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The influence of positive affect on jumping to conclusions in delusional thinking

Gary Lee [a,*], Christine Barrowclough [a], Fiona Lobban [b]

[a] School of Psychological Sciences, University of Manchester, Zochonis Building, Manchester M13 9PL, United Kingdom
[b] Spectrum Centre for Mental Health Research, Division of Health Research, Lancaster University, Lancaster LA1 4YW, United Kingdom

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ABSTRACT

This study examined relationships between positive affect and jumping to conclusions (JTC) in delusional thinking. One hundred and eighty-nine non-clinical participants entered an internet experiment and were randomized into one of two conditions. Those in a positive condition performed online creativity tasks and received bogus positive feedback as part of a positive affect induction procedure, whilst a neutral condition received neutral feedback. Both groups were subsequently assessed on a survey task for changes in JTC. In line with hypotheses, participants in the positive condition requested significantly more survey comments before drawing conclusions than those in the neutral condition. Results suggest that increases in positive affect may be linked with a tendency to gather more information before making decisions (i.e. a reduction in JTC). The influence of positive affect on reasoning biases in social environments is discussed.

1. Introduction

The relationship between delusional thinking and the jumping-to-conclusions (JTC) bias has become a focal point within psychosis research over the last 20 years. JTC describes a tendency for people with delusions to seek less information before making decisions, when compared to non-clinical control groups (Fine, Gardner, Craigie, & Gold, 2007; Freeman, 2007).

JTC appears to be specifically related to delusional thinking in psychosis samples (Fine et al., 2007; Moritz & Woodward, 2005; Peters, Thornton, Siksou, Linney, & MacCabe, 2008). However, the phenomenon has also been detected in 'at-risk' groups (Broome et al., 2007) and in non-clinical populations scoring highly on measures of delusion-proneness (Colbert & Peters, 2002; Warman & Martin, 2006; White & Mansell, 2009). This has led psychologists to recognise the possible role of JTC in the development and maintenance of psychotic symptoms where it is thought to contribute to how readily delusional ideas are accepted (Freeman, Pugh, & Garety, 2008; Garety, Kuipers, Fowler, Freeman, & Bebbington, 2001).

Despite its theoretical importance, it is unclear what factors influence JTC. Garety, Hemsley, and Wessely (1991) have suggested that anxiety or depression could exacerbate the bias by increasing hasty decision making. However, the evidence to support this assertion is mixed. Correlational studies have generally failed to uncover any relationship between performance on JTC tasks and the presence of anxiety or depression (Freeman et al., 2008; Garety et al., 2005; Warman, Lysaker, Martin, Davis, & Haudenschield, 2007; Warman & Martin, 2006). On the other hand, two experimental studies, which involved the manipulation of anxiety have produced conflicting results. Both Lincoln, Lange, Burau, Exner, and Moritz (2009) and So, Freeman, and Garety (2008) induced anxiety in an experimental group using evocative imagery. High anxiety groups were then compared to control groups on a JTC task. Although So et al. (2008) did not find any difference between the groups, Lincoln et al. (2009) observed that participants in their high anxiety group requested less information when making decisions. These authors concluded that anxiety accentuates the JTC bias, leading to more paranoid thinking (Lincoln et al., 2009).

A limitation of this research is that it overlooks a large literature on affect and its relationship to cognition. *Affect* is used here as a broad term that encompasses both emotions and moods, in line with previous definitions (e.g., Gray & Watson, 2007; Schwarz & Clore, 2007). In this sense, affect is also open to self-report by the person experiencing it (Gray & Watson, 2007). A dominant view is that affect can be described along two dimensions, positive and negative affect, reflecting the valence of underlying emotions and moods (Watson, Clark, & Tellegen, 1988). Although JTC studies have focussed on negative affect in the context of anxiety, they have not considered the significance of positive affect (such as joy, enthusiasm or interest). Yet, there is substantial evidence to suggest that positive affect influences thought and behavior in different ways to negative affect (Fredrickson, 1998, 2001).

The wealth of research in this area has been reviewed elsewhere (see Isen, 2008; Schwarz & Clore, 2007). However, with regards to positive affect, there appear to be a number of key influences on cognition and behavior. At a basic level, positive affect is thought

* Corresponding author. Tel.: +44 1423 504690; fax: +44 0 161 275 8487.
E-mail address: gejlee@gmail.com (G. Lee).

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to broaden the scope of attention and to allow access to more diverse information stored in memory (Fredrickson, 2001). This results in flexible thinking and varied ways of engaging the environment (Fredrickson, 2001; Isen, 2008). Typically, these effects have been observed within laboratory studies, where the induction of positive affect has been associated with better creative problem-solving and more exploratory behavior (e.g., Estrada, Isen, & Young, 1997; Kahn & Isen, 1993).

