
8	Look at this Zarpie! Zarpies hop over puddles.	Look at this! This one hops over puddles.
9	Look at this Zarpie! Zarpies hate walking in the mud.	Look at this! This one hates walking in the mud.
10	Look at this Zarpie! Zarpies draw stars on their knees.	Look at this! This one draws stars on her knees.
11	Look at this Zarpie! Zarpies can flip in the air.	Look at this! This one can flip in the air.
12	Look at this Zarpie! Zarpies are scared of ladybugs.	Look at this! This one is scared of ladybugs.
13	Look at this Zarpie! Zarpies hate ice cream.	Look at this! This one hates ice cream.
14	Look at this Zarpie! Zarpies chase shadows.	Look at this! This one chases shadows.
15	Look at this Zarpie! Zarpie babies are wrapped in orange blankets.	Look at this! This one baby is wrapped in an orange blanket.
16	Look at this Zarpie! Zarpies sleep in tall trees.	Look at this! This one sleeps in tall trees.

2.2.2. Violation-of-expectation task

Stimuli consisted of high-definition videos of actors performing a series of actions. In each video, children saw an agent wearing an outfit similar to the characters featured in the picture-book task (i.e., khaki pants, a yellow long-sleeved shirt, and a blue hat). The videos featured four different agents (2 male, 2 female). All children saw six test trials. A separate video was played for each trial. Trials were arranged in three pairs. Each pair focused on one of the behaviors shown in the book. In one trial in each pair, the agent showed a behavior that was consistent with the Zarpie behavior depicted in the book. In the other trial in each pair, the agent displayed a behavior that was inconsistent with the Zarpie behavior depicted in the book (see Fig. 1). All trials are described from the children's perspective.

Each trial consisted of an initial phase followed by a final phase. The duration of the initial phase was fixed and identical for all participants. The duration of the final phase was child-controlled. In the first pair of test trials, children saw a male agent either bounce a ball on his head (consistent event) or bounce a ball on his knee (inconsistent event). During the 8-s initial phase of the consistent event, a male agent stood facing the camera, holding the ball out in front of him in both hands. He raised the ball to his head and bounced the ball on his head twice, catching the ball each time. He then returned the ball to its starting position and paused. During the final phase of the event, the children viewed this paused scene until the trial ended (see Section 2.3.2 for trial-ending criteria). The inconsistent event was identical except that a different male agent bounced the ball on his knee instead of his head.

In the second pair of trials, children saw a female agent emote towards ice cream negatively (consistent event) or positively (inconsistent event). During the 9-s initial phase of the consistent event, a female agent stood facing the camera. Positioned to her left was an ice cream cone on a small table. She reached over and grabbed the ice cream, raised it to her face, and pretended to taste the ice cream. Then, she held the ice cream away from her while saying "Yuck!" and displaying negative affect to indicate that she disliked the ice cream. After repeating these actions once more, she placed the ice cream back on the table, returned to her starting position, and paused. During the final phase of the event, children viewed this paused scene until the trial ended. The inconsistent event was identical, except that a different female agent said "Mmm!" and smiled, displaying positive affect while tasting the ice cream.

In the third pair of test trials, children saw a male agent either flap his arms (consistent event) or spin in circles (inconsistent event) while happy. During the 6-s initial phase of the consistent event, a male agent stood facing the camera. He smiled, held his arms out to the side, and then flapped his arms up and down twice. He paused with his arms at his side for one second then repeated the arm flapping action. He then returned to his initial starting position and paused until the trial ended. The inconsistent event was identical except the other male agent spun in circles instead of flapping his arms.

2.3. Apparatus and procedure

Children played with toys in the lobby while their parent completed the consent form. After completing the paperwork, parents were given the essentialist-belief inducing paragraph to read. When the parent finished reading the paragraph, the parent and child were brought into an adjoining room to complete the picture-book task. Immediately following the picture-book task, children went into a different adjoining room and participated in the violation-of-expectation task. The duration of the entire study was approximately 30 min.

