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## Situational changes in self-awareness influence 3- and 4-year-olds' self-regulation

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### ABSTRACT

In adults, heightened self-awareness leads to adherence to socially valued norms, whereas lowered self-awareness is associated with antinormative behavior. Levels of self-awareness are influenced by environmental cues such as mirrors. Do situational changes in self-awareness also have an impact on preschoolers' self-regulation? Adherence to a socially valued standard was observed under different conditions of self-focus. In Experiment 1 the standard was prescribed ("don't look in the box"), and in Experiment 2 children had the opportunity to be altruistic. Heightened self-focus was induced using a large mirror. In a neutral condition, the nonreflective side of the mirror was shown. To lower self-focus, children wore a disguise. Preschoolers peeked less and showed more altruism when the mirror image was present. As found for adults, it appears that self-awareness leads 3- and 4-year-olds to adhere to salient social standards. These results suggest that self-focus has a socially adaptive regulatory function from an early age.

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### Introduction

Self-recognition is considered a key milestone of human development; typically emerging at around 2 years of age (Courage, Edison, & Howe, 2004; Lewis & Brooks-Gunn, 1979). A litmus test of this development is the mirror mark test of self-recognition (Amsterdam, 1972; Gallup, 1970). In this test, infants are surreptitiously marked (classically with rouge) in a visually inaccessible area. To pass, they must take self-directed action when a mirror is introduced, reaching for or trying to

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remove the mark. This simple behavior indicates that the infants have inferred a relationship between the mirror image and themselves. In other words, they have become conscious of the self as an object. This development might be considered as fundamental to human social cognition and interaction. Without it, there would be no concept of “me” as distinct from “you”, no self-evaluative thought or emotion, no theory of mind, and no moral connection between us. Few other developmental events have such weighty consequences. Yet it is only during the past 40 years or so that measures of the onset of objective self-consciousness have been elaborated.

Moreover, the first empirical test of objective self-consciousness, the 1970s mirror mark test, is still the most commonly used. In humans, passing in the mark test has been correlated with self-reference in language (Courage et al., 2004; Lewis & Ramsay, 2004), emotion (Kochanska, Gross, Lin, & Nichols, 2002; Lewis, Sullivan, Stanger, & Weiss, 1989), problem solving (Moore, Mealiea, Garon, & Povinelli, 2007), and social interaction (Bischof-Kohler, 1991; Johnson, 1982; Zahn-Waxler, Radke-Yarrow, Wagner, & Chapman, 1992). These findings confirm that the measure is indicative of a wider sense of self-awareness. However, the development of other empirical tests of objective self-consciousness has stalled. This is unfortunate because the dependent variable of the mark test (mirror-guided reaching for a mark on the face) offers only a limited expression of self-awareness. Although physical self-monitoring conceivably has some evolutionary value, the primary consequence of explicit self-awareness is not grooming. Rather, as noted, becoming conscious of the self as an object results in a profound transformation of one's cognitive and social landscape. Regrettably, the mirror mark test can be used to express such consequences only indirectly through association with other sociocognitive developments.

Duval and Wicklund's (1972) theory of objective self-awareness was one of the earliest theories to formalize the functional nature of explicit self-consciousness. According to this theory, any stimulus that reminds one of the self as an object (e.g., mirrors, audiences, cameras) will induce self-focused attention, which in turn prompts self-evaluation. Those judging themselves to fall short of ideal standards will either adjust their behavior to conform or withdraw from the evaluation-inducing situation. In this way, cognitive and affective equilibrium regarding the self is maintained. Moreover, because our ideal standards are socially learned, any resulting self-regulation is likely to be socially adaptive. This theory, offering testable predictions of the complex relationship among self-recognition, cognition, affect, and behavior, was readily supported in adults (for reviews, see Fejfar & Hoyle, 2000; Gibbons, 1990; Silvia & Duval, 2001). For example, Diener and Wallbom (1976) found that whereas 71% of undergraduates cheated on an anagram task when seated in a room without a mirror, only 7% did so when the mirror was present. Yet despite the success of objective self-awareness theory and considerable interest in the development of self-consciousness and its sociobehavioral correlates, only a handful of studies have considered the ontogeny of Duval and Wicklund's (1972) “mirror effects” (Beaman, Klentz, Diener, & Svanum, 1979; Froming, Allen, & Jensen, 1985; Froming, Nasby, & McManus, 1998).

Developmental research suggests that children have established the prerequisites for functional self-awareness as described by Duval and Wicklund's (1972) theory by 3 years of age. Children of this age can become “self-focused” as demonstrated by mirror self-recognition. Moreover, they experience positive and negative affect depending on their perceived adherence to ideal standards, suggesting that they can self-evaluate (Heckhausen, 1984; Lewis, Alessandri, & Sullivan, 1992; Stipek, Recchia, & McClintic, 1992). However, only one study has tested Duval and Wicklund's predictions on preschool children. Beaman and colleagues (1979) recruited homeowners at Halloween to secretly observe the behavior of groups of “trick-or-treaters” who were left alone with a bowl of sweets with the instruction to take only one sweet. The trick-or-treaters were between 1 and 13 years of age. Half of the children were left in a room with a large prominent mirror, and the remainder were left in a room without a mirror. Beaman and colleagues found that children in the mirror condition were significantly more likely to follow their hosts' instruction than children in the no-mirror condition (9% broke the rule in the mirror condition vs. 38% when the mirror was absent). As for adults, then, the mirror seemed to encourage children to adhere to ideal standards of behavior.

