Schizophrenia Research 154 (2014) 68–72

Contents lists available at ScienceDirect

Schizophrenia Research

journal homepage: www.elsevier.com/locate/schres

Jumping to perceptions and to conclusions: Specificity to hallucinations and delusions

Eleonore Bristow [a,1], Paul Tabraham [b,1], Nicola Smedley [a], Thomas Ward [a], Emmanuelle Peters [a,c,*]

[a] Institute of Psychiatry, King's College London, Department of Psychology, London, UK
[b] University College London, Sub-department of Clinical Health Psychology, London, UK
[c] National Institute for Health Research (NIHR) Biomedical Research Centre for Mental Health at South London and Maudsley NHS Foundation Trust, London, UK

ARTICLE INFO

Article history:
Received 8 October 2013
Received in revised form 20 January 2014
Accepted 3 February 2014
Available online 25 February 2014

Keywords:
Schizophrenia
"Jump-to-conclusions"
"Jump-to-perceptions"
Delusions
Hallucinations
Cognitive models of psychosis
Cognitive biases

ABSTRACT

Background: There is evidence that people with psychosis display a "jump-to-conclusions" (JTC) reasoning style, and that this bias may be specific to delusions. A "jump-to-perceptions" (JTP) cognitive bias has also been found and is typically linked to hallucinations. However, there is some evidence for an association between JTP and delusions, and its specificity to hallucinations remains unclear. It has been suggested that these biases are related and products of shared cognitive processes.
Methods: This study examined the symptom specificity of JTC and JTP, and the relationship between them, in a sample of 98 individuals with delusions divided into 'hallucinators' ($n = 51$) and 'non-hallucinators' ($n = 47$). Biases were assessed using the beads task and visual and auditory perceptual tasks.
Results: As predicted, both groups demonstrated a JTC bias, but the 'hallucinators' showed a more pronounced JTP style in both modalities. The presence of JTC and JTP biases did not co-occur: making a decision on the beads task after two or fewer draws was not related to visual JTP, and was associated with a less marked JTP bias in the auditory perceptual task. No differences were found in JTP or JTC between participants with and without a schizophrenia diagnosis. JTP, but not JTC, was associated with the presence of hallucinations.
Conclusions: These findings suggest that the JTC and JTP biases show specificity to delusions and hallucinations, respectively, and not to diagnosis. There was no evidence that they are the product of shared cognitive processes, further supporting their specificity.

1. Introduction

Cognitive models of psychosis describe a dynamic, multi-factorial pathway from anomalous experiences to positive symptoms involving social factors, pre-existing beliefs, maladaptive appraisals and affective and cognitive disturbances (Bentall et al., 2001; Garety et al., 2001; Morrison, 2001; Bentall et al., 2007; Garety et al., 2007). Cognitive and perceptual biases are viewed as causal in the development and maintenance of delusions in particular (Freeman, 2007).

One of the most researched cognitive biases is "jumping-to-conclusions" (JTC). This data-gathering bias leads individuals with delusions to make decisions hastily on the basis of less information than healthy and clinical controls, meaning that they accept delusional hypotheses more readily (Garety et al., 1991). There is substantial evidence that people with delusions, and those who are delusion-prone, show a JTC style on a probabilistic inference task (the 'beads task'; see Fine et al., 2007; Freeman, 2007, for reviews). Other studies have found that the JTC bias is specific to data gathering, rather than reflecting general reasoning deficits such as probability estimation and hypothesis testing (Peters et al., 2008).

Studies investigating the specificity of the JTC bias to delusions have produced mixed findings. Mortimer et al. (1996) and Menon et al. (2006) found that the JTC bias in schizophrenia patients was unrelated to the presence or severity of delusions, suggesting that it may relate more generally to a diagnosis of schizophrenia. In contrast, other studies have reported specificity to delusions (Garety et al., 1991; Moritz and Woodward, 2005; Van Dael et al., 2006). Peters et al. (2008) found more JTC-type errors in individuals with (compared to without) delusions, but no differences were found between those with and without a schizophrenia diagnosis. In a meta-analysis, Fine et al. (2007) concluded that individuals with delusions characteristically display a JTC bias and that this relationship is not an epiphenomenon of schizophrenia. However, its association with other symptoms, such as hallucinations, has not been investigated.

The jumping-to-perceptions (JTP) bias (i.e. the increased likelihood of identifying an ambiguous perceptual event as external and real, rather than internal and imaginary; Bentall, 1990) has been more commonly linked to hallucinations (Rankin and O'Carroll, 1995; Böcker et al., 2000). It has been suggested that auditory hallucinations result from a failure in reality discrimination, namely the ability to determine

* Corresponding author at: PO Box 77, Department of Psychology, Henry Wellcome Building, Institute of Psychiatry, De Crespigny Park, London SE5 8AF, UK. Tel.: +44 207 848 0347; fax: +44 207 848 5006.
E-mail address: emmanuelle.peters@kcl.ac.uk (E. Peters).
[1] Joint first authors.