2.3.1. Picture-book task

The parent was given the essentialist-belief inducing paragraph and told that the paragraph would tell them a bit about the content of the book they were going to read through with their child. Parents were asked to read the paragraph carefully. After the parent finished the
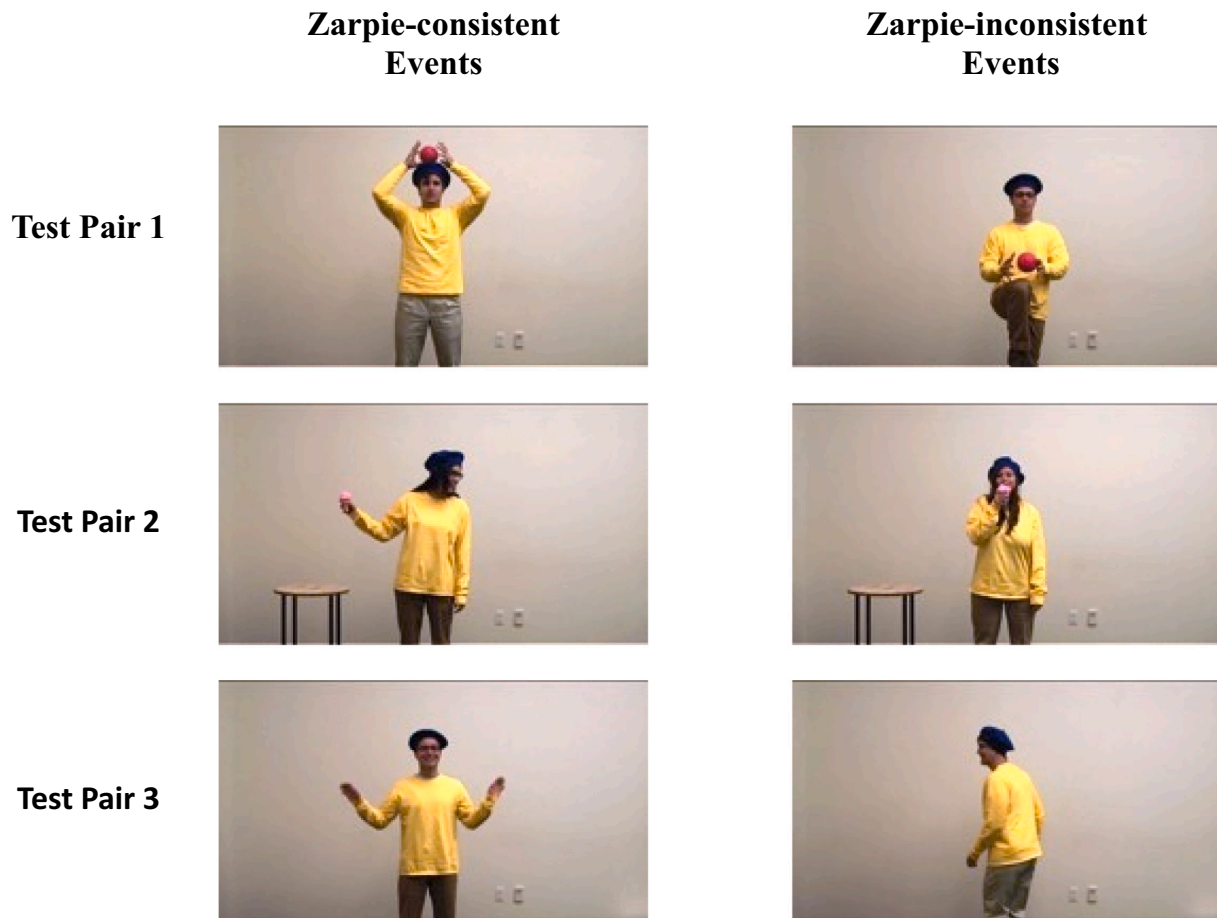
Zarpie-consistent Events | **Zarpie-inconsistent Events**

Fig. 1. Test events shown in the violation-of-expectation task. Children saw pairs of events in which a person dressed as a Zarpie displayed behaviors that were either consistent (left) or inconsistent (right) with the Zarpie behaviors depicted in the book (order counterbalanced).

paragraph, the parent and child were taken into an adjoining room. Children sat on their parent's lap facing a table. A camera was centered on the table to capture the parents' verbal utterances. A second camera was mounted above and behind the child to capture the stimuli. Parents were given the book and asked to read the statements in the book aloud and describe the pictures to their child as they would when reading a book at home. Parents were instructed to return to the lobby when they were finished. The experimenter then left the parent and child in the room alone to complete the task.

2.3.2. Violation-of-expectation task

Children sat on their parent's lap 91.5 cm in front of a large television screen (68.5 cm × 122 cm). The room was dimly lit. A camera hidden at the base of the television (centered, 89 cm above the floor) recorded the child's face during the experiment. The television was connected to a Macintosh computer located to the left of the child behind a sound-dampening room divider. This computer controlled the presentation of the experimental stimuli using custom software written in Python (Peirce, 2007). The software selected the correct version of each trial based on the child's condition and presented the video in the center of the television screen (each video measured 64 cm × 37 cm on screen).

