‘It’s all good’: Children’s personality attributions after repeated success and failure in peer and computer interactions

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Abstract:
The present study examined children’s use of behavioural outcome information to make personality attributions in social and non-social contexts. One hundred and twenty-eight 3- to 6-year-olds were told about a story actor who engaged in primarily successful or primarily unsuccessful interactions with several different people (social context) or several different computers (non-social context). Subsequently, children made behavioural predictions and trait attributions about the actor. Findings indicated that participants were more likely to use past information to make behavioural predictions and trait attributions when hearing about primarily successful than primarily unsuccessful interactions, although there were age-related differences in trait attribution as a function of success and trait type. There was no support for differential use of information across contexts, as participants’ predictions and attributions were similar regardless of hearing about interactions with computers or humans. Factors involved in the development of impression formation are discussed.

Article:
Personality attribution becomes increasingly sophisticated over the course of childhood (e.g. Rholes & Ruble, 1984). With age, there are advances in children’s use of trait terminology (e.g. Yuill, 1992), the application of trait knowledge to make mental state inferences (e.g. Heyman & Gelman, 2000), consideration of mental states, such as motives, when making personality judgments (e.g. Heyman & Gelman, 1998; Yuill & Pearson, 1998), and the use of different amounts of behavioural information for trait attribution and behavioural prediction (e.g. Boseovski & Lee, 2006, 2008). Despite a growing body of research, there are considerable gaps in our knowledge about the processes that drive personality understanding, particularly in the preschool years. Given the importance of the personality attribution process to healthy adult functioning (e.g. Weiner & Graham, 1999), it is necessary to understand impression formation from a developmental perspective.

Of particular relevance to educators and researchers is how children make attributions about their own and other people’s success and failure in the academic and social domains (e.g. Benenson & Dweck, 1986; Burgner & Hewstone, 1993; Cauley & Murray, 1982; Droege & Stipek, 1993; Heyman & Dweck, 1998; Ruble, Parsons, & Ross, 1976; Satterly & Hill, 1983; Stipek & Daniels, 1990; Whitley & Frieze, 1985). Indeed, attributional style has a tremendous influence on children’s perceptions of what they can achieve (Dweck & Leggett, 1988; Erdley & Dweck, 1993; Fincham, Hokoda, & Sanders, 1989). Children with an entity theory of intelligence (i.e. belief that it is fixed) are less likely to pursue learning goals than children with an incremental theory of intelligence (i.e. belief that it can modified), due in part to a fear of being perceived negatively (Dweck, 1986; Dweck & Leggett, 1988).

Previous research has revealed several trends in children’s attributions of success and failure. First, children as young as 4 years of age exhibit a preference for internal than external causes when explaining behaviour and this tendency increases with age (see Miller & Aloise, 1989, for a review). Second, trait explanations appear earlier for success than failure (Benenson & Dweck, 1986; Normandeau & Gobeil, 1998; Satterly & Hill, 1983), emerge in the social domain prior to the academic domain (Benenson & Dweck, 1986), and become increasingly differentiated with age (Heyman, Gee, & Giles, 2003; Stipek & Daniels, 1990). Finally, school-age children exhibit the same 'egotism bias' as adults: they are more likely to attribute their success to ability, and their failures to external factors such as task type (Whitley & Frieze, 1985).

In this paper, we discuss the influence of two factors on children's attributions about success and failure: behavioural outcome and context. Specifically, we examined whether 3- to 6-year-olds differentiate their personality attributions about a story actor as a function of success history (high success vs. low success outcomes), and whether these attributions differ in a social context (i.e. interactions with humans) versus a non-social context (i.e. interactions with computers). At a practical level, it is important to determine whether children's judgments about success and failure are realistic. For instance, a child who is pessimistic after a single failure is more likely to miss future learning opportunities than one who takes the failure in stride. An understanding of how children process this type of information may be helpful in tailoring appropriate interventions for those who are at risk for faulty attribution, particularly if there are age-related trends in children's thinking about success and failure in early childhood. Theoretically, knowledge about the types of information that children use to make personality attributions will provide insight about their causal-explanatory frameworks or 'naive theories' about the workings of the world (e.g. Hickling & Wellman, 2001).