The magnitude of Beaman and colleagues' (1979) mirror effect increased with age, remaining significant for all but the youngest age group, 1- to 4-year-olds. However, this null result for preschoolers is difficult to interpret for a number of reasons. First, Beaman and colleagues' ecologically

valid method leaves open questions regarding the control of experimental variables such as differences between homeowners and the composition of the trick-or-treating groups. Second, the number of transgressions increased significantly with age, meaning that the procedure might not have been suitable for younger children and that the developmental increase in the mirror effect could be explained by an increase in power attributable to the number of children. Finally, it is conceivable that treating 1- to 4-year-olds as a homogeneous group may have masked relevant developmental changes in self-awareness. Considerable changes in self-awareness occur during this period, most notably the onset of mirror self-recognition (Lewis & Brooks-Gunn, 1979). The main aim of the current study was to provide empirical support for the theory that children should show mirror effects by 3 years of age.

As pioneered by Beaman and colleagues (1979), our first experiment sought to determine whether exposure to a mirror would influence preschoolers' self-regulation in a temptation paradigm. The procedure was based on an adaptation of Lewis, Stanger, and Sullivan's (1989) paradigm introduced by Polak and Harris (1999). Specifically, children were left alone with a box painted to look like a zoo in the context of a game that required guessing which toy animal was inside the zoo. Prior to being left alone, children were explicitly told not to look in the box to reveal the toy until the experimenter returned. In a second experiment, children were given the opportunity to earn toys for an unfamiliar child by completing a task involving picking up magnetic fish with a rod. To maintain an element of temptation, children were given the opportunity to stop halfway through the fishing game. If they stopped, the unfamiliar child received one toy; if they continued, two toys were earned for the other child. At the end of the game, children were also given the opportunity to donate stickers given as a reward for participation to the child.

To experimentally manipulate self-consciousness, children sometimes played the games in front of a large mirror. At other times, the mirror was turned around to conceal its reflective surface. Following Duval and Wicklund's (1972) predictions, the first of these conditions was expected to induce self-focus and in turn self-evaluation, leading to increased adherence to the ideal standard. In Experiment 1 the ideal behavioral standard is compliance with an external rule, whereas in Experiment 2 the ideal behavioral standard (altruism) must be represented internally. The latter would imply a self-contained self-regulation system, as described by Duval and Wicklund for adults. The second condition was expected to be self-“neutral” and so not conducive to self-regulation. However, we considered the possibility that self-focus arising from unfamiliarity with the testing situation might undermine the neutrality of this condition. For this reason, a third condition was introduced. This condition aimed to experimentally lower self-awareness through deindividuation.

Deindividuation refers to a temporary loss of personal individuality that arises from attention being focused outward and/or anonymity (Festinger, Pepitone, & Newcomb, 1952; Reicher, Spears, & Postmes, 1995; Zimbardo, 1969). Although the concept was not included in Duval and Wicklund's (1972) theory, the effect of deindividuation on behavior can be interpreted as the antithesis of objective self-awareness; because neither the self nor personal standards are salient, the cognitive self no longer exerts control (see Diener, 1977, and Postmes & Spears, 1998, for reviews). For example, Miller and Rowland (1979) found that participants tested in the trick-or-treat paradigm breached a “two-sweet” rule more often when wearing Halloween masks. To determine whether deindividuation would also influence self-regulation in our experiments, children sometimes were asked to wear a costume and be referred to by a generic term (“zookeeper” in Experiment 1, “fisherman” in Experiment 2). By manipulating self-awareness in polar directions, we hoped to improve our chances of experimentally varying the level of self-focus and, in so doing, to index an early functional impact of self-awareness.

## Experiment 1

### *Method*

#### *Participants*

A total of 30 children (17 boys and 13 girls) took part: 15 3-year-olds (mean age = 37.9 months,  $SD = 3.0$ , range = 34–41) and 15 4-year-olds (mean age = 49 months,  $SD = 4$ , range = 44–59). Partici-

pants were recruited with parental consent from a university nursery attended by children of moderate to high socioeconomic status. The procedure took place during the children's ordinary nursery time in a testing room next door to the main nursery.

### Materials

Materials included a box painted to look like a zoo, assorted model animals, a hat and waistcoat, a mirror (12 × 16 inches), and a stopwatch. The game was played on the floor in a corner of the testing room directly facing the mirror, which was propped against the wall. The game was video-recorded from an adjoining room by a confederate through a one-way mirror, the reflective surface of which was shielded from the child both by height (the one-way mirror began 1.5 m from the floor) and by a curtain.

