The aim of the current study was to explore whether the age and the familiarity of the individuals comprising a group majority influenced the tendency of 3- and 4-year-old children to conform. Participants were presented with two variants of a novel task in which they were required to judge which of three line drawn tigers had the greatest number of stripes. The participants made their judgements in two contexts, first after viewing five informants perform the task incorrectly, and second without viewing the responses of other individuals. The informants comprised either a group of familiar children, a group of unfamiliar children, a group of familiar adults, or a group of unfamiliar adults. The results showed that the children displayed selective conformity with respect to informant age, readily adopting the incorrect response when it was indicated by an adult majority, but failing to do so when the same incorrect response was indicated by a majority of children. In contrast the familiarity of the individuals comprising the majority had little influence on the tendency of children to conform. These results suggest that children are not blanket conformists, rather they respond selectively depending on characteristics of the individuals comprising the group majority.
Conformity - here defined as the tendency of an individual to display the most frequent behavior performed by others (Claidière & Whiten, 2012) - is a topic that has generated substantial interest since the seminal studies of Asch (1955). In these early studies Asch demonstrated that adult participants could often be led to make incorrect judgements on straightforward perceptual tasks if they were first exposed to the ‘incorrect’ judgements made by a series of confederates. Subsequent studies that have employed age appropriate variants of the Asch paradigm, have shown that conformity is not restricted to adulthood and frequently occurs in both adolescent and school aged children (Berndt, 1979; Bishop & Beckman, 1971; Costanzo & Shaw, 1966). However, despite knowing much about conformity in late childhood and adulthood we still know relatively little as to when, and how, this conformist tendency develops in early childhood. The current study aimed to enhance our knowledge of conformity in the preschool period by: 1) extending the study of conformity to the new unexplored domain of number judgement, before asking for the first time, 2) whether the tendency of preschool children to conform is influenced by characteristics of the informants (age and familiarity) comprising the group majority.

Within the existing literature it has been shown that preschool children often display conformity in a variety of different domains, including verbal testimony (e.g., Chen, Corriveau, & Harris, 2012; Corriveau, Fusaro, & Harris, 2009; Seston & Kelemen, 2013), action copying (e.g., Haun, Rekers, & Tomasello, 2012; Herrmann, Legare, Harris, & Whitehouse, 2013; Hu, Buchsbaum, Griffiths, & Xu, 2013; McGuigan & Robertson, 2015; Wilks, Collier-Baker & Nielsen, 2015), and visual perception (Corriveau & Harris, 2010). Irrespective of the specific task domain being tested conformity is typically assessed by exposing children to a task in which there are two or more alternative ways to respond (e.g., adopt label A or label B; copy
action A or action B; select short line or long line). In order to create the group majority necessary to elicit conformist behavior one of the responses is performed by all, or most, of a group of informants, with a minority comprising a single individual who performs a different response to the majority. Alternatively, a group majority has been created by an individual endorsing the behavior of one of the initial informants, through for example nodding their head in agreement as that informant labels an object (Fusaro & Harris, 2008; 2013). Despite variation in both the way in which the group majority was constructed, and the specific task domain being tested, the majority of studies have shown that a substantial number of 2- to 5-year-old children preferentially adopt the response displayed by the group majority.

The extent to which preschool children display conformist behavior does however vary markedly across studies. For example in a modification of the Asch paradigm Walker and Andrade (1996) found conformist behavior in 85% of their 3- to 5-year-old sample, whereas only 33% of children in the same age range conformed to the tool choice made by a group of adult informants (DiYanni, Corriveau, Kurkul, Nasrini, & Nini, 2015). There are many sources of variation that may explain the different levels of conformity witnessed across these studies. One source of variation lies in the characteristics of the individuals comprising the informant group, including the level of informant familiarity (i.e., informants are known or unknown to the participant), and informant age (adult informants or child informants). Within the existing literature it is difficult to determine whether informant familiarity, and informant age, have distinct influences on conformity as previous studies have confounded these two characteristics by employing either unfamiliar adult informants (e.g., Chen et al., 2012; Corriveau et al., 2009; DiYanni et al., 2015; Hu et al., 2013), or familiar child informants (Haun et al., 2012; Haun & Tomasello, 2011; McGuigan...
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In addition to substantial variation in the characteristics of the informant group, previous studies have tested conformity using a variety of different tasks, each of which varies in the nature of the response required (e.g., make an accurate perceptual judgement; select an affordant tool) making direct cross study comparisons extremely difficult. Therefore in order to elucidate our understanding of the factors that influence conformity the current study aimed to systemically vary both the age and familiarity of the informant group whilst holding the task domain constant.

