



Introduction

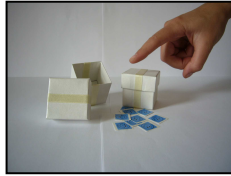
Everyday, we compare what we have in reality to what could have been, be it small (e.g., "I should have left the house earlier, and then I wouldn't be stuck in traffic") or large (e.g., "If only I studied harder at school, I would be in a better job"). This thinking about what could have been is known as 'counterfactual thinking'. Often, emotional reactions are experienced alongside these thoughts, known as 'counterfactual emotions', such as regret and relief. Although there is a great deal of research on adults' counterfactual emotions, there is a scarce literature on the development of children's experience of these emotions.

The only tasks that have been used are a *games task* in which participants themselves play a game involving decisions that led to regret or relief³ and a *stories task*, in which participants read about two protagonists who experience regret and relief because of their choices². Results from both studies suggest that children experience regret from 7, but neither provided positive evidence for the experience of relief.

Study 1: The Games Task³

(Based on Amsel & Smalley, 2000)

- Participants choose between two boxes that contained differing quantities of stickers.



- Rate their feelings about their chosen box



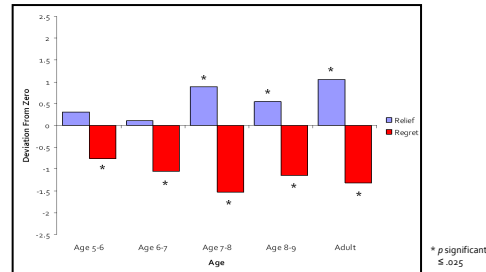
- View the contents of the non-chosen box

- Rate their feelings about their first box once again.
- 2 x regret trials (initial box contained 2 or 3 stickers; alternative box contained 8 stickers)
2 x relief trials (initial box contained 2 or 3 stickers; alternative box contained zero stickers)

Study 1: Participants & Results

N = 106				
age 5-6	n = 21	mean age = 5;7	11 males	
age 6-7	n = 19	m = 6;7	4 males	
age 7-8	n = 19	m = 7;8	11 males	
age 8-9	n = 23	m = 8;10	9 males	
adult	n = 24	m = 20.4 years	2 males	

The 5-6-year olds demonstrated regret as initial score subtracted from the second score differed from zero. Relief was shown in 7-8-year-olds. There is evidence of lag between regret and relief.



Study 1: Discussion and Conclusions

Our results suggest that children can experience regret two years earlier than the literature suggests. We have also provided the first positive evidence for children's experience of relief, at 7 years.

However, there are three limitations to these results:

- Positive outcomes: The literature suggests that children and adults are more likely to think counterfactually after a negative outcome^{3,4}. Perhaps if children lost stickers, there may be more of a need to think counterfactually.
- Size of the consequence: On regret trials, children lost out on 5 or 6 stickers. In contrast, they won all the possible stickers on the relief trials. The difference between the two boxes on the relief trials may have been too small to be thought of as significant.
- The rating scale: It is inflexible. If children said that they were very happy after winning 3 stickers, they couldn't say that they were even happier after seeing that they could have won nothing.

We aimed to resolve these limitations and further investigate the specific circumstances under which children demonstrate regret and relief.

Study 2: Methods

N = 162			
age 4-5	n = 55	mean age = 5;1	29 males
age 5-6	n = 52	m = 6;2	27 males
age 6-7	n = 55	m = 7;3	31 males



- Choose one of two face-down cards
- Rate happiness of the contents on 5-point scale
- View the contents of the non-chosen card
- Re-rate feelings of the contents of the first box using the blue arrows: even sadder, the same, even happier than before
- Difference between the ratings is compared to zero

4 trials: Regret-Win: Win 2/3, could have won 8
Regret-Lose: Lose 2/3, could have won 3
Relief-Win: Win 2/3, could have lost 3
Relief-Lose: Lose 2/3, could have lost 8

Study 2: Results

		Regret-Win W2/3, W8				Regret-Lose L2/3, W3				Relief-Win W2/3, L3				Relief-Lose L2/3, L8			
		%		<i>p</i>		%		<i>p</i>		%		<i>p</i>		%		<i>p</i>	
	<i>n</i>	←	↑	→		←	↑	→		←	↑	→		←	↑	→	
Age 4-5	55	49	31	20	.010*	22	60	18	.049 ^Δ	9	60	31	.432	16	64	20	.025 ^Δ
Age 5-6	52	55	25	20	.001**	69	19	12	<.001**	14	14	73	<.001**	39	22	39	.212
Age 6-7	55	62	36	2	<.001**	73	21	6	<.001**	0	22	78	<.001**	22	29	49	.010*

Percentages of arrows chosen, Binomial Sign Tests, proportions = .33

Highlighted columns represent the arrow expected to be chosen

The 4-5-year-olds demonstrated a limited experience of regret, three years younger than initially suggested.

Apart from the 4-5-year-olds' abilities, regret and relief develop in parallel from 5-6-years, apart from relief-lose, at 6-7-years. This is once more positive evidence for relief, two years younger than our first games task.

5-6- and 6-7-year-olds were combined for greater power. Regret-lose and Relief-win were compared using a McNemar Test, $n = 33$, $k = 12$, $p = .487$. No significant difference between the two trials suggests that the emotions of regret and relief develop in parallel.

Study 2: Discussion and Conclusions

We provide unique evidence that children can experience some form of regret at 4-5-years, 3 years younger than we and the literature initially anticipated. We also found the first positive evidence that children from 5 possess the necessary cognitive skills in order to experience regret and relief. These emotions are pervasive in adults and it seems that they develop from a young age. Discovering their function requires further work so it may be possible that young children learn from their regrets just as adults do.

Our three initial limitations were investigated. We have evidence that children think counterfactually after negative outcomes, but not necessarily only negative outcomes, more meaningful gains and losses are more likely to trigger regret and relief, and the flexible scale permitted more reliable responding.

It is not until children are 6-7 that they think counterfactually after a negative outcome on the relief-lose trials. The delay in success may be due to this being a learned response. As adults, we attempt to find positives after negative events, such as failing in an activity, yet children do not acquire the skills to do so until at least 6-7-years.

Thus trying to prompt children that a negative outcome could have been worse (e.g., on consoling a child with a broken toy "at least you have something to play with"), may fall on uncomprehending ears.

References

- ¹Amsel, E. & Smalley, D. (2000). Beyond really and truly: Children's counterfactual thinking about pretend and possible worlds. In K. Riggs & P. Mitchell (Eds.), *Children's reasoning and mind* (pp. 99-134). Brighton, England: Psychology Press.
- ²Guttenberg, R.E. & Ferrell, J. (2004). Reality compared with its alternatives: Age differences in judgements of regret and relief. *Developmental Psychology*, 40(3), 764-775.
- ³Weisberg, D.P. & Beck, S.R. (under review). Children's thinking about their own and others regret and relief. *German, T.* (1999). Children's causal reasoning: Counterfactual thinking occurs for 'negative' outcomes only. *Developmental Science*, 2, 442-447.
- ⁴Gleicher, F., Koss, K.A., Baker, S.M., Strathman, A.J., Richman, S.A. & Sherman, S.J. (1990). The role of counterfactual thinking in judgements of affect. *Personality and Social Psychology Bulletin*, 16(2), 384-395.