### Procedure

Experiment 1 used a within-participants design. Each child took part in three sessions separated by 1 week. In the "self-aware" session, children were referred to by name and played in front of the mirror. In the "deindividuated" session, only the nonreflective side of the mirror was shown and children wore a costume and were referred to as "zookeeper". In the "neutral" session, children were referred to by name, but the nonreflective side of the mirror was shown. To control for order effects, the order of sessions was counterbalanced. In all conditions, children were told that they were going to play a guessing game. In the self-aware condition, the experimenter then remarked, "We will play the game right here in front of the mirror; you will guess which animals are in the zoo". In the neutral condition, the experimenter remarked, "We will play the game right here on the floor; you will guess which animals are in the zoo". In the deindividuation condition, children were told, "We will play the game right here on the floor; you will be the zookeeper who guesses which animals are in the zoo", and were helped into costume. Because manipulations of self-awareness have rarely been published for preschoolers (and we know of no studies inducing deindividuation), these methods were based on the simplest possible adaptation of paradigms to support situational changes in self-awareness used for adults.

During the guessing game, animals were covertly placed in a zoo box one at a time by the experimenter. After each placement, the experimenter said, "Okay [child's name in the self-aware or neutral condition, "zookeeper" in the deindividuation condition], now it's time to guess". Children were then given clues to allow them to guess which animal was in the box, for example, "The animal in the box says 'moo!'" To ensure that children had equal experience of success in the game (and therefore equal motivation to peek), clues were given until children guessed correctly, after which they were permitted to open the box to retrieve the animal. After three turns, the experimenter put the final animal into the box but interrupted the game by saying, "Okay [child's name in the self-aware and neutral conditions, "zookeeper" in the deindividuation condition), it's almost time to guess, but first I need to get the tidy up box from next door. We can guess which animal is in the box when I come back, BUT don't look in the box while I'm gone, okay?" Children were required to respond in the affirmative (nodding or saying "okay") before the experimenter left the room to ensure that they were aware of the rule.

Children were then left alone in the room for 90 s. Post hoc, videotapes were scored for peeking in the box and latency to peek. Given preschoolers' documented difficulties with response inhibition and the high transgression rates in previous studies (Lewis, Stanger, et al., 1989; Polak & Harris, 1999), we expected peeking to be common. Latency to transgress was included as an indicator of children's efforts to control such behavior. During her absence, the experimenter stood out of view in the doorway of an adjoining room, where the tidy up box could be retrieved. From this vantage point, the experimenter could ensure that the children remained in the room and that any requests for her return could be heard and heeded. On the three occasions when an early return was necessary, the children had already peeked in the box, allowing them to contribute a valid latency score. Peeking at the toy required not only looking but also lifting the lid of the box; this ensured that any transgression involved overt and volitional behavior. This is important because self-regulation (our dependent variable) can be exercised only on conscious behavior.

On reentering the room and sitting down, the experimenter asked the children, "Did you look in the box?" At this point, the experimenter was blind to whether the children had actually looked in the

box, and all answers were greeted neutrally. In line with Polak and Harris's (1999) adaptation, we also incorporated a more Machiavellian measure of deception. Specifically, when the game resumed, the experimenter gave misleading clues about the identity of the animal in the box. For example, if the animal in the box was a pig, the experimenter imitated a chicken. The misleading clue meant that for children who did peek, full deception required not only denying looking but also responding in accordance with the misleading clue (in this example, saying the animal in the box was a chicken rather than a pig). Only verbal indicators of deception (e.g., false denial of looking, guesses in accordance with misleading clue) were coded.

## Results

### Transgression

Table 1 shows average transgression rates (peeking is given a score of 1 and not peeking is given a score of 0) split by condition and age group. Children transgressed most often in the deindividuated condition and least often in the self-aware condition. Although 4-year-olds transgressed more often than 3-year-olds, both age groups showed the same pattern of transgression across conditions. An analysis of variance (ANOVA) that included condition as a within-participants factor and age group as a between-participants factor confirmed that the variation in transgression rates across conditions was significant,  $F(2, 56) = 3.5$ ,  $MSE = .116$ ,  $p = .035$ ,  $\eta_p^2 = .11$ . Specifically, pairwise Bonferroni comparisons showed a significant difference in transgression rates between the self-aware and deindividuated conditions ( $p = .02$ ). Age also had a main effect on transgression rates,  $F(1, 28) = 4.7$ ,  $MSE = .397$ ,  $p = .03$ ,  $\eta_p^2 = .14$ , but there was no interaction with condition,  $F(1, 28) = 0.09$ ,  $MSE = .116$ ,  $p = 0.9$ ,  $\eta_p^2 = .003$ .

Nearly 54% of children transgressed in the self-aware condition, 66.7% in the neutral condition, and 76.7% in the deindividuated condition. Chi-square analysis confirmed that children were equally likely to peek as not to peek in the self-aware condition,  $\chi^2(1, 30) = 1.3$ ,  $p = .86$ . However, in the neutral condition, children showed a marginal tendency toward transgression,  $\chi^2(1, 30) = 3.3$ ,  $p = .07$ , which became significant when deindividuated,  $\chi^2(1, 30) = 8.5$ ,  $p = .003$ . Most children behaved consistently across conditions, with 14 always transgressing (6 3-year-olds and 8 4-year-olds) and 5 never transgressing (all 3-year-olds). However, as shown in Table 2, for the 11 children whose behavior varied across conditions, transgressions were relatively rare when self-aware but relatively common when deindividuated.