Based on previous research, there are reasons to believe that children will be more likely to make positive than negative judgments about social and academic ability, irrespective of actual success history information. It has been established that children exhibit a positivity bias towards themselves (e.g. Stipek, 1981; Stipek & Mac Iver,1989), as well as others (e.g. Heyman & Giles, 2004; Stipek & Daniels, 1990). For example, kindergartners' and first graders' ratings of their own abilities are typically high and do not reflect teacher ratings (Stipek, 1981). In middle childhood, children expect traits to change in a positive, but not negative, direction (Heyman & Giles, 2004). Of strong relevance to the present study, Benenson and Dweck (1986) found that trait explanations emerged in the first grade for social and academic success, but only in the fourth grade for social failure and were still absent for academic failure. However, because this was not the focal point of this naturalistic study, the exact amount of information upon which children based their judgments in this study was unknown (e.g. participants were asked to think about classmates who got 'a lot right' on schoolwork; see Benenson & Dweck, 1986, p. 1181). Thus, children may have had more information about their classmates' success than failure, resulting in trait explanations for success only. Alternatively, success information may have been more salient than failure information.

The current study is the first to examine systematically children's trait attributions in response to successful and unsuccessful outcomes. We controlled experimentally the amount of information to which children were exposed so that we could determine whether success and failure information are 'weighted' equally in the context of personality attributions. This enabled us to determine whether five instances of positive behaviour have the same impact as five instances of negative behaviour in generating future predictions of positive and negative behaviour, respectively, and judgments of niceness and meanness, respectively. We also compared children's responses in person-to-person (i.e. social) interactions versus person-to-object (i.e. non-social) interactions, as there has never been a systematic comparison of whether information about success history is treated differentially to make personality attributions across these contexts. Finally, we examined personality attribution in children ranging from 3 to 6 years of age, and there has been a paucity of research on impression formation in this particular age group. Given recent research indicating that preschoolers have a rudimentary 'theory of personality' (e.g. Boseovski & Lee, 2006; Heyman & Gelman, 1998), it is important to map the factors that influence the personality attribution process in early childhood.

Participants were told about a story actor who engaged in interactions with different people or computers (social vs. non-social context), successfully or unsuccessfully (high success vs. low success). 'Low success' was defined as five unsuccessful social or nonsocial interactions coupled with one successful attempt, whereas 'high success' was defined as five successful interactions coupled with one unsuccessful attempt. Previous research indicates that five behavioural exemplars are sufficient for inducing personality attribution in this age group (see Boseovski & Lee, 2006). The interactions included multiple recipients (i.e. humans or computers) instead of one recipient over time, as previous research indicates that this type of distinctiveness information is most likely to elicit personality attributions (e.g. McArthur, 1976).

After the story, participants made behavioural predictions and trait attributions about the actor. Based on previous findings of a positivity bias in childhood (e.g. Boseovski & Lee, 2006, 2008; Heyman & Giles, 2004) and evidence that trait explanations emerge first for success than failure (Benenson & Dweck, 1986), we expected that children would be more likely to make the appropriate trait attributions and behavioural predictions about the actor after high rather than low success interactions. Because children received the same amount of success and failure information in this study, we were able to determine whether a positivity bias was in effect. Based on previous work conducted naturalistically (e.g. Benenson & Dweck, 1986), as well as findings in the folk psychological literature (e.g. Wellman & Gelman, 1992) and causal reasoning literature (see White, 1995), we also expected personality judgments to vary by domain. We predicted that trait attributions about the actor would be stronger in the human–human than human–computer conditions. Specifically, the actors should be deemed more responsible for the outcome of their interactions with people because human behaviour is viewed as voluntary and intention-driven (e.g. Legerstee, 1992; Miller, 1985; Wellman & Gelman, 1992; White, 1995), while physical phenomena are thought to be driven by energy transmission principles (e.g. Shultz, 1982; White, 1988). Thus, an unsuccessful interaction with a computer might be attributed to mechanical failure on the part of the computer, whereas an unsuccessful interaction with another human may be more likely to be attributed to the actor.

Method

Participants

There were 128 participants, with 32 participants at each of the following ages: 3 years (M = 43.8 months, SD = 3.4, 19 males), 4 years (M = 55.1 months, SD = 3.2, 16 males), 5 years (M = 63.4 months, SD = 2.8, 21 males) and 6 years (M = 80.6 months, SD = 5.6, 19 males). Participants were recruited and tested through the Child Development Laboratory or via preschools and schools in a mid-sized North American city. Participants were predominantly Caucasian and from middle-class backgrounds, although this information was not collected systematically.

Materials

Line drawings of boy and girl actors were compiled into storybooks. Drawings depicted the actor's interactions with different people or computers, with each interaction presented on a separate page.

