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Short report

The influence of stimulus valence on confirmation bias in children

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ABSTRACT

Background and objectives: The aim of the present study was to replicate our previous study and to further examine the relation between fear and positive and negative confirmation bias in children.
Methods: Fifty-three non-clinical children (9–13 years) were shown pictures of a kindly-perceived (quokka) and a dangerous-looking (aye aye) animal. For each animal, levels of fear and information seeking patterns were obtained.
Results: The results indicated that the aye aye was rated as more threatening and less kind than the quokka. For the aye aye more negative than neutral or positive information was selected; no differences were observed for the quokka. Regardless of type of animal, higher fear levels coincided with more search for negative information. Positive confirmation bias in the quokka was indirectly observed as low fear levels were associated with an increased search for positive information. Finally, for the quokka searching negative information coincided with an increase in the scariness of the quokka; this pattern was absent for the aye aye.
Limitations: Though the results are informative, no clinically anxious children were tested, a positive beliefs questionnaire was lacking and children were forced to select one of the presented answer alternatives.
Conclusions: The present study indicates that the mere perception of danger can trigger confirmation bias; a positive view can, in case of low fear levels, result in increased search for positive information. Additionally, a relation was observed between increased negative attitude and search for negative information. The results, implications and suggestions for future research are discussed.

Anxiety disorders are the most common mental disorders in children (Merikangas, Nakamura, & Kessler, 2009). Children with (proneness to) anxiety disorders display information processing deficits that are not, or to a lesser extent, observed in non-anxious persons (Hadwin, Frost, French, & Richards, 1997; Muris et al., 2000; Waters, Lipp, & Spence, 2004). An information processing deficit that has recently gained interest is confirmation bias. This is the tendency to search for information that confirms the (negative) view a person holds, while ignoring alternative information that undermines the current view. Such preference for verification over falsification strategy then automatically results in the reinforcement and maintenance of fear (De Jong, Mayer, & Van Den Hout, 1997; Mathews & MacLeod, 2005).

Several studies have examined the relation between fear and confirmation bias in children. To this end, fear for an unknown neutral animal is often established by (indirectly) providing negative information, for example by reading aloud negative information about the animal (Muris et al., 2009). In line with the information processing theories, this induced fear resulted in a negative view, to an inclined search for information that confirmed the dangerousness of the animal and to a declined search for alternative information (Muris, Huijding, Mayer, van As, & van Alem, 2011; Muris et al., 2009; Remmerswaal, Muris, Mayer, & Smeets, 2010). This search for negative information resulted in turn in enhanced fear levels, indicating the reciprocal relation between fear and confirmation bias (Remmerswaal, Huijding, Bouwmeester, Brouwer, & Muris, 2014).

Though useful, providing additional information to establish a certain view and measure confirmation bias has its drawbacks. The child might simply remember and apply the information provided. For example, negative statements as “The Cuscus is dangerous” or “The Cuscus will attack you” are stored in memory and applied in confirmation of the sentence “If you stroke a Cuscus, it will bite you”. In such case the child is not necessarily inclined to search for

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negative information, but applies the learned premises to select the most logical option.

In a recent study we demonstrated that it is possible to observe negative confirmation bias without providing additional negative information. Just the mere perception of threat, pictures of dangerous-looking animals, was sufficient to observe negative confirmation bias (Dibbets, Fliek, & Meesters, 2014). However, the children could only search for neutral or negative information; no positive alternative was available. The lack of the positive alternative hinders the detection of positive confirmation bias, a bias that has conceived considerably less attention. Only a few studies have addressed this topic; providing positive information is, in some occasions, associated with an enhanced search for positive information (i.e., IST trial 2, Remmerswaal et al., 2014; Exp 1., Remmerswaal, Muris, & Huijding, 2015). It is not known if a similar positive confirmation bias can be observed without providing additional information. Additionally, and most importantly, it is unclear what the relation is between a potentially kind animal, fear and confirmation bias patterns. From a clinical point of view, especially this topic is relevant as a negative search pattern on a putative harmless animal might be indicative of maladaptive responding.