### Latency to transgress

Children who did not peek were awarded the full latency of the waiting period (90 s). Table 3 shows the average latency to transgression in each condition for each age group. Although 4-year-olds were consistently faster to transgress than 3-year-olds, both age groups waited longest without transgressing under the self-aware condition, followed by the neutral and then deindividuated conditions. An ANOVA confirmed that latency to transgress differed significantly between conditions,  $F(2, 56) = 4.3$ ,  $MSE = 683.6$ ,  $p = .02$ ,  $\eta_p^2 = .132$ . Pairwise Bonferroni comparisons revealed that children were significantly faster to transgress when deindividuated than when self-aware ( $p = .005$ ). As with transgression rates, neither self-aware nor deindividuated latencies significantly differed from the neutral wait period. There was a main effect of age on latency,  $F(1, 28) = 5.9$ ,  $MSE = 2580.9$ ,  $p = .02$ ,

**Table 1**  
Average transgression rates split by condition and age group.

Condition	Average transgression rate		
	Total	3-year-olds	4-year-olds
Self-aware	.53 (.50)	.40 (.13)	.67 (.12)
Neutral	.67 (.50)	.53 (.13)	.80 (.11)
Deindividuated	.76 (.40)	.60 (.13)	.93 (.06)

Note. Data are means. Standard deviations are in parentheses.

**Table 2**  
Patterns of transgression for individuals whose peeking varied across conditions.

Age of individual	Self-aware	Neutral	Deindividuated
3 years	–	–	+
3 years	–	–	+
4 years	–	–	+
4 years	–	+	+
4 years	–	+	+
3 years	–	+	+
3 years	–	+	+
4 years	–	+	–
4 years	–	+	–
4 years	+	–	+
4 years	+	–	+
Total	2	6	9

Note. +, transgressed; –, did not transgress.

**Table 3**  
Average transgression latencies split by condition and age group.

Condition	Average transgression latency (s)		
	Total	3-year-olds	4-year-olds
Self-aware	48 (40)	51 (10.0)	36 (10)
Neutral	41 (27)	61 (9.4)	31 (9)
Deindividuated	39 (26)	46 (8.4)	12 (8)

Note. Data are means. Standard deviations are in parentheses.

$\eta_p^2 = .17$ , but again there was no interaction involving age,  $F(2, 56) = 0.54$ ,  $MSE = 683.6$ ,  $p = .58$ ,  $\eta_p^2 = .02$ . Although not significant, the variation in transgression latency across conditions held when considering the data of the 14 children who always transgressed (13 s in the self-aware and neutral conditions, 6 s when deindividuated),  $F(2, 26) = 2.5$ ,  $MSE = 96.5$ ,  $p = .10$ ,  $\eta_p^2 = .16$ . Again, pairwise Bonferroni comparisons approach significance for the difference between the deindividuated and self-aware conditions only ( $p = .078$ ).<sup>1</sup>

### Deception

Of the 25 children who looked in the box, 15 always admitted it, 5 sometimes denied it (2 3-year-olds and 3 4-year-olds), and 5 consistently denied it (all 4-year-olds). Transgression denial percentages were 37, 30, and 34.7% in the self-aware, neutral, and deindividuated conditions, respectively, Cochran's  $Q(2, 30) = 1.1$ ,  $p = .56$ . Of the deceivers, only 5 (all 4-year-olds) concealed their deception by “guessing” in accordance with the misleading clue; all did so in the deindividuation condition, 3 did so in the self-aware condition, and 2 did so in the neutral condition.

### Discussion

The majority of children needed to be physically prevented from peeking before a guess was made during the game. Moreover, when the experimenter left the room, the majority broke the stated rule and looked in the box. This confirms that, as found in similar studies (Lewis, Stanger, et al., 1989; Polak & Harris, 1999), peeking was a prepotent response. However, when the mirror was present, children peeked less and were slower to peek compared with a no-mirror condition where their identity was masked (literally through disguise and figuratively through generic labeling). To our knowledge, this

<sup>1</sup> When considering the average transgression latency for all those who peeked in each condition (rather than how individual children's behavior changed across conditions), the picture was less clear (self-aware  $M = 12.1$  s,  $SD = 14.4$ ; neutral  $M = 16.9$  s,  $SD = 14.7$ ; deindividuated  $M = 10.4$  s,  $SD = 13.2$ ).

finding represents the first evidence that early self-regulation arising from mirror self-recognition extends beyond mark-directed behavior. Under conditions of high self-awareness, preschoolers (like adults) show effortful behavioral control, aiming to conform to a salient standard. Moreover, in negating mirror effects, the anonymity-promoting condition provides perhaps the first evidence that preschoolers (like adults) can be deindividuated.

Although individual differences in the magnitude of mirror effects were evident, manipulating self-awareness apparently had similar effects for 3- and 4-year-olds' self-regulation. There was only one significant developmental effect in that 4-year-olds were significantly quicker to transgress than 3-year-olds in all conditions, contradicting previous observations of developmental improvement in inhibition (see, e.g., Gerstadt, Hong, & Diamond, 1994; Jones, Rothbart, & Posner, 2003). However, Beaman and colleagues (1979) also found that transgression increased with age. A plausible explanation for this reversal is that, rather than the experimenter being less able to inhibit, 4-year-olds might better appreciate the experimenter's inability to witness or detect their transgression—particularly if done swiftly. This explanation, relating to theory of mind, gains support from the pattern of deception observed.

