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Is understanding regret dependent on developments in counterfactual thinking?

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Children's understanding of counterfactual emotions such as regret and relief develops relatively late compared to their ability to imagine counterfactual worlds. We tested whether a late development in counterfactual thinking: understanding counterfactuals as possibilities, underpinned children's understanding of regret. Thirty 5- and 6-year-olds completed tasks assessing counterfactual thinking and understanding regret. Performance on the counterfactual task was better than that on the regret task. We suggest that thinking about counterfactuals as possibilities is a necessary but not sufficient cognitive development in children's understanding of regret. We discuss how other developments in counterfactual thinking may underpin children's emotional understanding.

Sometimes emotional experiences are influenced not only by the situation in which we find ourselves, but also by what could have happened instead. For example, when a student gets a mediocre grade on a test but knows she could have worked harder and got a top grade, she will be somewhat negative about her actual grade. When counterfactual worlds impact on how adults feel about the real world, there can be counter-intuitive consequences. For example, bronze medal winners look happier than those who win silver (Medvec, Gilovich, & Madey, 1995). This makes sense if the former make a comparison with a counterfactual world in which they won nothing, and the latter think how they nearly won gold. Here, we focus on children's understanding of situations where the counterfactual world is better than the real world, when one might experience regret.

While regret and relief are common experiences for adults, understanding these counterfactual emotions appears relatively late in development. Guttentag and Ferrell (2004) read stories to 5-year-olds, 7-year-olds, and adults in which two characters experienced the same negative outcome. For one character there was a readily available counterfactual alternative that would have led to a better outcome. For example, one boy

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who fell off his bike would normally take a different route. Seven-year-olds and adults, but not 5-year-olds, consistently identified who would feel more regret based on their choices.

Similarly, Amsel and Smalley (2000) demonstrated that 5-year-olds did not show evidence of regret when playing a game that should induce counterfactual emotions. Participants chose between two boxes, kept the contents of their chosen box, and rated how happy they were with their prize. Then, they saw what was in the unchosen box and re-rated their own prize. Adults who found that the unchosen box had a better prize than the chosen box rated themselves as less happy after seeing this. However, 5-year-olds' second ratings were not influenced by what was in the unchosen box. Thus, until seven children show no evidence of experiencing regret nor understanding why it occurs in others.

We know from Amsel's study that children could entertain the relevant counterfactual world. Children were asked how they would have felt if they had won the other prize, which 5-year-olds found easy. This kind of counterfactual thinking, when children ignore what is really the case and speculate about a false alternative, appears at around 3 or 4 years of age (see Beck, Riggs, & Gorniak, 2008; Harris, German, & Mills, 1996; Riggs, Peterson, Robinson, & Mitchell, 1998). For many, this is the end of the story of counterfactual thinking development, but later developments in children's counterfactual thinking could be responsible for their understanding of counterfactual emotions.

Two suggestions are explicit in the literature about what further development in counterfactual thinking may be critical for understanding regret. Beck, Robinson, Carroll, and Apperly (2006) demonstrated that it was not until children are 5 or 6 years old that they think about the counterfactual and actual events as two possibilities that could once have happened. In their experiments children saw a slide with two possible exits. A toy mouse ran down one side to one exit. The new open counterfactual question was 'Could he have gone anywhere else?' correct answer 'yes' indicating the other exit. Performance was compared with a standard counterfactual question (see Riggs *et al.*, 1998) 'What if he had gone the other way, where would he be?' to which children should answer by indicating the other side. Between 3 and 6 years children find the standard question easier than the open. Only 5- and 6-year-olds performed well on the open questions (85% correct). Beck *et al.* argued that there is a late development at this age when children understand that the counterfactual was a possibility that could have replaced the actual event. Furthermore, they argued that understanding regret requires this understanding. An individual would not feel regret if the alternative possibility was not something she thought could have happened and could have replaced the current reality. Although there is a slight age difference between when children pass Beck *et al.*'s open counterfactual question and Guttentag and Ferrell's (2004) regret task, it is plausible that this is the result of differences between the samples in the two studies.

An alternative suggestion was made by Guttentag and Ferrell (2004). They suggested that what was missing in 5-year-olds' thinking was a comparison between the actual and counterfactual outcomes. Understanding regret requires identification of one's real reaction, one's counterfactual reaction, and a comparison. According to them, it is this comparison which is critical.