Insight into the influence that different informant characteristics may have on conformity can potentially be gained by examining the results from a series of recent studies (which we call here for ease of reference ‘selective trust studies’), that have directly manipulated the characteristics (e.g., age, familiarity, expertise etc.) of single informants. With respect to informant familiarity previous ‘selective trust’ studies have shown that children are more likely to trust the verbal testimony provided by a familiar adult than an unfamiliar adult, unless given reason to doubt the information provided by the familiar individual (Corriveau & Harris, 2009). The influence of informant familiarity has been shown to be more variable within the domain of action copying, with some studies indicating that children are as likely to copy the actions performed by familiar adults as they are unfamiliar adults (Nielsen & Tomaselli, 2010; Stenberg, 2013), and others showing a preference towards coping adults who are familiar (Learmonth, Lamberth, & Rovee-Collier, 2005). Further studies paint a yet more complex picture in which informant familiarity leads to different levels of copying fidelity depending on informant status and the location (lab or home environment) in which the actions are performed (McGuigan, 2013; Seehagen & Herbert, 2012).
As well as exploring the influence that informant familiarity has on children’s behavior, studies from the selective trust literature have also detailed the influence of informant age in a variety of different domains. Within the domain of verbal testimony, children have been shown to correctly attribute knowledge likely to be within the adult domain (e.g., knowledge about food) to adults, and knowledge likely to be within the domain of children (e.g., knowledge about toys) to children (Fitneva, 2010; Jaswal & Neely, 2006; Taylor, Cartwright, & Bowden, 1991; Vanderborght & Jaswal, 2009). Similarly, when asked to choose between information provided by a child informant and an adult informant, preschool children more frequently trust the information provided by the adult informant, so long as both the child and adult informants were reliable (Jaswal & Neely, 2006). However, when the reliability of each informant was varied, such that one informant provided correct information and the other informant provided incorrect information, children more readily trusted the reliable informant irrespective of whether they were an adult or a child (Boseovski, 2012; Jaswal & Neely, 2006). More recent research, adds yet more complexity, showing that the authority level of the adult informant strongly influences the level of trust displayed in them (Chan & Tardiff, 2013). Thus it appears that the relationship between informant age and trust is multifaceted, with many factors influencing the tendency of children to trust the testimony of a particular informant.

The complex relationship between informant age and observer trust extends to domains outside of the testimony literature. In the domain of action copying, children tend to copy the actions performed by adults, but not peers, when the actions are inefficient (Flynn, 2008; McGuigan & Graham, 2010; McGuigan, Makinson, & Whiten, 2011; Wood, Kendal, & Flynn, 2012), or unusual (Zmyj, Daum, Prinz, & Aschersleben, 2012), whereas when the model’s actions are familiar, peers are
preferentially copied (Ryalls, Gul, & Ryalls, 2000; Zmyj, Daum, Prinz, et al., 2012; Zmyj, Daum, & Prinz, 2012). In addition to differences in the fidelity with which the actions of adult and child informants are copied, it has recently been shown that the level of copying fidelity following task demonstration by different adults can vary, with the technique displayed by high status individuals being copied more readily than the technique displayed by low status individuals, or strangers (McGuigan, 2014). As well as showing age based selectivity in the domains of verbal testimony and action copying preschool children have also demonstrated similar selectivity within the context of learning the rules of games, with children learning the rules of games more readily from adults than peers (Rakoczy, Hamann, Warneken, & Tomasello, 2010).

In sum those studies that have explored conformity in the preschool period have shown that young children often adopt the behavior of a group majority, comprised of either adults or peers, across a variety of different domains. In parallel to the conformity studies another cluster of ‘selective trust’ studies have explored children’s trust in single informants, showing that children respond selectively to characteristics of different informants, including age and familiarity. The aim of the current study was to integrate the findings from the conformity and selective trust literatures by asking whether the selectivity seen at the level of single informants extends to the context of a group majority. More specifically, whilst holding the task domain constant (number judgement task), we asked whether 3- and 4-year-old children always conform to a group majority irrespective of the identity of the individuals comprising the majority, or whether the tendency to conform varies according to the age and familiarity of the informants. It was predicted that the children would display conformist behavior, but the extent to which they did so would
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vary, with participants conforming most frequently after viewing a majority
comprised of familiar adults, and least frequently when the majority comprised
unfamiliar peers.