Confirming that preschoolers have the capacity to deny a misdemeanor (Lewis, Stanger, et al., 1989; Polak & Harris, 1999), a third of children falsely denied peeking at least once. However, only 2 3-year-olds who peeked denied it compared with 8 4-year-olds. Of these 8 older deceivers, 5 concealed their deception, feigning ignorance of the animal in the box by answering in accordance with a misleading clue. This result replicates Polak and Harris (1999), who found that only a handful of their 3.5-year-olds engaged in this form of deception. In both studies, children were motivated to guess correctly, making it likely that this form of deception involved further inhibition. This may have been particularly challenging for younger children. Moreover, as noted by Polak and Harris, the motivation for feigning ignorance requires second-order false belief understanding; children must infer what an adult will infer from their response. For this reason, it is unlikely that most children could effectively conceal deception prior to 6 or 7 years of age. Empirical support for this expectation, and direct confirmation of the contributions of inhibitory control (Talwar & Lee, 2008) and theory of mind (Talwar, Gordon, & Lee, 2007; Talwar & Lee, 2002) to transgression in this paradigm was provided in a series of studies by Talwar and colleagues.

We found no relationship between verbal deception and situational changes in self-awareness. However, it is possible that heightened self-focus may have an impact on verbal deception in an older sample, where the capacity to deceive verbally is greater. Offering reparation by admitting to the offense might be more common when self-focus, and so social conscience, is high. Conversely, self-focus may lead to social self-preservation, encouraging one to conceal transgression. The choice taken here has the potential to show interesting individual differences, reflecting the pull between public and private self-consciousness. Indeed, one of the first extensions of Duval and Wicklund's (1972) theory was the identification of two dispositional dimensions of self-consciousness (Fenigstein, Scheier, & Buss, 1975). For those high in public self-awareness, others' evaluation of the self takes precedence, whereas for those high in private self-awareness, own perceptions of the self are typically more salient. These dispositions were recently shown to have an impact on adults' tendency to successfully conceal deception (Johnson et al., 2005); those high in private self-consciousness are more convincing liars.

## Experiment 2

It is possible that in Experiment 1, in addition to indexing inhibition, response latencies reflected caution. Children in disguise may feel less vulnerable to being caught in the act of peeking due to their anonymity. In the neutral and self-aware conditions, this protection was absent. Alternatively, engagement with the mirror image may have provided instrumental distraction from peeking in the box. Or it may be that the disguise was interpreted as providing justification to peek (e.g., "I am the zookeeper; therefore, the zoo is mine"). Johnson and Downing (1979) observed such a result in adults, finding that Ku Klux Klan costumes induced aggression, whereas nurses' costumes did not. One way to experimentally test these alternative explanations is to introduce a paradigm where distraction and non-self-referent pretense are unlikely to influence the dependent variable in the same direction as self-evaluation. This was achieved in Experiment 2.



The aim of the game here was to catch fish so as to earn toys for an unfamiliar child. Some of the children played the game in front of the mirror, and some played it in disguise. In line with identity salience explanations set out in the Introduction, we expected that fewer toys would be earned for the other child when children played the game in disguise than when they played in front of the mirror. Because the standard for ideal behavior (altruism) is unspoken, this would allow us to determine whether children respond to self-focus not only with compliance to stated rules but also by evaluating their behavior in line with internalized rules for social conduct. However, playing the game in line with stereotypical expectations of the character introduced (the fisherman) would presumably produce the opposite result (the fisherman catch lots of fish and so earns more toys). Likewise, distraction arising from the mirror would presumably compromise fish catching (and so earning toys for others) rather than encourage it.

Experiment 2 also allowed us to test a further methodological concern raised by an anonymous reviewer. Because pretense involves transgression of the rules of reality, it is suggested that being in pretend mode may lead children to readily ignore all sorts of rules. On this reading, rather than becoming deindividuated per se, children interpret the disguise as permission to behave antinormatively. To test this explanation, we introduced a new situational change in self-awareness, a mixed condition in which children wore the disguise and played the game in front of the mirror. If pretense causes children to discount the usual rules of behavior, children should behave in this condition as they do when in disguise without the mirror (reserving fewer toys and stickers for others). Indeed, because the gap between reality and pretense is emphasized here, any resulting deviation from the usual rules of behavior might be magnified. However, if pretense in this paradigm functions primarily by making the self less salient (i.e., by deindividuation), the negative effects of pretense should be compromised in this condition. The disguise involves a change of clothes only, leaving the self recognizable and salient provided that the mirror is present.

### *Method*

#### *Participants*

A total of 96 children (46 boys and 50 girls) took part: 48 3-year-olds (mean age = 38.7 months,  $SD = 2.5$ , range = 33–41) and 48 4-year-olds (mean age = 53 months,  $SD = 5$ , range = 43–61). Children were recruited with parental consent from a local authority nursery attended by children of low to moderate socioeconomic status.

#### *Materials*

Materials included a magnetic fishing rod and 18 wooden sea creature shapes. Two animal puppet toys and six stickers per child were also available. Toys were stored in a large box. Polaroid photographs of unfamiliar children (one boy and one girl) were used to represent unfamiliar other children. A mirror (12 × 16 inches) was used to manipulate self-awareness, and the costume for the deindividuation condition was a yellow Sou'wester hat and raincoat.