Design and procedure

Two factors were crossed: domain (human-social or computer-non-social) and success level (high success or low success). Participants in each age group were assigned randomly to one of four conditions: human-high success, human-low success, computer-high success, computer-low success. There were 8 participants per condition per age group. Table 1 displays the design features of the experiment.

Table 1. Design features of experiment

	Domain	
Success level	Computer	Human
Low	Only one computer works Five computers do not work	Only one child says 'yes' Five children say 'no'
High	Five computers work Only one computer does not work	Five children say 'yes' Only one child says 'no'

Children were seated at a table with the experimenter in a quiet room. The session lasted approximately 10 min. After the children were comfortable with the setting, the experimenter told the story with the accompanying illustrations. Children were told that the character 'is a young boy/girl who goes to preschool/school just like you do.' The experimenter referenced the teacher and classroom depicted in the drawings. To achieve maximal identification with the characters, children heard about actors and recipients of their own gender (see Heyman & Dweck, 1998). The procedure then differed according to the condition to which the participant was assigned.

Human-high success

Participants heard about an actor who engaged in five successful interactions and one unsuccessful interaction, each with a different recipient on a different day. The teacher was described as instructing the actor that 'If you wish to play with someone, all you have to do is ask, 'May I play with you?' Participants were then told 'So [actor] goes over and asks [recipient], 'May I play with you?' just like the teacher said.' In the successful interaction outcomes, participants were told, 'You know what? [Recipient] says yes. [Actor] is really happy about this because he/she really wanted to play with [recipient].' In the unsuccessful interaction outcome, children were told 'You know what? [Recipient] says no. [Actor] is upset because he/she really wanted to play with [recipient].'

After hearing about all six interactions, participants were asked a direct prediction question in which they predicted the outcome of the actor's attempted interaction with a novel recipient, 'It's the next day at school and [actor] asks [novel recipient], 'May I play with you?' What do you think will happen in the story?' Participants were also asked a generalized prediction question in which they predicted the outcome of an attempted interaction with another novel recipient in a novel context (i.e. at the park rather than at school), 'Look, [actor] is at the park today and he sees [novel recipient]. He asks [recipient], 'May I play with you?' What do you think will happen in the story?' The purpose of this latter question was to determine whether children would generalize the information to a novel setting, indicating an appreciation of traits as stable entities (e.g. Rholes & Ruble, 1984). For both questions, children were given a forced choice option if they did not respond spontaneously, 'Do you think that [recipient] will say 'yes' or 'no?"

Human-low success

This was identical to the human-high success condition except that participants heard about one successful interaction and five unsuccessful interactions, each with a different recipient on a different day.

Computer-high success

Participants heard about an actor who engaged in five successful interactions and one unsuccessful interaction, each with a different coloured computer on a different day. The teacher was described as instructing the actor that 'If you wish to play with the computer game, all you have to do is press the green button' Participants were then told 'So [actor] goes over and pushes the green button, just like the teacher said.' In the successful interaction outcomes, participants were told, 'You know what? The game starts. [Actor] is really happy about this because he/she really wanted to play that game.' In the unsuccessful interaction outcome, children were told 'You know what? The game doesn't start. [Actor] is upset because he/she really wanted to play the game.'

After hearing about all six interactions, participants were asked a similar set of questions as those in the human stories, including a direct prediction question in which they predicted the outcome of another attempted interaction with a novel computer, 'It's the next day at school and [actor] goes to the computer and presses the green button. What do you think will happen?' Participants were also asked a generalized prediction question in which they predicted the outcome of another attempted interaction with a different computer in another context (i.e. at home), 'Look, [actor] is at home today and he wants to play on the computer, so he pushes the green button. What do you think will happen?' If children did not answer spontaneously, they were given a forced choice option, 'Do you think that the game will start or that it will not start?'

Computer-low success

This was identical to the computer-high success condition except participants heard about an actor who engaged in one successful interaction and five unsuccessful interactions, each with a different computer on a different day. Participants were asked the same set of questions as those in the computer-successful conditions.

Personality attribution questions

In addition to the behavioural prediction questions, participants in all conditions were asked personality attribution questions that centred on two themes: Agreeableness and Efficacy. For the Agreeableness questions, participants were asked, ‘Is he/she nice or not nice?’ and ‘Is he/she good or not good?’ For the efficacy questions, they were asked ‘Is he/she smart or not smart?’ and ‘Does he/she know how to use computers or not know how to use computers?’ The order of the forced choice options was counterbalanced between children.