Method

Participants. A total of 40 children (26 boys and 14 girls) who were aged 3 and 4
years at the time of testing (mean = 48 months, range = 36-59 months, SD = 6
months) participated in the study. All children attended the same Kindergarten in the
North East of Scotland, UK.

Design. The participants were allocated to one of four conditions using a 2 (familiar
informants or unfamiliar informants) x 2 (child informants or adult informants)
between-participants design. In the first phase of the experiment, the ‘Majority
Phase’, participants in each of the four conditions viewed five different informants
perform the task incorrectly. The informants varied with respect to familiarity and age
with participants viewing either: five familiar children, five unfamiliar children, five
familiar adults or five unfamiliar adults. In a second ‘No-majority Phase’ participants
performed a near identical task in which they were allowed to respond without having
witnessed the choice made by other individuals (see Fig. 1 for an overview of the
experimental design).

---Fig. 1 about here---

Materials. The stimuli presented to the participants in both phases of the experiment
comprised three line drawn tigers (positioned side by side) that varied only in color
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and the number of stripes they possessed. In Phase 1 the tiger on the left hand side of
the display was orange with two stripes, the tiger in the middle was red with three
stripes, and the tiger on the right hand side was yellow with four stripes. In Phase 2
the tigers (from left to right) were purple with two stripes, green with three stripes and
blue with six stripes.

In order to present the participants with information from an incorrect majority
we created a series of still frames consisting of head shots of five familiar adults, five
familiar children, five unfamiliar adults, and five unfamiliar children. The familiar
informants were either classmates or teachers who the participants’ knew from their
kindergarten class. The still frame of each face was followed by a second still frame
of an age appropriate hand pointing to the incorrect choice (the red tiger). The
photographs of the hands were taken from two of the children and two of the adults
who were photographed for the head shot. We included the hand shots from a small
number of individuals to maintain consistency across conditions, i.e., the same stills
of the informants hands could be presented in both the familiar and unfamiliar child
conditions, and both the familiar and unfamiliar adult conditions. In order to create the
illusion that each picture showed the hands of a different individual each model’s
hands were photographed pointing to the incorrect tiger from a variety of different
angles to give the appearance of five different individuals making the selection. All
stills were presented in slideshow format on a laptop display.

Procedure. Phase 1: Exposure to an incorrect majority.

Children were tested individually at a table in a quiet room within their kindergarten.
Once the participant appeared comfortable the experimenter laid out the three tigers in
the same order as the child would view in the slideshow (L to R: orange tiger, red
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tiger, and yellow tiger). It was explained to the participants that they would be asked
to ‘pick the tiger that had the most stripes’ but first they were going to see some
pictures showing five other people (either five familiar children; five unfamiliar
children; five familiar adults; or five unfamiliar adults) pointing to the tiger that they
thought had the most stripes. On completion of the slideshow the participants were
asked to select the tiger that they thought had the most stripes.

Phase 2: No majority exposure

In order to ensure that the children were picking the incorrect tiger as a result
of viewing the incorrect majority, rather than simply making an incorrect response,
the children were presented with a second near-identical task without viewing the
responses of other individuals. This allowed the participants to display their real
knowledge of the task free of the influence of others. On completion of the
experimental trial the participant was taken to a table in the opposite corner of the
room and shown three more tigers that varied in color and the number of stripes they
possessed (L to R: purple two stripes, green three stripes, blue six stripes). The
participant was once again asked to pick the tiger with the most stripes.

Scoring. In Phase 1 we recorded whether the participants displayed conformist
behavior by selecting the tiger chosen by the incorrect majority (selected the red
tiger), whether the participants ignored the information provided by the majority and
responded accurately (selected the yellow tiger), or whether they picked neither the
correct tiger nor the majority tiger (orange tiger). In Phase 2 we recorded whether or
not the children correctly selected the tiger with the most stripes (the blue tiger), or
whether they made an incorrect selection (either the purple tiger or the green tiger).
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Results

Of the 40 participants who took part in the study 18 (45%) chose the incorrect (red) tiger indicated by the group majority in Phase 1, with the remaining 22 participants (55%) responding correctly by indicating the yellow tiger. No participant selected the orange tiger in Phase 1. In contrast in Phase 2, where children responded without having first viewed a majority response, only 3 participants (7.5%) failed to select the correct tiger. As we could not be sure that the 3 children who failed Phase 2 understood the task, the data from these individuals was omitted from all subsequent analyses, leaving a final sample of 37 participants. The gender of the participants was also excluded from all further analyses as preliminary analyses revealed that there was no effect of participant gender on conformist behavior in Phase 1.