#### *Procedure*

A between-participants design was used. Children played a game on the floor in a quiet corner of their nursery room under one of four conditions. In line with Experiment 1, in the self-aware and neutral conditions, children were referred to by name and played the game in front of the reflective and nonreflective side of a mirror, respectively. In the deindividuated condition, children were asked to wear a costume and were referred to as “fisherman”, and the nonreflective side of the mirror was shown. In addition to these conditions, a “mixed” condition was introduced. Here children were treated as in the deindividuated condition but played the game in front of the reflective side of the mirror. Essentially, this gives a 2 × 2 design; children either played in front of a mirror or not, and they either wore a disguise or not. All children were told they were going to play a fishing game in which they had the chance to win toys for themselves and for another (unfamiliar) child who did not have any toys. Identifying an other's need is a logical prompt for altruism. Moreover, Gibbons and Wicklund (1982) and Mayer, Duval, Holtz, and Bowman (1985) observed that for adults, making an other's need salient is particularly important when attention is limited such as during self-focus.

The unfamiliar child was represented in a Polaroid photograph and was introduced as “Mary” or “Billy”. To minimize children’s identification with these characters (and so any potential overlap with self-representation), children always were asked to win toys for the child of the opposite gender. In line with Experiment 1, in the self-aware condition, the game began with the remark, “We will play the game right here in front of the mirror; you will catch the fish”. In the neutral condition, the game began with the remark, “We will play the game right here; you will catch the fish”. In the deindividuation condition, children were told, “We will play the game right here; you will be the fisherman who catches the fish”. and were helped into the costume. Finally, in the mixed condition, children were told, “We will play the game right here in front of the mirror; you will be the fisherman who catches the fish” and were helped into the costume.

For each child, there were two trials: one for the self and one for other (with the order counterbalanced). At the start of each trial, children were told, “Okay [child’s name in the self-aware or neutral condition, “fisherman” in the deindividuated or mixed condition], if you pick up all of the fish with your rod, you’ll earn two toys for [yourself/Mary/Billy] from this box” (toys were shown and then the box was closed). When children had picked up half of the fish (9), the experimenter interrupted the game by saying, “Okay [child’s name in self-aware or neutral condition, “fisherman” in deindividuated or mixed condition], you have done enough to get one toy [for Mary/Billy] now, or you can keep going until you’ve finished the game and get two toys [for Mary/Billy]. Do you want to stop? It’s up to you”. Children were allowed to choose the toys earned for the self from the box immediately after ending the trial. Likewise, at the end of trials for the other child, participants were allowed to pick and put aside toys for the other with reassurance that they would be delivered to Mary/Billy. Finally, children were given the opportunity to share their reward for participating by donating some stickers to the unfamiliar child. The experimenter said, “Thank you for playing my game, [child’s name in self-aware or neutral condition, “fisherman” in deindividuated or mixed condition]. Here are six stickers. You can keep them all, or you can give some to [Mary/Billy]. It’s up to you”. Six stickers were chosen to ensure that the reward was sufficiently large to be shared yet small enough for each sticker to be considered as valuable.

Although playing the game for the self offered an important control for children’s commitment and capacity to complete the game, we were primarily interested in children’s choices for the other. When the self was made salient (as in the mirror-present conditions), would children be more likely to earn the maximum toys for the other? Would more stickers be donated to the unfamiliar child? Both acts of altruism come at a cost to the self in terms of time and material goods, respectively.

## Results

Children typically earned more toys for the self ( $M = 1.9$ ,  $SD = 0.3$ ) than for the other ( $M = 1.5$ ,  $SD = 0.5$ ). Table 4 shows the mean number of toys earned for the unfamiliar child and the mean num-

**Table 4**  
Altruism rates split by condition and age group.

Condition	Average number of toys earned for other		
	Total	3-year-olds	4-year-olds
Self-aware	1.7 (0.4)	1.8 (0.11)	1.8 (1.40)
Mixed	1.6 (0.5)	1.6 (0.14)	1.7 (0.13)
Neutral	1.4 (0.6)	1.2 (0.13)	1.6 (0.15)
Deindividuated	1.3 (0.5)	1.0 (0.11)	1.5 (0.15)
Condition	Average percentage of stickers donated to other		
	Total	3-year-olds	4-year-olds
Self-aware	.26 (.03)	.20 (.08)	.30 (.06)
Mixed	.30 (.06)	.30 (.09)	.25 (.07)
Neutral	.14 (.05)	.15 (.08)	.10 (.06)
Deindividuated	.08 (.03)	.07 (.05)	.09 (.05)