We explored these two claims by making the first comparison between a regret task and a counterfactual reasoning task. We adapted Guttentag and Ferrell's (2004) stories to investigate regret and devised a new task for standard and open counterfactual questions following Beck *et al.* There were two possibilities. If children's understanding of regret is dependent on them understanding counterfactuals as possibilities, the two tasks should be of similar difficulty and there should be a relation between them. On the

other hand, if children's understanding of regret is limited by their ability to compare possible worlds, we would expect no relationship and possibly a difference in difficulty. In this case, future work should make a direct test of Guttentag and Ferrell's claim that an inability to compare the two worlds limits children's thinking about regret.

Method

Participants

Thirty 5- and 6-year-olds (18 boys, mean age 5 years 3 months) were recruited from a school in Surrey, UK which served a predominantly Caucasian, middle-class population.

Materials

The stories used are included in the Appendix. We used props to demonstrate the stories. For the Pond story, we used a board (approx. 50 cm^2), with a blue circle in the middle to represent the pond. A red path was drawn on one side of the pond and a yellow path went round the other side. Two dolls (approx. 10 cm tall) represented Bob and David. For the Ice Cream Story two dolls represented Mary and Susan, and we used pictures of ice creams. For the Road story, we used four small toy cars and another board that had a black road drawn on it. The road split in two leading to a swimming pool and a sweet shop.

Procedure

There were two regret stories: Pond and Ice Cream, based on Guttentag and Ferrell. In the Pond story, David normally cycles along the yellow path to school, but today takes the red path. A tree has fallen on the red path. David hits it and falls off his bike. The other character, Bob, normally takes the red path, so he is on his typical route when he also falls. The test question was, 'Who would be more upset about deciding to ride along the red path around the pond that day? Bob, who rides on the red path around the pond everyday, or David, who usually rides on the yellow path but decided to ride along the red path today, or do you think they would feel the same?' Guttentag and Ferrell confirmed that adults say that David would feel worse. We added an open counterfactual question to the end of the story, 'Could David have gone another way?'. In the Ice cream story, one girl ate her usual dessert and another ate an unusual dessert. Both felt ill.

In the Road task, which assessed counterfactual thinking, the first car drove to the fork in the road as children were told, 'Sam had decided to go for a drive in his car. He could either go down this road to the swimming pool or he could go down this road to the sweet shop.' The character took one of the roads, 'Today Sam decided to drive down this road to the sweet shop.' Children were asked a standard counterfactual question, 'What if he had gone the other way, where would he be?' or an open counterfactual question, 'Could he have gone anywhere else?' There followed three further trials each using a different car and driver. We alternated standard and open counterfactual questions and each child had two standard questions and two open questions. We counterbalanced the order of tasks (regret or road).

Results

Children scored 1 for each correct answer to a question (Table 1). We used Wilcoxon paired ranks tests to make comparisons between question types, making a Bonferroni correction, $p < .0125$, for multiple comparisons. First, we compared performance on

the standard and open questions in the Road story. Performance was significantly better on the former $Z(N = 30) = -2.83$, $p = .005$. Second, we compared performance between the explicit counterfactual questions and the regret questions. The regret question was significantly more difficult than the open counterfactual in the regret task $Z(N = 30) = -4.46$, $p < .001$ and the open counterfactual in the road task $Z(N = 30) = -3.63$, $p < .001$ ($N = 30$) $= -4.33$, $p < .001$. Third, children found it no more difficult to answer an open counterfactual question within the context of the regret task than the road task, $Z(N = 30) = -.71$, $p = .48$.

Table 1. Children's success on the regret and counterfactual tasks

	Frequency of correct answers		
	0	1	2
Regret question 'Who feels worse?'	14	10	6
Open counterfactual in regret story	2	9	19
Open counterfactual in Road story	2	6	22
Standard counterfactual in Road story	0	2	28

Note. $N = 30$.

Discussion

We replicated Guttentag and Ferrell's (2004) finding that 5- and 6-year-olds do not understand regret. Children did not recognize that the person who had made an unusual choice would be more likely to regret it than the person who followed their normal course of action. We also replicated Beck *et al.*'s (2006) finding that open counterfactuals are more difficult to answer than standard counterfactuals.