Influence of informant age and familiarity. In order to determine whether the extent to which the participants conformed was influenced by the familiarity and age of the informants we compared the level of correct responding that occurred in Phase 1, to the level of correct responding that occurred in Phase 2 in each of the four conditions. Conformity was indicated by a significant decrease in correct responding in Phase 1 (as a result of the participants adopting the incorrect choice indicted by the majority) relative to the level of correct responding witnessed in Phase 2. A series of Wilcoxon tests performed on each of the four conditions revealed that the children performed significantly fewer correct responses in Phase 1 than Phase 2 after viewing the incorrect response indicated by the majority comprising familiar adults ($Z = -2$, N-ties = 5, $p = .046$, two tailed; see Fig 2.) and the majority comprising unfamiliar adults ($Z = -2.7$, N-ties = 3, $p = .008$, two tailed; see Fig 2). However, the participants
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responded accurately in both Phase 1 and Phase 2 after viewing an incorrect majority comprising children, irrespective of whether they were familiar or unfamiliar, suggesting that same aged peers had little influence on the tendency to conform (see Fig. 2).

---Fig. 2 about here---

Discussion

The current study extended our knowledge of conformity in the preschool period to the new, unexplored, domain of number judgement. Solutions to the task were indicated by four different informant groups allowing us to provide, what is to our knowledge, the first systematic exploration of the influence of the age and familiarity of the group majority. Results showed that 3- and 4-year-old children often conformed to the informants’ incorrect judgements, but the extent to which they did so varied according to the identity of the informants comprising the group majority. The informant characteristic that had the greatest influence on conformity was informant age, with only the adult majorities influencing the participants’ behavior to such an extent that they acted against their real world knowledge of the task and responded incorrectly. In contrast informant familiarity had no influence on the participants’ responses with similar levels of conformity being witnessed after exposure to both familiar and unfamiliar adults, and familiar and unfamiliar peers. This pattern of performance suggests that preschool children do not blindly copy the way in which a majority of respondents perform a task. Instead it appears as though the tendency to conform can be applied selectively, and in the case of the current study varies according to the age of the individuals comprising the group majority.
That the children so ‘blindly’ adopted the solution provided by the adult informants is somewhat curious as the task was well within the capabilities of preschool children, and contained an unambiguously correct solution (one tiger had more stripes than the others). However, despite the apparent simplicity of the task the fact that all five adult informants selected the same incorrect option may have led the children to doubt their own knowledge of the task, and subsequently adopt the choice made by the adults as they believed the adult choice to be the correct one. If the participants were harbouring reservations that their own knowledge of the task was inaccurate then we would have expected the participants to attempt to align their responses on the second task to the response made by the adults in Phase 1. However, no attempt to modify responding was witnessed in Phase 2 where the levels of correct responding were very high. This suggests that the participants were not conforming to the choice made by the adult informants as a result of a belief that their own knowledge was somehow deficit and that the adult response was the correct one.

If the children did not believe that the option chosen by the adult informants was the correct solution how can the high levels of conformity be explained? One possibility is that the selection made by the children was influenced by the fact that the group of adult informants appeared to be making the incorrect response deliberately. Previous studies have shown that preschool children are highly skilled in correctly attributing knowledge, and expertise, from different domains to appropriately aged informants (Fitneva, 2010; Jaswal & Neely, 2006, Taylor et al., 1991; Vanderborght & Jaswal, 2009). It therefore likely that the children would have correctly ascribed adults with the ability to make accurate number judgements. The awareness that adults are generally accurate when making number judgements would have led to the incorrect performance of all five of adult informants appearing highly
unusual, and may have resulted in the children interpreting the incorrect responses as
intentional and therefore worth adopting (McGuigan, Whiten, Flynn, & Horner, 2007;
McGuigan, 2012). Indeed, the influence that unusual responses can have on children’s
selective copying was highlighted in a recent review that concluded that adult
informants were more likely to be copied than peer informants when the response was
inefficient or unusual, whereas peers were more likely to be copied when familiar
actions were involved (Zmyj & Seehagen, 2013).