ber of stickers donated in each condition. A univariate ANOVA was run considering the effects of mirror, disguise, and age on the number of toys earned for the unfamiliar child. To control for individual differences in performance, the number of toys earned for the self was included as a covariate. There was a main effect of mirror,  $F(1, 87) = 11.2$ ,  $MSE = .195$ ,  $p = .01$ ,  $\eta_p^2 = .11$ , with children earning more toys for the other when the mirror was present ( $M = 1.7$ ,  $SD = 0.06$ ) than when it was absent ( $M = 1.4$ ,  $SD = 0.07$ ). There was also a marginally significant main effect of age,  $F(1, 87) = 3.86$ ,  $MSE = .195$ ,  $p = .052$ ,  $\eta_p^2 = .04$ , with 4-year-olds earning more toys for the other ( $M = 1.46$ ,  $SD = 0.07$ ) than 3-year-olds ( $M = 1.64$ ,  $SD = 0.07$ ). There was no main effect of disguise (disguise  $M = 1.5$ ,  $SD = 0.07$ , no-disguise  $M = 1.6$ ,  $SD = 0.07$ ),  $F(1, 87) = 0.65$ ,  $MSE = .195$ ,  $p = .42$ ,  $\eta_p^2 = .007$ , and no significant interactions.

A univariate ANOVA that included mirror, disguise, and age as fixed factors showed a main effect of mirror on sticker donation,  $F(1, 87) = 11.4$ ,  $MSE = .059$ ,  $p = .01$ ,  $\eta_p^2 = .117$ . Children donated more stickers to the other when the mirror was present ( $M = 28\%$ ,  $SD = 3$ ) than when it was absent ( $M = 11.2\%$ ,  $SD = 3.8$ ). There were no main effects of age (3-year-olds:  $M = 19.4\%$ ,  $SD = 3$ ; 4-year-olds:  $M = 19.8\%$ ,  $SD = 4$ ),  $F(1, 87) = 0.01$ ,  $MSE = .059$ ,  $p = .97$ ,  $\eta_p^2 = .000$ , or of disguise (disguise  $M = 19\%$ ,  $SD = 3.5$ ; no-disguise  $M = 20.2\%$ ,  $SD = 3.7$ ),  $F(1, 87) = 0.06$ ,  $MSE = .059$ ,  $p = .80$ ,  $\eta_p^2 = .001$ , and no significant interactions.

There was a significant positive correlation between the number of toys earned for the other and the number of stickers subsequently donated ( $r^2 = .285$ ,  $p = .005$ ). This remained significant when controlling for age ( $r^2 = .289$ ,  $p = .004$ ).

### Discussion

As in Experiment 1, there were reliable changes in children's self-regulation associated with situational changes in the salience of the self. Both 3- and 4-year-olds earned more toys for others and donated more stickers to others when the mirror was present (self-aware and mixed conditions) than when it was absent (neutral and deindividuated conditions). This result accords with Experiment 1 in showing that mirror exposure impacts on the behavior of preschoolers, in this case encouraging prosocial behavior. Although mirror self-recognition has been correlated with prosocial behavior and empathy (Bischof-Kohler, 1991; Johnson, 1982; Zahn-Waxler et al., 1992), no previous study has directly linked mirror self-recognition with prosocial behavior in children. Importantly, the data do not fit with an explanation based on the attention-grabbing properties of the mirror, which presumably would have distracted from the fishing game.

Children showed more commitment to a socially valued standard when the self was made salient regardless of age, but unlike in Experiment 1, the social standard was not stated explicitly. Children were given a free choice of how much help to give an unfamiliar child, although they were made aware that the child had few toys. Thus, our results imply that altruism may be an internalized standard by 3 years. However, this observation is offset by a clear self-serving bias in work and sticker distribution. The 3-year-olds in particular found it more difficult to resist the temptation to stop the game for the other halfway through. This is reminiscent of developmental changes in future-orientated thinking paradigms where children are required to delay gratification for the self and other (Atance, 2008). Variations in overall generosity toward the other were also observable in both age groups. The number of toys earned for the other was positively associated with the number of stickers subsequently donated, suggesting that some children placed more personal value on altruism than did others. Such individual differences may interact with mirror effects; for example, Froming and colleagues (1998) found that the number of prosocial trait words judged by 11-year-olds as self-descriptive influenced whether a mirror had the effect of increasing donations to the other. This interaction confirms that 11-year-olds take their cue to act from an existing self-schema when made self-aware and opens the possibility that Duval and Wicklund's (1972) theory could be used to test not only the process of self-awareness but also the content. Might children's identification with characters that show prosocial choices (e.g., in an adaptation of Joseph's [1979] Preschool Picture Self-Concept Scale) predict their reactions to mirror exposure?

The influence of deindividuation on children's behavior in Experiment 2 is more challenging to assess. Children who pretended to be a fisherman in front of the mirror caught more fish than children who pretended without the mirror. Conceivably, mirror exposure made the pretense more salient,

encouraging children to catch more fish (appearing to be altruistic as a by-product). However, this cannot account for the positive effect of the mirror when the disguise is absent. Conversely, it is possible that the mirror made the disguise less believable, and so the general antinormative effects of pretense were present only in the mirror-absent condition. For this explanation to hold, one must accept that the effects of pretense in this paradigm depend on the self becoming less salient (i.e., deindividuated). It is clear that the impact of the disguise was less than that of the mirror. However, if we interpret our results according to identity salience, it is apparent that mirror exposure would undermine any attempt at deindividuation. Further work is warranted before the impact of deindividuation can be discounted.<sup>2</sup>

## General discussion

This study provides novel evidence to suggest that situational variations in self-focus have an impact on preschoolers' social conduct. In two experiments, promoting 3- and 4-year-olds' self-focus enhanced self-regulation relative to conditions when the self was not salient. Paradoxically, increasing self-focus through environmental cues led to a behavioral bias toward others' interests. This implies that self-focus impacted on self-regulation by prompting evaluation of the self in a social context, as described for adults in Duval and Wicklund's (1972) theory.