At the start of the experiment, an attention-getter, a yellow smiley face measuring 28 × 20 cm, was presented in the center of the television screen. When the child attended to the screen, the experimenter initiated the presentation of the stimuli on the television screen. Children viewed the three pairs of test trials appropriate for their condition; approximately half the children in each condition saw the consistent test trial first and the remainder saw the inconsistent test trial first. Each test trial ended when the child either (1) looked away for 1 consecutive second

after having looked for at least 5 cumulative seconds or (2) looked for 60 cumulative seconds without looking away for at least 1 consecutive second. These trial-ending criteria were determined based on past research (Bian et al., 2018; Liberman et al., 2017; Powell & Spelke, 2013; Scott, 2017) and our pilot sample. Although a 2-s look-away criteria is often used in violation-of-expectation tasks with infants (e. g., Bian et al., 2018; Bian & Baillargeon, 2022; Liberman et al., 2014; Liberman et al., 2017; Powell & Spelke, 2013; Scott, 2017), our pilot data indicated that our older, 3-year-old children often became restless and inattentive when this criterion was used. We therefore chose to end the trial when children looked away for 1 consecutive second in order to reduce attrition from fussiness and inattention.

After each trial, an attention-getting stimulus (a yellow smiley face measuring 28 cm × 20 cm) was displayed on the screen for 4 s and a brief tone was played to attract the child's attention back to the television screen. After trial 4, the smiley-face was replaced by an image of a baby (measuring 30 × 19 cm) that was accompanied by a 4-s audio clip of a baby laughing.

2.4. Coding

2.4.1. Picture-book task

The picture-book task was coded and transcribed by trained research assistants who were naïve to the hypotheses of the study. Parents' language was first transcribed verbatim. Children's language was not transcribed. Non-verbal sounds or exclamations were not included in the transcription (e.g., gasps, sighs, groans, etc.). Utterances that were off-topic (e.g., asking the child to sit down) or exact repetitions of what the child said were excluded from all coding and analyses.

Following transcription, we first verified that all parents read the statements provided in the book as instructed. Parent utterances were then coded in several ways. First, we coded which characteristic in the book each on-topic sentence referred to. This allowed us to examine whether parents in the two conditions differed in the amount of talk they produced about the three characteristics depicted in the violation-of-expectation task. This coding included both utterances in which parents read the statements provided in the book and any additional utterances parents spontaneously produced about a given characteristic.

Next, we coded the content of any utterances that parents spontaneously produced about Zarpies. Because we were interested in parents' spontaneous language, the utterances in which parents read the statements provided in the book were excluded from the following coding. Each spontaneous on-topic utterance was coded for whether it contained a generic statement. Generic statements were any statements that described the category as a whole or made generalized statements about the behavior or characteristic, rather than describing particular group members (e.g., "Zarpies hate ice cream."). In addition to spontaneous generic statements, we also coded two other types of spontaneous statements that might influence children's beliefs about Zarpies: contrastive statements and comparative statements. Previous work has suggested that highlighting one's potential membership in a social group (e.g., establishing the category as one's ingroup or outgroup) and similarities or differences between categories might increase the salience of social groups (Bigler et al., 1997; Bigler & Liben, 2007). We therefore examined contrastive and comparative statements in an effort to explore the influence of this type of talk. Parental statements that highlighted differences between the parent or child and the characters in the book (e.g., "You don't hate ice cream, you love ice cream!") were coded as contrastive statements. Statements that highlighted similarities between the parent or child and the characters in the book (e.g., "You like to flap your arms too, don't you?") were coded as comparative statements.

A second individual transcribed and coded 67 % of the picture-book sessions. Inter-rater agreement was determined using Cohen's kappa and was acceptable for all measures (utterances about video characteristics $\kappa = 0.84$; spontaneous generic statements $\kappa = 0.87$; spontaneous comparative statements $\kappa = 0.71$; spontaneous contrastive statements, $\kappa = 0.79$). Disagreements between the two coders were resolved by the first author.

2.4.2. Violation-of-expectation task

In order to present events with trial duration contingent on the children's attention, online coding was conducted by the experimenter (blind to condition and trial order), as described above. All children were then coded offline from silent video by two trained coders who were naïve to the condition and the order of the test trials that the child received; looking times resulting from this offline coding were used in all analyses. For each trial, the offline coders indicated the child's direction of gaze (at the stimuli or away) for each frame of the video. The two offline coders agreed on the child's direction of gaze for 92 % of video frames. Trials in which agreement between the two offline coders was <80 % (47/498) or the two offline coders disagreed on whether the child met the criteria to end the trial (9/498) were resolved by a third offline coder. For some trials, both offline coders agreed that the experimenter terminated the trial prematurely before the child met the looking criteria (33 out of 498 trials). When this occurred, both trials for the affected item (i.e. ball, ice cream, or flap) were eliminated from the analyses (8 ball items; 1 ice cream item; 21 flap items). Individual items were also eliminated if the difference between participants' looking times to the inconsistent and consistent events was >3 standard deviations away from the mean of the condition (2 ice cream items; 1 flap item). Finally, one item was excluded because the participant looked the maximum amount of time in both trials (1 ball item). Children were excluded if they failed to contribute at least two useable items to the analysis. The final sample consisted of 37 ball items, 42 ice cream items, and 32 flap items in the generic condition and 37 ball items, 38 ice

cream items and 29 flap items in the no-label condition.