There was a clear difference in difficulty between the two tasks. Children found the open question much easier to answer than the 'Who feels worse?' regret question. Counter to Beck *et al.*'s suggestion, understanding counterfactuals as possibilities is not sufficient for children to understand regret. This gives weight to Guttentag and Ferrell's claim (2004) that the critical development for understanding regret is comparing the actual and counterfactual worlds. Future research should investigate whether children's performance on regret tasks is correlated with other reasoning tasks involving comparison and, perhaps, whether regret tasks can be made easier by scaffolding the child in making the comparison.

On closer examination there was a pattern in children's performance. No child answered the regret questions correctly without also passing the open counterfactual question within the regret story (two children obtained a lower score on the road open question than on the regret question, which may have been the result of guessing). Thus, children who showed understanding of regret were (almost always) able to think about counterfactuals as possibilities. Understanding that both were once possibilities may be a first step in the process of comparing the two outcomes. Perhaps, understanding counterfactuals as possibilities is a necessary if not sufficient step towards understanding regret.

There is another important difference between the demands of the regret questions and the open counterfactual questions. In the former, children may not realise that counterfactuals are relevant. However, the reasoning questions explicitly prompt children

to think counterfactually. It is possible that children's difficulty is not due to limited ability to compare between the two worlds, but results from them not spontaneously considering the alternative world. There is very little research focusing on children's spontaneous counterfactual thinking (exceptions are Harris, 1997; Kujzac & Daly, 1979). However, in Amsel and Smalley's (2000) study, 5-year-olds successfully answered counterfactual questions about how they would have felt if they had chosen the other box. Despite this explicit prompt, they still failed to show regret. Thus, it seems unlikely that children's failure to consider the counterfactual spontaneously could be the sole cause of their difficulty with regret.

In conclusion, we considered whether cognitive developments in children's counterfactual thinking may underpin their apparently late developing understanding of regret. Recognising counterfactuals as possibilities that could once have replaced the actual world was not the critical development in children's understanding of regret, but may be necessary. In line with Guttentag and Ferrell (2004), we suggest that being able to compare counterfactual and actual world permits understanding of regret. Although, this hypothesis was not tested here, future research investigating this claim will advance our understanding of children's thinking about regret.

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Appendix

Stories used in regret task

The Pond Story

Bob and David both ride their bikes to school each morning. There are two paths that go to school around a pond. You can ride along the red path or you can ride along the yellow path. Everyday, when Bob gets to the pond he goes along the red path around the pond. Today, Bob took his usual way to school along the red path. Unfortunately, today a tree fell across the red path. Bob hit the branch with his bike, fell off his bike, was hurt and was late for school. Everything on the yellow path was fine. David always goes along the yellow path. However, today David decided that instead of going along his usual yellow path to school he was going to ride along the red path. David also hit the tree, fell off his bike, was hurt and was late for school.

Who would be more upset about deciding to ride along the red path around the pond that day?

(1) Bob who rides on the red path around the pond everyday, or
(2) David who usually rides on the yellow path but decided to ride along the red path today, or
(3) Do you think they would feel the same?

Open counterfactual: Bob and David chose to ride along the red path to school today, could they have gone another way to school?

The Ice Cream Story

Mary and Susan both like ice cream and they definitely like both vanilla and chocolate. At lunchtime at school, Mary always chooses to eat chocolate ice cream for her dessert, whilst Susan always decides to eat vanilla ice cream. Today at lunch, Mary ate her usual desert, chocolate ice cream. Susan, however, decided not to have her usual dessert of vanilla ice cream but instead to try the chocolate ice cream. Today there were germs in the chocolate ice cream, and everyone who ate the chocolate ice cream got stomach aches. Mary and Susan got sick because they ate the chocolate ice cream that had germs in it.

Do you think one girl would feel worse about eating the chocolate ice cream today and getting sick?

(1) Mary who usually eats chocolate ice cream, or
(2) Susan who usually eats vanilla ice cream but decided to eat chocolate ice cream instead, or
(3) Do you think they would feel the same?

Open counterfactual: Today Mary and Susan both ate chocolate ice cream for their dessert, could they have chosen anything else?