The interplay between self-recognition and self-evaluation warrants investigation because it is not clear why self-recognition should precede spontaneous self-evaluation by a full year. One possibility is that the lag reflects the time taken to internalize ideal standards for behavior. In this case, one might expect children to adhere to others' standards when self-focused (as in Experiment 1) prior to their own standards (as in Experiment 2). Although parents play a key role in shaping early achievement motivation and morality (Alessandri & Lewis, 1993; Belsky, Domotrovich, & Crnic, 1997; Kelley, Brownell, & Campbell, 2000; Kochanska, Forman, Aksan, & Dunbar, 2005), the process of internalization has so far proved to be difficult to track. Duval and Wicklund's (1972) predictions are potentially valuable here. As noted, in so much as children's behavioral choices under conditions of self-focus reflect their ideal standards, objective self-awareness theory might be used to track the incorporation of specific social rules into the self-schema.

Duval and Wicklund's (1972) theory also has potentially important practical implications from a developmental perspective. Might obedience by young children in a nursery be improved simply by introducing a large mirror? Unfortunately, any such advantage may prove to be difficult to sustain. Not only is the focus of attention known to be subject to change and fatigue, but also objective self-consciousness is emotionally charged and so may be actively avoided. Nevertheless, on a broader scale, by enhancing our understanding of how, why, and when specific moral and educational standards might be internalized and observed, developmental object self-awareness-based predictions might have an impact on the expectations we have of children of different ages in educational and judiciary settings.

An important next step will be to assess and control for other cognitive contributors to self-regulation. For example, inhibitory control is likely to be important to the expression of functional self-consciousness. The more self-control we have, the greater our power to achieve desired outcomes for the self. Likewise, the ability to predict the valence of outcomes for the self (i.e., predict our own and others' evaluation of our actions) may rely on theory of mind and/or future-oriented thinking. For example, in Experiment 1, 4-year-olds' capacity to reason about their ability to deceive (and so present themselves positively to the experimenter) seemed to influence their decisions. Although there are marked developmental and individual differences in these capacities (inhibition: Jones

<sup>2</sup> When treated as a four-condition design, a univariate ANOVA showed a main effect of condition on the number of toys earned for the other,  $F(1, 87) = 11.9$ ,  $MSE = .219$ ,  $p = .01$ ,  $\eta_p^2 = .10$ , with post hoc Bonferroni comparisons indicating a significant difference between the self-aware and deindividuated conditions ( $p = .025$ ). The difference between the deindividuated and mixed conditions also approached significance ( $p = .09$ ). Likewise, condition had a significant effect on the percentage of stickers donated to the other,  $F(3, 88) = 4.1$ ,  $MSE = .059$ ,  $p = .008$ ,  $\eta_p^2 = .12$ , with the largest difference being between the deindividuated and mixed conditions ( $p = .018$ ), followed by the deindividuated and self-aware conditions ( $p = .07$ ). These results confirm, as in Experiment 1, that the largest differences occur between polar sides of the "identity salience" scale.

et al., 2003; theory of mind: Hughes et al., 2005; future-orientated thinking: Atance, 2008), their interaction with mirror effects is yet to be explored.

Currently, we have evidence to suggest that the saliency of the self influences 3- and 4-year-olds' self-regulation in at least two contexts: situations requiring compliance (Experiment 1) and situations allowing the opportunity for altruism (Experiment 2). These contexts fit into a broader literature concerning the development of committed compliance (willingness to follow others' rules) and altruism. Children begin to show committed compliance (Kochanska et al., 2005) and empathetic/altruistic reactions to others (Eisenberg et al., 1996; Johnson, 1982; Zahn-Waxler et al., 1992) from around 2 years. The timing of these developments has led to a theoretical link being drawn between prosocial behavior and the onset of objective self-awareness as measured by mirror self-recognition (see Bischof-Kohler, 1991; Johnson, 1982, and Zahn-Waxler et al., 1992, for correlations). The link is based on the emotional/motivational consequences of recognizing the self as a social object. At a basic level, empathetic responses to the other (emotional recognition of the other's similarity to the self) are thought to prompt prosocial responses. Later, self-conscious emotions such as pride, shame, and guilt are thought to play a key role in motivating social conduct (both prospectively and retrospectively). In a sense, then, Duval and Wicklund's (1972) theory is already implicitly represented in the developmental literature. However, there has been little experimental investigation of the role of self-consciousness in prosocial self-regulation.<sup>3</sup> The key contribution of the current study is to make explicit the methodological potential of objective self-awareness theory to explore this issue. We did so by providing the first *direct* evidence that early self-focus has an important socially adaptive function.

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<sup>3</sup> Grazyna Kochanska and colleagues' work linking guilt and social conduct offers perhaps the only exception to this rule (Kochanska, 1993; Kochanska, Murray, & Coy, 1997; Kochanska et al., 2002).

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