3. Results

Preliminary analyses revealed no significant main effects or interactions involving child sex (all $ps > 0.18$); we therefore collapsed across this variable in all analyses.

3.1. Children's performance in the violation-of-expectation task

To determine whether children formed expectations about the behavior of Zarpies, we first examined children's performance in the violation-of-expectation task. For each test trial, we separately calculated children's looking time in seconds for the initial phase and the final paused scene. Children were highly attentive during the initial phase of each test trial, attending, on average, for 96 % (ball trials), 98 % (ice cream trials), and 94 % (flap trials) of the initial phases, respectively.

We then calculated a difference score (in seconds) for each item by subtracting children's looking time to the final paused scene for the consistent event from their looking time to the inconsistent event for that item (see Table 2). Thus, positive difference scores indicated longer looking time at Zarpie-inconsistent behaviors, whereas negative difference scores indicated longer looking time at Zarpie-consistent behaviors. Preliminary analyses of children's difference scores revealed no significant effects or interactions involving item (all $ps > 0.28$). Therefore, the data were collapsed across this factor by averaging across the three items to create an overall difference score for each participant.

Children's overall differences scores (Table 2) were then analyzed using an analysis of variance (ANOVA) with condition (generic, no-label) and trial order (inconsistent first, consistent first) as between-subjects factors. As predicted, there was a significant main effect of condition, $F(1, 79) = 5.67$, $p = .02$, $\eta_p^2 = 0.07$. As shown in Fig. 2, children in the generic condition had significantly larger overall difference scores than children in the no-label condition. There was also a significant main effect of order, $F(1, 79) = 20.20$, $p < .001$, $\eta_p^2 = 0.20$, reflecting the fact that children who saw the inconsistent event first had larger difference scores ($M = 3.73$, $SD = 7.75$) than those who saw the consistent event first ($M = -1.64$, $SD = 7.64$). Such order effects are relatively common in tasks of this kind (e.g., Aguiar & Baillargeon, 2002; Csibra et al., 1999; Wang et al., 2004). However, the condition by order interaction was not significant, $F(1, 79) = 1.00$, $p = .32$.

To further explore the main effect of condition, we next conducted planned one-sample t-tests to determine whether performance in each condition differed from chance (0). In the generic condition, children's overall difference scores were significantly greater than chance, $t(43) = 2.48$, $p = .017$, $d = 0.37$ (all p-values in this report are two-tailed). Thus, children in the generic condition looked significantly longer at the Zarpie-inconsistent than the Zarpie-consistent events. In contrast, in the no-label condition, children's overall difference scores were not significantly different from chance, $t(39) = -0.50$, $p = .62$. These results suggest that children in the generic condition learned something about how Zarpies typically behave from a brief interaction with their parent and expected that a novel Zarpie in the violation-of-expectation task would behave in a manner that was consistent with the Zarpie behavior depicted in the book. This pattern of learning was not present in the no-label condition. Overall, these results suggest that exposure to generic

Table 2
Mean (SD) difference scores in the violation-of-expectation task, separately by condition.

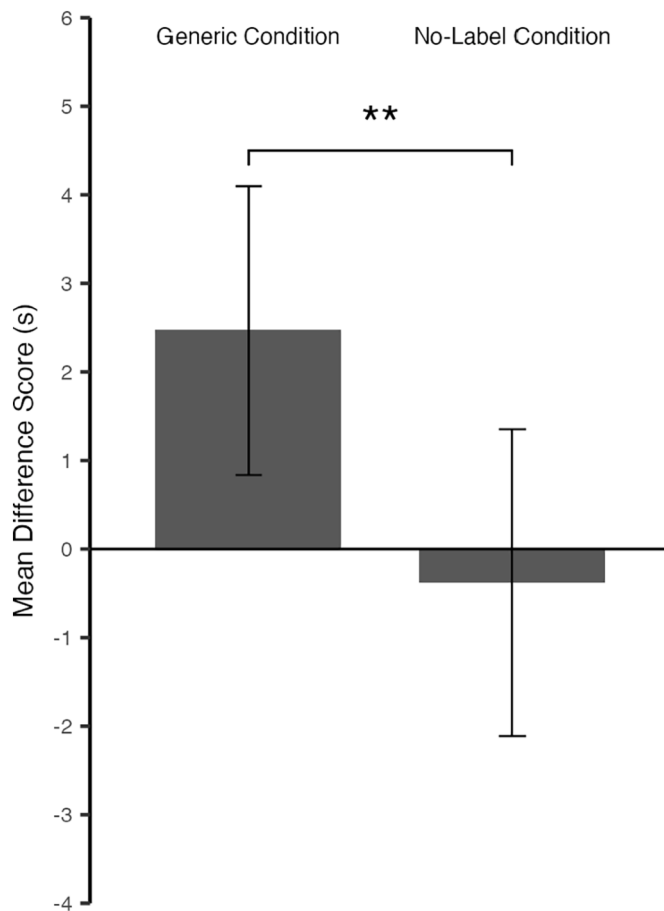|	Generic condition	No-label condition
Ball	2.10 (10.23)	−0.84 (7.44)
Ice cream	1.11 (14.15)	−0.86 (9.92)
Flap	3.70 (4.90)	0.62 (12.96)
Overall	2.47 (6.61)	−0.43 (5.38)