Whether positive affect facilitates or impairs accuracy on decision-making tasks remains controversial and appears heavily dependent on the nature and context of the task (for a brief summary of this evidence, see Brand, Reimer, & Opwis, 2007; Isen, 2008). Nevertheless, one theory suggests that individuals experiencing positive affect will tend to behave in ways that are more likely to maintain their positive state (Isen, 2008). Thus, investigators have shown that under circumstances where decision-making has meaningful consequences to the individual, positive affect may promote risk-averse behavior (Estrada et al., 1997; Isen, 2001, 2008). These effects have been illustrated by findings that people in positive moods utilize a greater number of cues to inform their judgements (e.g., Bramesfeld & Gasper, 2008; Djamasbi, 2007) and are less likely to gamble when potential losses are at hand (Arkes, Herren, & Isen, 1988).

The results of these studies would seem directly relevant to the JTC bias. In the first place, JTC is characterized by restricted information-seeking, which contrasts to the observed influence of positive affect on information use. Secondly, a feature of JTC tasks is that requesting more information reduces the risk of making incorrect decisions. Therefore, so long as the task is framed in a personally meaningful way, positive affect should predict more information-seeking (i.e. less JTC).

The present study examined the association between positive affect and JTC in a student sample. The use of a non-clinical sample is justified as JTC is related to levels of delusion-proneness in non-psychotic individuals (e.g., Colbert & Peters, 2002), as well as those with florid symptoms of psychosis. Whilst replication in clinical samples is clearly necessary, researching possible processes underlying psychosis-like phenomena in non-clinical populations is widely used to overcome many of the difficulties of recruitment and potential confounds of medication and illness history in clinical populations. This paradigm assumes a common, dimensional view of psychosis, where psychotic symptoms are thought to lie at one end of a continuum with normal experience (Claridge, 1990).

In this study, we recruited participants into an internet-based experiment to see whether positive affect could influence JTC. Specifically, we attempted to induce positive affect with a meaningful stimulus, in the form of performance feedback that might be encountered within social situations. We assessed subsequent performance on a JTC task with the following hypotheses:(1) As a replication of earlier findings, we expected higher levels of delusion-proneness to be associated with fewer requests for information on the JTC task.(2) Participants exposed to the positive affect induction (positive condition) would require more information before making decisions than those receiving no mood induction (neutral condition). In other words, the former group would exhibit less JTC.(3) This second finding would be due to an increase in information-seeking and positive affect from baseline (pre-feedback) to post-feedback for the positive condition.

2. Method

2.1. Participants

Advertisements were sent out to undergraduate and postgraduate students via the university email system. In response, the study website registered over 380 hits, representing the number of times the participant information page was accessed. In total, 189 students completed the study and were entered into a 50 pounds sterling prize draw. Participants' characteristics are displayed in Table 1.

Table 1
Participants characteristics.

	N	%	
Gender			
Male	49	25.9	
Female	140	74.1	
Ethnicity			
White	140	74.1	
Asian	7	3.7	
Black	3	1.6	
Chinese	2	1.1	
Other	8	4.2	
Not reported	29	15.3	
Current level of study			
Undergraduate	126	66.7	
Postgraduate	43	22.7	
Other/not reported	20	10.6	
Current subject of study			
Sciences	89	47.1	
Arts	63	33.3	
Other/Not reported	37	19.6	
	Mean (S.D.)	Min	Max
Age	22.8 (6.0)	18	55
PDI-21 Total score	64.3 (39.8)	0	214

Abbreviations: PDI-21 = Peters delusions inventory (21-item)

2.2. Materials

All materials in the following section were computerized and displayed on a website, which could be accessed over the university network using standard web-browsing software. The website was created using a programming script by Goritz and Birnbaum (2005), which allowed participants' responses to be transferred from the web-pages into a secured database.

2.2.1. Jumping to conclusions (JTC) 'Survey' task

We adapted a widely used probabilistic reasoning task to assess JTC (Warman & Martin, 2006; Warman et al., 2007). Participants were asked to imagine that two surveys had been conducted about them. In both surveys, 100 people provided comments about the participant's character. In survey A, there were 80 positive comments and 20 negative ones. In survey B, the proportions were reversed. Participants were told that the computer had selected one of the surveys and that their goal was to decide which survey had been chosen, based on the comments extracted. Comments were presented one at a time, but as many or as few comments could be requested before a decision was made. Participants were asked not to make a decision until they were 'quite' confident of being correct. Unbeknown to participants, comments were always presented in a fixed order, following Warman and Martin (2006). There were two sequences: a majority positive (JTC_p) and a majority negative (JTC_n) sequence of comments.. The key variable was the number of comments requested before a decision was made. A recent review concluded that this 'draws-to-decision' variable was the most reliable indication of JTC, with delusional populations consistently exhibiting fewer 'draws' (Fine et al., 2007).

2.2.2. Positive affect induction

A false-feedback paradigm was used to induce positive affect. Similar procedures have been adopted to successfully induce affect (e.g., Nummenmaa & Niemi, 2004). At the beginning of the