The unusual, and somewhat ambiguous, nature of the adults’ actions in the
current study may have led the children to adopt a socially driven mode of learning,
where social information was prioritized over accurate information (DiYanni et al.,
2015). Within the context of the current task social information may have been more
heavily weighted as the adult consensus was interpreted as providing useful
information about a social convention. Conventional actions, like the current actions,
are typically performed without an apparent rationale, and are often those kinds of
actions that define different cultural behaviors (e.g., the way we dress and eat in
different societies). A suite of recent studies have shown that young children are more
likely to copy behaviors when conventional cues are present in a display, including
the number of informants displaying a particular action (e.g., Herrmann et al., 2013;
McGuigan & Roberston, 2015), and the nature of the language used (Moraru, Gomez
& McGuigan, 2016). In contrast the participants may have viewed the incorrect
performance of the child informants as less unusual than that of the adults, instead
attributing the incorrect responses of the children as resulting from a lack of expertise,
rather than displaying useful conventional behavior. In this instance the participants
engaged in a perceptually driven mode of learning, and subsequently responded
accurately, rather than conforming, in the child informant conditions.
Future studies should detail the circumstances under which children will engage in either a perceptually driven or a socially driven mode of learning. The current results suggest that a key factor in determining which learning mode children will adopt is the ability of children to provide a rationale for the incorrect response provided by the informant group. If children can attribute a rationale for the incorrect choice (e.g., a lack of expertise) then children ignore the consensus information and engage in a perceptually driven mode of learning. If however a rationale cannot be found (e.g., a group of expert adults make unusual choices) then children ignore the perceptual information and engage in a socially driven mode of learning. Another factor that may influence which learning mode children engage with is whether the adopting the incorrect behavior of the group impacts on the ability to complete the task successfully. In the current task adopting the approach of the incorrect adult majority was cost free, and did not impact on the children’s ability to complete the task, and the levels of conformity were high. In contrast in DiYanni et al. (2015) adopting the response of the majority (select an inefficient tool) would have impacted on the children’s ability to complete the task (crush cookies) successfully, and conformity was low.

In conclusion it appears that children in the preschool period do not display conformist behavior on every occasion where they view a majority of individuals performing a particular response. Instead, children have the capacity to act selectively, basing their decision to conform on characteristics of the individuals comprising the informant group. The complex interplay between the tendency to conform and characteristics of the group majority may also be influenced by the nature of the task response (ambiguous or unambiguous), and the context in which the task is presented (e.g., conventional or instrumental). This selective approach to conformity may be a
product of evolved transmission biases, a set of biases that allow observers to
maximize social learning in an environment in which a variety of task variants and
models are available (Boyd & Richerson, 2009). When approaching a task for the first
time a useful strategy for a naïve individual is to copy the approach to the task that is
displayed most frequently by individuals in the surrounding environment, as it is
likely that the most frequent approach is a successful one. This ‘conformist bias’ takes
away the need for trial and error learning, which is potentially ineffective and time
consuming, and instead provides a powerful, and quick, way to socially learn both the
conventions and instrumental actions necessary to function successfully in social
groups. If however the capacity to adopt the majority approach interacts with a
capacity to learn selectively from different informants-‘model-based bias’-, then
children will be able to selectively prioritize the information provided by certain
groups of individuals (e.g., experts), providing children with a powerful set of tools
with which to learn from the individuals surrounding them. Intriguingly it appears as
though these biases are evident in children as young as three years of age, with
children moderating their behavior depending on the identity of the group majority
within the context of environmental uncertainty.

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Figure 1. The upper panel shows the stimuli used in Phase 1, and the lower panel the stimuli used in Phase 2. In the prior information stage of Phase 1 the children saw 5 informants point to the middle ‘incorrect’ tiger before being asked to judge which of the same three tigers (2 stripes, 3 stripes and 4 stripes) has the most stripes. In Phase 2 children received no prior information before being asked to judge which of three tigers (2 stripes, 3 strips and 6 stripes), different to those used in Phase 1, has the most stripes.
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Figure 2. Dark gray bars show the number of children choosing the correct option in each phase. Light gray bars show the number of children selecting the incorrect option indicated by the majority. Stars indicate significant difference from the No-majority control condition. * p < .05; ** p < .01
Figure 2. Dark gray bars show the number of children choosing the correct option in each phase. Light gray bars show the number of children selecting the incorrect option indicated by the majority. Stars indicate significant difference from the No-majority control condition. * $p < .05$; ** $p < .01$