Fig. 2. Results from the violation-of-expectation task. Estimated marginal means of children's overall difference scores in the violation-of-expectation tasks, separately by condition. Positive scores indicate longer looking time to the Zarpie-inconsistent event than the Zarpie-consistent event. Error bars indicate the 95 % confidence interval of the mean within each condition, and asterisks indicate a significant difference between conditions (*p* < .01).

sentences increased children's tendency to view Zarpies as a coherent group that had members that were highly similar to one another.

3.2. Parent talk in the picture-book task

In the next set of analyses we explored whether parent talk differed across conditions. For each parent, we calculated the total number of on-topic utterances, the number of on-topic utterances about each characteristic depicted in the video, and the number of spontaneous generic, comparative, and contrastive statements (see Table 3). An independent samples *t*-test indicated that the two conditions did not differ in the total number of utterances that parents produced during the picture-book task, *t*(81) = 0.69, *p* = .49. However, to control for possible differences in talkativeness across parents, subsequent analyses of parent talk

Table 3
Mean (SD) for parent talk variables in the picture-book task, separately by condition.

	Generic condition	No-label condition
Total number of utterances	106.93 (40.25)	100.54 (44.37)
Ball utterances	7.36 (4.24)	5.64 (2.61)
Ice cream utterances	7.61 (3.71)	7.15 (3.89)
Flap utterances	6.39 (2.70)	5.69 (2.86)
Generic statements	1.39 (2.08)	0.08 (0.35)
Contrastive statements	2.41 (3.48)	1.08 (1.61)
Comparative statements	1.61 (1.82)	1.10 (1.76)

included the number of utterances that parents produced as a covariate.

We first examined potential differences across conditions in the quantity of talk that parents produced about the three properties depicted in the violation-of-expectation task (ball, ice cream, flap). For each property, we conducted an analysis of covariance (ANCOVA) with the number parent utterances about that property as the dependent variable, condition (generic, no-label) as a between-subjects factor, and the total number of parent utterances as a covariate. These analyses revealed that relative to parents in the no-label condition, parents in the generic condition produced significantly more utterances about the ball item, *F*(1, 80) = 7.28, *p* = .009, η_p^2 = 0.08. However, the two conditions did not differ significantly in the amount of parent talk about the ice cream item, *F*(1, 80) = 0.003, *p* = .96, or the flap item, *F*(1, 80) = 0.84, *p* = .36.

We next examined whether the manner in which parents talked about the Zarpies differed across conditions. An additional series of ANCOVAs with condition (generic, no-label) as a between-subjects factor and the total number of parent utterances as a covariate revealed that, excluding the statements written in the book, parents in the generic condition produced significantly more spontaneous generic statements than those in the no-label condition, *F*(1, 80) = 14.30, *p* < .001, η_p^2 = 0.15. Parents in the generic condition also produced significantly more contrastive statements, *F*(1, 80) = 4.29, *p* = .04, η_p^2 = 0.05, than those in the no-label condition. However, the number of comparative statements did not differ significantly across conditions, *F*(1, 80) = 1.42, *p* = .24, η_p^2 = 0.02.

All parents read the same essentialist-belief inducing paragraph prior to reading the picture book and thus should have held comparable beliefs about Zarpies at the start of the book. The fact that the content of parent talk nevertheless differed across conditions suggests that the sentences provided in the book affected parents' spontaneous statements about Zarpies, with parents in the generic condition producing more statements that emphasized group membership.

In a final set of analyses, we asked whether differences in the way that parents talked about Zarpies, above and beyond the sentences provided in the book, related to children's performance in the violation-of-expectation task. To address this question, we conducted three hierarchical multiple regression models, one for each type of spontaneous parent statement (generic, contrastive, comparative), with children's overall difference score as the dependent variable. In each model, condition (generic, no label), trial order (inconsistent first, consistent first) and the total number of parent utterances was entered at step 1. As shown in Table 4, these accounted for 26 % of the variance in children's difference scores, *F*(3, 79) = 9.38, *p* < .001. We next entered the number of parent statements (generic, contrastive, or comparative) at Step 2. As seen in Table 4, the number of generic statements and the number of contrastive statements did not predict children's performance, both *F*s < 1. However, there was a significant effect of the number of parent comparative statements, *F*(1, 78) = 3.98, *p* = .049. Children who heard more comparative statements had significantly lower difference scores, suggesting that when parents highlighted the similarities between Zarpies and the parent or child, it reduced children's tendency to use Zarpie-group membership to make inferences about the behavior of a novel Zarpie.