Although participants in the human conditions did not receive information about the actor’s computer skills and those in the computer conditions did not receive information about the actor’s social skills, all questions were asked in all conditions, as previous research indicates that children are likely to generalize trait attributions across domains (see Stipek & Daniels, 1990) and we wanted to determine whether this would apply in the present context.

Results

Logistic regression analyses were conducted to examine the contribution of the independent variables (age, domain, and success level) to performance on the dependent variables (prediction, agreeableness, and efficacy measures). All quantitative variables were standardized (i.e. converted to z scores). Model significance was assessed using the χ^2 difference test, in which the retention of each predictor and interaction in a model must lower the variability substantially to justify its inclusion (see Menard, 2002). Potential gender effects were also examined for each model. Because there were no significant effects or interactions involving this variable on any of the dependent measures, it was excluded from the final models.

Prediction measures

Children’s predictions were assessed with a direct prediction question and a generalized prediction question. Each question was scored separately such that children were given a score of 1 for making a target consistent prediction (e.g. if they viewed high success outcomes and predicted future successful outcomes or if they viewed low success outcomes and predicted future unsuccessful outcomes), regardless of whether they answered it spontaneously or picked the correct forced choice option. Answers that were not target consistent were given a score of 0. Thus, children received a dichotomous score of 0 or 1 for their performance on each of these questions.

For the direct prediction question, the best fitting model included only success level as a significant predictor of performance. Age and domain were not retained in the model, nor were any interactions between the variables. The overall model was significant, χ^2 (1, N = 128) = 3.847, p = .052. There was a significant effect of success level such that participants were more likely to make the target consistent prediction in the successful than unsuccessful conditions, (β = 0.545, *Wald* = 3.64, p = .056). The means were .468 (SE = .06) and .640 (SE = .06) for the low and high success conditions, respectively. Tests against chance (using the binomial distribution with p set at .05, for all results discussed here) indicated that in the high success conditions only, a greater number of children made the target consistent response than expected by chance.

For the generalized prediction question, the best fitting model included age and success level as significant predictors of performance. Domain was not retained in the model, nor were any interactions between the variables The overall model was significant, χ^2 (2, N = 127) = 16.41, p < .001. There was a significant effect of success level such that participants were more likely to make the target consistent prediction in the successful than unsuccessful conditions, (β = 0.1.33, *Wald* = 12.1, p = .001). The means were .375 (SE = .06) and .687 (SE = .06) for the low and high success conditions, respectively. These were greater than expected by chance for the high success conditions and less than expected by chance for the low success conditions. There was also a significant age effect such that participants were less likely to make to make the target consistent prediction with age, ($\beta = 0.389$, *Wald* = 4.02, p = .045), as reflected in the low success conditions. Responses of each age group were at chance levels, with the exception of the 6-year-olds, whose target consistent responses were lower than expected by chance in the low success conditions (see Figure 1).

Agreeableness measures

Children's agreeableness attributions were assessed with a good/not good question and a nice/not nice question. Each question was scored separately, with one point allotted for a target consistent attribution (i.e. saying 'nice' and 'good' in the high success conditions; saying 'not nice' and 'not good' in the low success conditions.). Other responses were given a score of zero. For both questions, the best fitting models consisted of age, success level, and age X success level. Domain was not retained in either of the models, nor were any other interactions between the variables. Figure 2 displays performance on each of these questions as a function of age and success level.

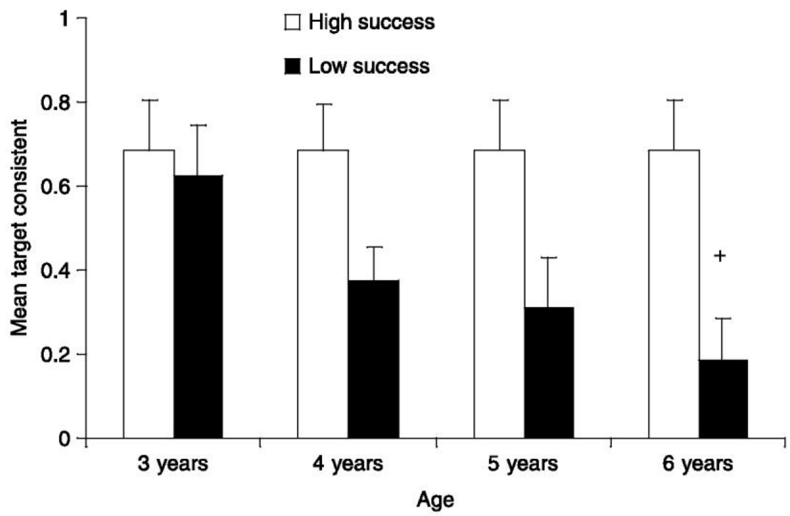


Figure 1. Mean number of target consistent responses on the general prediction question by age and success level.
Note. For all figures, higher scores indicate that participants were more likely to make the target consistent prediction or attribution (i.e. to predict future success in the high success conditions and future failure in the low success conditions; to predict *high* agreeableness and competence in the high success conditions; *low* agreeableness and competence in the low success conditions). Dashed lines represent chance performance (binomial test). Asterisks indicate greater than chance performance; plus signs indicate less than chance performance ($\alpha = .05$).