The aim of the present study is to replicate our previous findings and to explore the relation between stimulus valence and confirmation bias in children. Based on previous studies, we expect that 1) a dangerous-looking animal will result in search for more negative information; 2) a kindly-perceived animal will trigger search for positive information; that, regardless of animal type, 3) higher levels of perceived danger will coincide with more search for negative information; and 4) search for negative information will increase a negative view, indicating a reciprocal relationship between confirmation bias and fear.

1. Method[1]

1.1. Participants

Fifty-three non-clinical Dutch children (17 boys, 36 girls) aged 9–13 years (M = 10; 9, SD = 11 months) from regular primary schools participated. Parents received written information about the experiment and gave written informed consent. The information stated that only children without anxiety problems were invited to participate. The study was approved by the Ethical Committee Psychology (ECP-110_V12_01_2012_A1).

2. Material

2.1. Animals

Two animals were used for the present study, the quokka and the aye aye (cf. Dibbets et al., 2014). In our previous study, the aye aye was rated as threatening, whereas the quokka was rated as kind. The pictures were printed or presented on a computer screen and labeled with the species name (see Fig. 1).

3. Questionnaires

3.1. State-trait anxiety inventory for children (STAIC)

The trait subscale of the STAIC was administered to measure how anxious a child feels in general (Dutch version, Bakker, Van Wieringen, van der Ploeg, & Spielberger, 1989). Cronbach's alpha for the current study was 0.86.

3.2. Fear beliefs questionnaire (FBQ)

Two Fear Beliefs Questionnaires, FBQs, were administered; one for the quokka and one for the aye aye (cf. Dibbets et al., 2014; Muris et al., 2009). Cronbach's alpha for the quokka and aye aye were 0.91 and 0.90, respectively.

3.3. Attitudes

For each animal four printed Visual Analogue Scales (VAS_{print}) were presented concerning threat-related items (perceived dangerousness) and a positive characteristic (perceived kindness); a computerized version (VAS_{pc}) was presented to assess scariness.

3.4. Confirmation bias

The confirmation bias task was based on the task of Remmerswaal et al. (2014; 2015). In this computerized Search For Information (SFI) task the tendency to select positive, neutral and negative information was measured. Per animal 12 trials were presented; the VAS_{pc} was presented before ($VAS_{pc\#1}$) and after ($VAS_{pc\#2}$) these trials. On each trial the question "What do you further want to know about the quokka/aye aye?" was presented on the top of the screen. At the middle of the screen a picture of the particular animal was displayed. At the bottom three information options were displayed: a negative (e.g., "I want to know if the aye aye eats small animals"), a neutral (e.g., "I want to know if the aye aye eats green leafs") and a positive option ("I want to know if the aye aye eats delicious fruits"). Selection of an option with a mouse click resulted in a confirmative answer, e.g., selection of the neutral option resulted in the answer "Yes, the aye aye eats green leaves". Pressing spacebar led to the next trial. Information options, positions and presentation order of the animals were counterbalanced.

3.5. Procedure

All children were tested in their classroom under supervision of two research assistants. Children started with the STAIC, filled out the VAS_{print} and then completed the FBQ. Subsequently, children individually carried out the SFI in a separate room. Debriefing took place after the last participant.

3.6. Statistics

In total two values were missing, one item of the SFI for the quokka and one for the aye aye, resulting in a general lower score of the SFI for these two children. All data were analyzed parametrically. In all main data analyses gender was included as factor (see for a meta-analysis of gender effects Chaplin & Aldao, 2013).[2] If no (interaction) effect of gender was observed in the main analysis, gender was not included in the follow-up analyses. Bonferroni Holm corrections were made in case of multiple comparisons, the threshold was set at $p < 0.05$.

4. Results

4.1. Trait anxiety (STAIC)

The STAIC scores (M = 31.23, SD = 7.00) were normally distributed, Kolmogorov-Smirnov, $D(53) = 0.098$, $p = 0.20$, and comparable to other studies in non-clinical children (e.g., Muris,

[1] See for methodological details Dibbets et al. (2014).

[2] Note that results were similar in case gender was not included in the data analyses.