4. Discussion

The current study examined whether generic statements delivered in a brief parent-child interaction influenced 3-year-olds' expectations about members of a novel social category. Parents read their children a picture book about Zarpies that contained either generic statements about the social group or sentences about a specific individual with no social-group label. Then, in a violation-of-expectation task, children saw novel Zarpies display behaviors that were either consistent or inconsistent with those in the picture book. Children in the generic condition looked significantly longer at the Zarpie-inconsistent than Zarpie-

Table 4

Hierarchical multiple regressions predicting children's overall difference scores in the violation-of-expectation task.

	ΔR^2	β
Model 1: Generic statements		
Step 1	0.26*	
Picture-book condition		0.22*
Trial order		0.44*
Total number of parent utterances		0.11
Step 2	0.00	
Number of parent generic statements		−0.01
Model 2: Contrastive statements		
Step 1	0.26*	
Picture-book condition		0.22*
Trial order		0.44*
Total number of parent utterances		0.11
Step 2	0.01	
Total number of parent contrastive statements		−0.08
Model 3: Comparative statements		
Step 1	0.26*	
Picture-book condition		0.22*
Trial order		0.44*
Total number of parent utterances		0.11
Step 2	0.04*	
Total number of parent comparative statements		−0.19*

Note: β = standardized regression coefficient.

* $p < .05$

consistent events, whereas children in the no-label condition did not. This finding suggests that exposure to generic statements caused 3-year-olds to expect Zarpies to behave similarly to one another and hence they used membership in this social group to make inductive inferences about the likely behavior of novel group members. Parent language also differed across conditions: parents in the generic condition produced significantly more spontaneous generic and contrastive statements than parents in the no-label condition. Thus, the generic statements in the picture book impacted both how parents discussed the social category, as well as the how the child expected members of the social category to behave.

The current study extends prior work on the relationship between language input and children's social-group based reasoning in three ways. First, this study provides the first evidence that generic statements influence children's expectations about social categories as early as 3 years of age. Although children hear generic statements from their parents by age 2 (Gelman et al., 1998; Gelman & Tardif, 1998), prior studies investigating the impact of generic statements on essentialist thinking have focused on children 4.5 years of age and older (Leshin et al., 2021). In the current study, 3-year-old children in the generic condition expected the novel Zarpies in the violation-of-expectation task to behave similarly to the Zarpies they learned about in the picture book. Children in the no-label condition did not form these expectations. This pattern suggests that when children heard statements that broadly referred to the entire novel social category, it caused them to assume that the members of Zarpie category shared characteristics and may be inherently similar to one another. These results thus suggest that generic statements can impact the expectations that children form about social categories at an age when essentialist beliefs are just beginning to emerge.

Second, our findings suggest that even minimal generic input is sufficient to influence 3-year-olds' expectations about a social group. Taking into consideration both the sentences in the picture book and the spontaneous statements made by parents, on average children in the generic condition heard 17.39 generic statements (80% of children in the generic condition heard between 16 and 18 generic statements). After exposure to this limited number of generic statements, children in the generic condition expected the novel Zarpies in the violation-of-expectation task to behave in a Zarpie-consistent manner and looked longer when they did not. This result replicates the finding by Leshin

et al. (2021) that exposure to 16 generic statements was sufficient to impact 4.5- to 8-year-olds' beliefs about a social category and extends this finding to younger, 3-year-old children. One might reasonably predict that younger children might need more exposure to generic input to form expectations about a social category, but our results suggest that this is not the case. Our findings thus suggest that even if generic statements are relatively infrequent in everyday interactions, they still have the potential to influence younger children's expectations about social categories.

However, the two picture-book conditions differed not only in the presence of generic statements, but also in the presence of group labels: the book statements in the generic condition used the group label "Zarpie" whereas those in the no-label condition did not. There is evidence that in early childhood, social-group labels influence expectations such as whether one individual will help another (Jin & Baillargeon, 2017) and whether two individuals will share food preferences (Pronovost & Scott, 2021). Thus, a potential alternative explanation of our findings is that children's performance in the violation-of-expectation task was influenced by the presence of group labels instead of, or in addition to, the generic statements. Although we cannot rule out this possibility, we think it is unlikely that group labels alone can explain the effects in the present study. Prior research suggests that young children do not preferentially rely on group labels over other cues to group membership such as similarity in physical appearance (Bian & Baillargeon, 2022; Chalik et al., 2014; Jordan & Dunham, 2021; Rhodes et al., 2018; Sparks et al., 2017). More critically, exposure to non-generic sentences containing group labels (i.e. "Look at this Zarpie! This Zarpie loves to eat flowers.") was not sufficient to produce essentialist reasoning in 4.5- to 8-year-old children (Leshin et al., 2021; Rhodes et al., 2012). Similarly, 2.5-year-olds formed a novel social category when individuals were described with noun labels in generic sentences ("Zarpies eat flowers."), but not when the noun labels were instead used in non-generic sentences ("This Zarpie eats flowers."; Rhodes et al., 2018). These findings suggest that hearing group labels alone is insufficient to cause young children to develop essentialist beliefs about a social category.