For the good/not question, the overall model was significant, χ^2 (3, N= 127) = 16.41, p < .001. There were significant effects of both success level ($\beta = 4.32$, *Wald* = 37.87, p < .0001), and age, ($\beta = 2.61$, *Wald* = 6.08, p = .014). These were qualified by a significant age x success level interaction, ($\beta = 2.111$, *Wald* = 8.08, p = .004). To examine the nature of the interaction, additional regression analyses were run at each level of success (low vs. high by age). With increasing age, participants were less likely to make the target consistent attribution in the low success conditions ($\beta = 0.114$, *Wald* = 7.18, p = .007). In contrast, there was no difference with age for the high success conditions, ($\beta = 0.036$, *Wald* = 1. 32, p = .251). As shown in Figure 2a, all age groups exhibited greater than chance performance in the high success conditions, and the 5- and 6-year-olds performed below chance levels in the low success conditions.

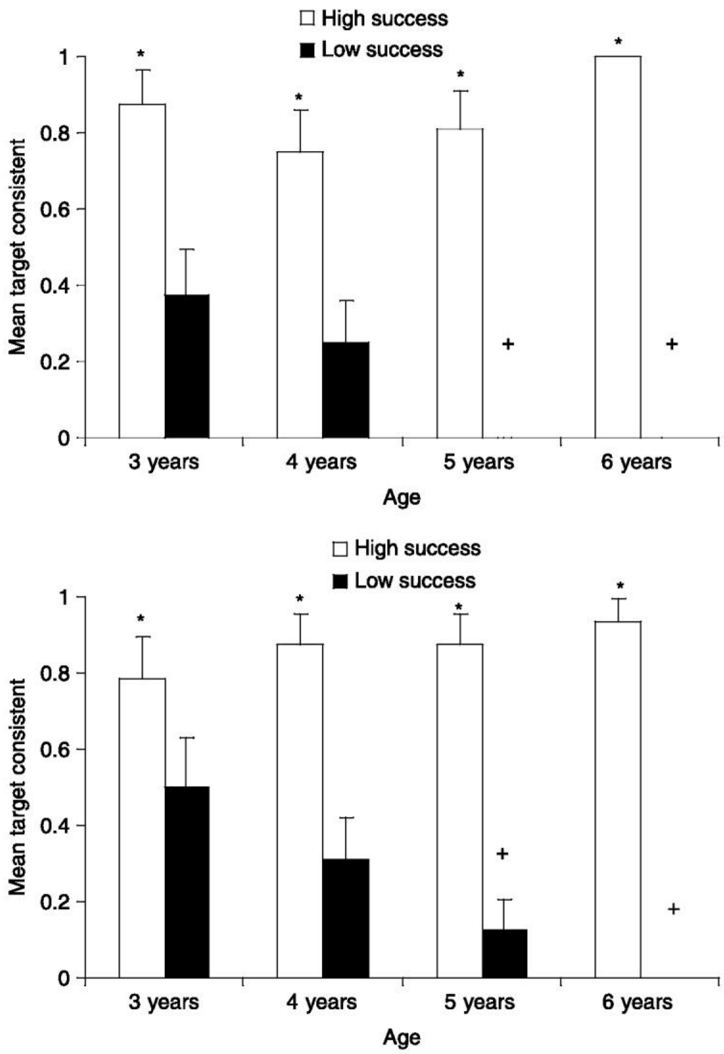


Figure 2. Performance on the agreeableness questions. (a) Mean number of target consistent responses on the good/not good question by age and success level. (b) Mean number of target consistent responses on the nice/not nice question by age and success level.

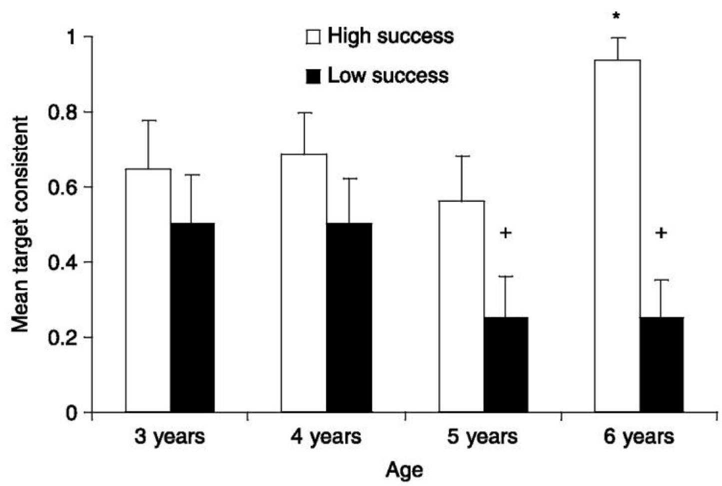
For the nice/not nice question, the overall model was significant, χ^2 (3, N = 125) = 78.16, $p < .0001$. Again, there were significant effects of both success level ($\beta = 3.97$ *Wald* = 37.44, $p < .000$ 1), and age, ($\beta = 2.80$, *Wald* = 6.76, $p = .009$). These were qualified by a significant age X success level interaction, ($\beta = 2.32$, *Wald* = 10.19, $p = .001$). Additional regression analyses indicated that children were less likely with age to make the target consistent attribution in the low success conditions, ($\beta = 1.83$, *Wald* = 10.65, $p = .001$), while there were no differences with age in target consistent attributions for the high success conditions, ($\beta = 0.486$, *Wald* = 1. 11, $p = .291$). As shown in Figure 2b, all age groups exhibited greater than chance performance in the high success conditions, and the 5- and 6-year-olds were below chance in the low success conditions.

Efficacy measures

Children's efficacy attributions were assessed with two questions: knows how to use computers/doesn't know how to use computers question and a smart/not smart question. Each question was scored separately, with one point allotted for a target consistent attribution (i.e. saying 'knows' and 'smart' in the high success conditions; saying 'doesn't know' and 'not smart' in the low success conditions.). Other responses were given a score of zero. For both questions, the best fitting models consisted of age, success level, and an age X success level interaction. Domain was not retained in either of the models, nor were any other interactions between the variables. Figure 3 displays the performance on each of these questions as a function of age and success level.

For the knows/doesn't know question, the overall model was significant, χ^2 (3, N= 125) = 24.28, p < .0001). There were significant effects of both success level (β = 1.55, *Wald* = 14.72, p < .0001), and age, (β = 1.77, *Wald* = 6.08, p = .014). These were qualified by a significant age X success level interaction, level (β = 1.23, *Wald* = 7.60, p = .006). Additional regression analyses were conducted at each level of success (low vs. high) by age. With increasing age, participants were less likely to make the target consistent attribution in the low success conditions (β = 0.695, *Wald* = 5.11, p = .024). In contrast, there was no significant age difference in the high success conditions, (β = 0.538, *Wald* = 2.746, p = .097). As shown in Figure 3a, all age groups performed at chance levels in the high success conditions except for the 6-year-olds. Both the 5- and 6-year-olds were less likely to choose the target consistent response than expected by chance in the low success conditions.

For the smart/not smart question, the overall model was significant, χ^2 (3, N= 127) = 16.4 1, p < .001. There were significant effects of success level (β = 2.99, *Wald* = 35.30, p < .0001), and age, (β = 1.93, *Wald* = 5.19, p = .023). These were qualified by a significant age X success level interaction, (β = 1.49, *Wald* = 7.29, p = .007). Additional regression analyses were conducted at each level of success (low vs. high) by age. With increasing age, participants were less likely to make the target consistent attribution in the low success conditions (β = 1.057, *Wald* = 6.61, p = .01). In contrast, there was no significant age difference in the high success conditions, (β = 0.441, *Wald* = 1.403, p = .236). As shown in Fig. 3b, 5- and 6-year-olds chose the target consistent response more often than expected by chance in the high success conditions and less often than expected by chance in the low success conditions.