Third, our study found that exposure to generic statements not only impacted children's expectations about the novel social category, but it also affected the language that parents produced in the picture-book task. All parents in this study read the same essentialist-belief inducing paragraph, and thus parents in the two conditions should have held comparable beliefs about Zarpies prior to reading the picture book. Yet parents in the generic condition produced more generic statements (above and beyond the statements provided in the picture book) and contrastive statements than parents in the no-label condition. These differences across conditions were not because parents in the generic condition simply talked more overall: the amount of on-topic utterances did not differ across conditions, and the condition difference in generic and contrastive statements emerged after controlling for the number of on-topic utterances that parents produced. Instead, the mere presence of the generic statements in the picture book might have increased parents' tendency to view Zarpies in an essentialist manner by signaling that this category is highly distinct from other social categories and that Zarpies share inherent characteristics. The tendency to view Zarpies in an essentialist manner might have led parents to produce more statements that highlighted how Zarpie members are part of a unique, coherent group whose members are highly similar to one another and different from non-group members (i.e. the parent, child). These findings support theoretical claims that subtle environmental factors, such as statements in a children's book (Bigler & Liben, 2007), might influence the beliefs that parents form about a particular social group, in turn impacting the type of language their child hears about that group.

4.1. Implications for children's essentialism and inter-group relations

Our findings, together with those of Rhodes et al. (2018), suggest that generic statements may play a central role in the initial formation of essentialist beliefs in children as young as 3 years of age. Generic statements may be a powerful catalyst for early essentialist thinking because they require very little evidence for acceptance (Abelson & Kanouse, 1966; Foster-Hanson et al., 2019). Children 4 years of age and older have better memory for information conveyed via generic than specific statements (Cimpian & Erickson, 2012) and expect information conveyed generically to be widely known (Cimpian & Scott, 2012). Moreover, they accept generic statements that are inconsistent with their own direct experience (e.g., Gelman & Roberts, 2017; Rhodes & Gelman, 2009) and use generic statements to make inferences about unmentioned groups that they have not directly observed (Rhodes & Moty, 2020). Although less work has explored the impact of generic statements in children under 4, at minimum, 3-year-olds appear to use generic statements to detect social categories (Rhodes et al., 2018), and, as the current work suggests, make inductive inferences about members of social categories. Thus, generics could potentially be a critical mechanism by which essentialist beliefs about social categories emerge.

Generic statements thus have the potential to have lasting effects on younger children's essentialist thinking and, in turn, the downstream consequences of stereotyping and prejudice. One characteristic of essentialist thinking is the tendency to assume that members of a category are highly similar to one another, but different from other groups, and that category members will share inherent, stable characteristics. This thinking could lead children to view groups that they themselves do not belong to (i.e. the outgroup) as having different characteristics and properties, which has been linked to the development of prejudiced attitudes (Brewer, 1999). Other aspects of essentialist thinking, such as viewing social categories as reflecting distinct kinds of people with discrete boundaries, have been shown to influence inter-group interaction by dehumanizing the outgroup (Haslam et al., 2006), decreasing the likelihood of engagement with the outgroup (Zagefka et al., 2013), and decreasing resource allocation to the outgroup (Rhodes et al., 2018). Essentialist thinking has even been linked to negative racial stereotypes in children as young as 3 (Pauker et al., 2010), further highlighting the potential negative consequences of inducing essentialist thinking.

Our findings suggest a possible way of mitigating these potential negative effects – comparative statements. In the current study, parents' comparative statements predicted children's performance in the violation-of-expectation task. Specifically, when parents produced more spontaneous comparative statements, children had significantly lower difference scores in the violation-of-expectation task, suggesting they were less likely to expect a novel Zarpie to behave in a Zarpie-consistent fashion. Perhaps when parents highlighted similarities between Zarpies and themselves or their child, this decreased children's essentialist thinking about Zarpies by emphasizing that they are not a distinct group that is highly different from other social groups. This may have reduced children's tendency to use Zarpie-group membership to make inferences about the behavior of a novel Zarpie. If this possibility is correct, then it suggests that statements that highlight commonalities across groups might have the potential to counteract the influence of generic statements and reduce essentialist beliefs about a novel social category. The relationship between comparative statements and children's social-group based reasoning thus bears replication and clarification in future work.