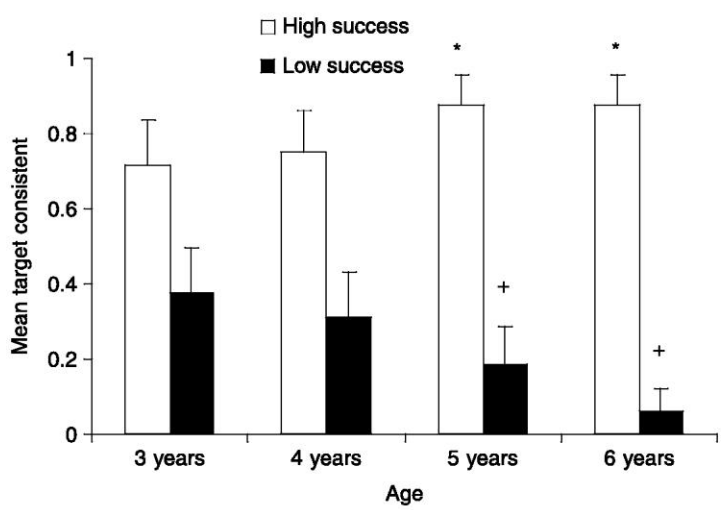


Figure 3. Performance on the efficacy questions. (a) Mean number of target consistent responses on the knows/doesn't know question by age and success level. (b) Mean number of target consistent responses on the smart/not smart question by age and success level.

Discussion

We assessed 3- to 6-year-olds' use of information about success history and domain to make global personality judgments about an actor. Findings indicated that success history, but not domain, had a tremendous impact on children's personality judgments. As hypothesized, children were more likely to draw on success history to make personality judgments under circumstances of repeated success than repeated failure. That is, despite receiving the same amount of information across conditions (five instances of success or five instances of failure), participants as a group readily predicted future success, but not failure, more often than expected by chance. This prediction of success also generalized to a novel context more often than expected by chance in the successful conditions, suggesting that children perceived the success as resulting from stable dispositional features of the actor (see Rholes & Ruble, 1984).

The tendency to base judgments about the actor on success, but not failure, extended to children's trait attributions. Notably, inspection of the means reveals age-related differences in response patterns both within and across trait measures. For the agreeableness questions (good/not good and nice/not nice), all age groups were more likely than expected by chance to label the actor as 'good' and 'nice' after hearing about multiple successes. However, the 3- and 4-year-olds responded randomly in the unsuccessful conditions, while the 5- and 6-year-olds chose the target consistent trait fewer times than expected by chance (i.e. they, too, largely deemed the actor as 'good' and 'nice'). By 5 years of age, children exhibited a clear positivity bias in these judgments such that they continued to take into account positive evidence but systematically disregarded negative evidence in their trait attributions, despite receiving the same amount of information. A different picture emerged for the efficacy questions (knows/doesn't know and smart/not smart). Here, 3- and 4-year-olds responded randomly even after hearing about multiple successes, suggesting that their appreciation of constructs related to efficacy may lag behind their understanding of agreeableness. This is consistent with previous research (Benenson & Dweck, 1986). By 6 years of age, a positivity bias was again evident in that target consistent attributions were greater than expected by chance for the high success conditions and fewer than expected by chance for the low success conditions for both questions.

Based on these findings, there appears to be a developmental progression whereby as a group, children respond unsystematically to failure information at 3 and 4 years of age and disregard it systematically by 5 years of age, either intentionally or because they are unable to process it in this context. In contrast, the use of success information appears to emerge very early, particularly for agreeableness. Notably, there were no age differences in the use of success information for either the good/not good question and the nice/not nice question, and all age groups were more likely than chance to make the target consistent response to these questions. The finding of a positivity bias is consistent with the results of Benenson and Dweck (1986), who reported earlier trait attributions for success rather than failure in school aged children. More generally, these findings are also consistent with research indicating that young children tend to judge others favourably even in the face of counter-evidence (e.g. Boseovski & Lee, 2008), overgeneralize positive traits of others (Stipek & Daniels, 1990), and believe that positive traits will remain stable and negative traits will attenuate (Heyman & Giles, 2004; Lockhart, Chang, & Story, 2002; Lockhart, Nakashima, Inagaki, & Keil, 2008). This latter finding may explain children's reluctance to predict negative behaviour in the future in the present study. Notably, the positivity bias stands in contrast to the adult literature on impression formation in which greater weight is often given to negative, than positive, information (e.g. Skowronski & Carlston, 1989).

Young children's strong inclination towards the positive may have biological underpinnings. While an unrealistically positive view of the self and others reflects poor metacognition and is typically construed as a limitation, an elevated sense of optimism is adaptive in that it encourages children to explore new academic and social opportunities, engage in trial-and-error learning and skill practice, and persist in achieving their goals even in the face of failure (Bjorklund, 1997; Bjorkland & Green, 1992; see also Lockhart et al., 2002, 2008). In the realm of peer relations, viewing one's classmates positively increases the chances of social success (see Mize & Ladd, 1990). Accordingly, the processing of negative information may lag considerably behind the processing of positive information to provide children an initial opportunity to equip themselves with the necessary tools for both academic and social success.

In addition to children's seemingly natural inclination to view things positively, socialization processes are likely to contribute to the positivity bias. As children proceed from the preschool to elementary school years, they may recognize increasingly the importance of prosocial verbal and non-verbal expressions (e.g. Talwar, Murphy, & Lee, 2007). By middle childhood, they may be reluctant to say anything negative about anyone based on social display rules. Moreover, it could be argued that young children's limited exposure to adversity, both in the real world and in child-related media, may result in a truly optimistic view of the self and others. Given this tendency to view others positively, it may be particularly important to target programs on racial and ethnic diversity to children in middle childhood. While the present findings certainly support the notion of a strong positivity bias in this age group, it is possible that this positivity response reflects an early form of the egotism bias wherein the 'blame' (i.e. negative prediction or attribution) is attributed to something external, in this case the computers or other recipients instead. The current study does not speak to this question, as we did not ask participants to make attributions about the recipients or any situational factors. This could be tested in the future by asking children to make more extensive person-situation attributions, as is typically done in the adult literature.

Contrary to prediction, context had virtually no effect on personality judgments. Irrespective of whether the interaction involved a human or a computer, participants were more likely to make the target consistent attributions and predictions after hearing about primarily successful than unsuccessful interactions. Thus, this research extends our knowledge about the positivity bias to a non-human entity. Although speculative, the lack of a context effect suggests that children's theory of causality may start off rather undifferentiated in nature. This is in contrast to adults' causal theories, which are highly developed and arguably domain specific (e.g. Sperber, Premack, & Premack, 1995). These causal theories likely become increasingly differentiated as children acquire domain specific knowledge about artifacts (see Scaife & van Duuren, 1995, for a discussion of children's perception of computers) and as the general positivity bias attenuates over time.

Based on these findings, there are several directions to pursue in future research. First, an individual differences approach is needed to determine the degree to which this positivity bias holds across children. For example, it is likely that children who are exposed to unusual adversity at a young age (e.g. abuse) do not hold an optimistic view of others and may instead view themselves or others, negatively. If this is the case and if a positivity bias is in fact adaptive during this developmental period, then identification of these children will be important so that their developmental trajectories can be monitored. Early negative experiences, along with a generally pessimistic world view, may be predictive of children who exhibit later social information processing problems.

Second, an individual differences approach may also uncover disparate personality judgments among children who subscribe to entity versus incremental theories of personality. While previous research suggests that preschoolers tend to be incremental theorists when reasoning about psychological traits (Lockhart et al., 2002) and that they tend to predict change in a positive direction (Lockhart et al., 2008), this is unlikely to hold for all children and it may be dictated by children's backgrounds as described above. For example, a child subject to excessive criticism may be led to believe that they are incompetent and that there is no possibility for change. Even for those children who are identified as incremental theorists, there may be different 'thresholds' of acceptance for trait change (i.e. some children may be reluctant to accept evidence of change). Because these theories have important implications for learned helplessness, motivation and depression (Lockhart et al., 2008) it is important that they be examined.

Third, while we did not uncover gender differences in the present study (and our participants viewed same-gender interactions only), previous research suggests that gender plays an important role in the perception of others' personal attributes (e.g. Burgner & Hewstone, 1993; Condry & Ross, 1985; Giles & Heyman, 2005). In particular, gender schemata may interact with a prepotent positivity bias in interesting ways. For example, children's tendency to view relational aggression as more typical of girls and physical aggression as more typical of boys (Giles & Heyman, 2005) and to judge aggression by boys as more typical than aggression by girls (Condry & Ross, 1985) may result in a more punitive view of individuals who violate these gender expectations. As children exhibit outgrow gender rigidity, assessments may become more realistic.

Fourth and finally, future research should examine further children's personality attributions in human-nonhuman interactions. From a methodological standpoint, it necessary to assess attributions of both the actors and recipients (i.e. in this case, the computers) and this may be particularly important in light of the fact that that children begin to make attributions about the intelligence of non-human entities in middle childhood (Scaife & van Duuren, 1995). It is also possible that domain effects will emerge in other human-nonhuman interactions (e.g. operation of a telephone or an automobile) and across different contexts (e.g. children vs. adult actors; presence of causal information vs. causal ambiguity). Systematic examination of these factors will enable us to learn more about the processes implicated in early impression formation.

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