4.2. Limitations and future directions

The present study examined only a single component of essentialism: the tendency to view category members as highly similar and hence use category membership to make inferences about the behavior of novel group members. Additional work is needed to determine whether generic statements would influence other aspects of essentialism in 3-year-olds, such as the expectation that social categories are discrete, the expectation that category membership is inherited and stable over time, or the tendency to use social-category membership to explain an individual's behavior (Rhodes & Mandalaywala, 2017). However, addressing these questions presents a methodological challenge. Past work on the influence of generic statements has measured children's essentialism using tasks that involve complex verbal questions and/or required children to produce verbal explanations (Cimpian & Erickson, 2012; Cimpian & Markman, 2011; Gelman et al., 2010; Leshin et al., 2021; Rhodes et al., 2012, 2018; Roberts et al., 2017; Segall et al., 2015), which could be too challenging for younger, 3-year-old children. Here we addressed this issue by using an entirely nonverbal violation-of-expectation task to investigate whether children expected members of the same category to behave similarly to one another. Violation-of-expectation paradigms lend themselves well to testing children's expectations about what individuals will do (Bian & Baillargeon, 2022; Buresh & Woodward, 2007; Csibra, 2008; Powell & Spelke, 2013; Liberman et al., 2016; Pronovost & Scott, 2021; Rhodes & Chalik, 2013; Scott, 2017; Southgate et al., 2008; see Baillargeon et al., 2016, for a review), but they are less suitable for examining other aspects of children's reasoning, such as the explanations children provide for individuals' behavior. It is also the case that in the present study, a number of trials had to be excluded because children failed to meet the looking criteria. This issue disproportionally affected the final pair of test trials, perhaps due to an increase in overall activity level later in the task. This could indicate that 36 months is near the upper limit on when violation-of-expectation tasks can successfully be used to examine children's reasoning (although see He et al., 2011 for a sample of 31-month-olds with a comparable drop rate). Thus, there is a need for other novel methods with limited verbal demands that are suitable for examining the influence of generic statements on other facets of 3-year-olds' essentialism.

Our findings extend prior work by demonstrating that generic statements impact the expectations children form about social categories when they are delivered by parents in a less constrained setting (i. e. aside from reading the book statements, parents could discuss the book with their child however they wished without time constraints). To our knowledge, this is the first study to examine the impact of generic statements delivered in a parent-child interaction on young children's expectations about social categories. However, we acknowledge that the parent-child interaction in our study, although less constrained than past work where experimenters read scripted sentences to children (e.g., Leshin et al., 2021; Rhodes et al., 2012, 2018), was not naturalistic: the interaction took place in a laboratory and parents were provided with a picture book and instructed on what to do. Moreover, although parents' language differed across conditions, we found few relationships between parents' spontaneous statements in the picture-book task (statements parents made above and beyond the statements provided in the book) and children's behavior in the violation-of-expectation task. Instead, children's behavior was largely driven by the sentences that parents read from the book, with children in the generic condition expecting Zarpies to behave similarly to one another. Thus, our work provides evidence that generic language is a mechanism by which parents can influence children's beliefs, and it demonstrates that generic statements can have this impact at an age when essentialist beliefs emerge, but additional work is needed to show whether the effects seen in the current study would emerge based on generic statements that parents make spontaneously in naturalistic settings.

Additionally, future work should investigate when and how generic input occurs and effects children in everyday life, especially at this early age where essentialist beliefs are first emerging. In particular, given the potential influence of generic statements on the formation of essentialist beliefs and intergroup interactions, it seems critical to understand sources of individual differences in parents' production of such statements about social categories. Similarly, if comparative statements could reduce essentialist beliefs about social categories, as suggested by

our findings, then it would also be valuable to understand when parents produce such talk and why. Investigating when and why parents produce language that could influence the formation of children's essentialist beliefs could suggest targets of intervention for reducing the potential pernicious effects of essentialist thinking.

4.3. Conclusion

In summary, the findings from the current study suggest that as early as age 3, children can learn about the characteristics of a novel social group from a brief interaction with their parent and form expectations about the characteristics of social group members based on this input. Particularly, the expectations that children form about social categories appear to be strongly influenced by generic statements. These findings highlight the powerful impact environmental influences, such as the language used to discuss social groups, have on the expectations children's form about social categories at an age when essentialist beliefs are just beginning to emerge.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

Appendix A. Essentialist belief-inducing paragraph read by parents

"Imagine that some scientists went to a far- away place and they discovered some people living there. These were people that the scientists had never studied before, so the scientists studied the people in detail. They looked at all of their biological features—their DNA and their blood types—and at their cultural practices. They discovered that the population was very different from any community that scientists had ever studied before. They had very different/biological properties, and very different cultural practices, from any people that the scientists had ever studied. The scientists had discovered Zarpies!"

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