0920-9964/$ – see front matter © 2014 Elsevier B.V. All rights reserved.
http://dx.doi.org/10.1016/j.schres.2014.02.004

whether the source of an experience is internal or external (see Waters et al., 2012, for a review). Where the source of an experience is ambiguous, accurate mental representations and appropriate decision-making processes are required to correctly identify its source (Brébion et al., 1998). Bentall and Slade (1985) presented participants with an auditory signal detection task and found that individuals experiencing, as well as those predisposed to, hallucinations, were poor at reality discrimination and showed an externalising perceptual bias.

Signal Detection Theory proposes that processing errors precede mistaken external attributions in the reality discrimination pathway, thus differentiating between the role of response biases and accurate signal detection itself. However, this cognitive style is not unique to auditory hallucinations; as noted above a proneness to making hasty judgements is equally applicable to delusions. It has been suggested that the cognitive bases for impaired reality discrimination are a commonality of the positive symptoms of schizophrenia, and that JTP and JTC biases are grounded in shared cognitive processes (Waters et al., 2012). For instance, Colbert et al. (2010) found that the JTP bias was present in individuals both with remitted and active delusions, and Cahill (1996) showed that delusional severity correlated positively with external attributions of a distorted recording of schizophrenia participants' own speech. Using a similar paradigm, Johns et al. (2001) found that this source-monitoring deficit was present in participants with delusions, although it was particularly pronounced amongst those with hallucinations. There is therefore some evidence for an association between delusions and an externalising perceptual bias, and the specificity of the JTP bias to hallucinations remains unclear.

The current study sought to investigate the symptom-specificity of the JTC and JTP biases. Both visual and auditory biases were examined. Patients with delusions were divided into two groups: 'hallucinators' and 'non-hallucinators'. It was predicted that both groups would demonstrate a JTC bias, while the hallucinating group would demonstrate a more pronounced JTP style. The relationship between the JTP and JTC biases, and the role of symptoms and diagnosis, were also explored.

2. Method

2.1. Participants

Ninety-eight inpatients with delusions (62 men, 36 women) were recruited from the South London and Maudsley NHS Foundation Trust. Patients were approached if they were deemed by staff to have held one or more delusions within the last month, confirmed by case note review and a global delusions rating of three or more on the Schedule for the Assessment of Positive Symptoms (SAPS; Andreasen, 1984). Patients were excluded if they were under 18 or over 65, not fluent in English, had a primary diagnosis of drug or alcohol abuse or had known organic cerebral pathology.

Participants were divided into two groups on the basis of their SAPS Global Rating of Hallucinations scores. Participants scoring 1 or less ($N = 47$) were assigned to the 'Non-hallucinator' group (NH) and those scoring 2 or more ($N = 51$) to the 'Hallucinator' group (H). There were no differences between the groups in gender, age, estimated verbal IQ, or length of contact with mental health services (see Table 1). The H group scored significantly higher on the global rating of hallucinations than the NH group, as expected, as well as on delusions (see Table 1). Thirty-seven (72.6%) of the H group had a schizophrenia diagnosis compared to 22 (46.8%) in the NH group ($\chi^2_{(1,\ N\ =\ 98)} = 6.76$, $p = 0.009$).

2.2. Measures

2.2.1. Scale for the Assessment of Positive Symptoms (SAPS; Andreasen, 1984)

The delusions and hallucinations subscales of the SAPS were used. The SAPS is a semi-structured interview assessing the frequency and severity of hallucinations and delusions in the preceding month. Each category of hallucinations and delusions is rated on a six point scale, ranging from 0 (none) to 5 (severe). Based on these scores, global ratings for hallucinations and delusions are obtained (also ranging from 0 (none) to 5 (severe)).

2.2.2. Quick Test (QT; Ammons and Ammons, 1962)

Verbal intelligence was assessed using Form One of the QT, which is highly correlated with intelligence quotient (IQ) scores obtained on standard tests in schizophrenia participants (Frith et al., 1991). Participants are shown 4 pictures, and a list of 50 words is read aloud. Participants are asked to point to the picture that matches each word. The number of correct responses is used to derive an estimated IQ score.

2.3. Tasks

2.3.1. Beads task

Data-gathering bias was assessed using the probabilistic reasoning task ('beads task'; Garety et al. (1991)). Participants were shown two jars, one containing 85 red and 15 green beads, and the other 85 green and 15 red beads. The jars were removed from view. Participants were told that the experimenter would select and draw beads from one of the two jars. They were shown one bead at a time, in a predetermined order. The dependent variable (DV) was the number of beads seen (maximum of 20) before participants decided which jar the beads were being drawn from.

Table 1
Demographic information by hallucinator (H) and non-hallucinator (NH) group. Means (standard deviations) reported for parametric tests, medians (25th, 75th percentiles) for non-parametric tests.

	H	NH	Statistic
N	51	47	
Gender (% male)	60.8%	66%	Pearson's chi-square ($1, N = 98$) $= 2.82$, $p = 0.596$
Age	35.18 (8.82)	38.62 (11.54)	$t(94) = 1.7$, $p = 0.1$
Estimated IQ (Quick Test)	90.75 (12.10)	89.91 (13.58)	$t(95) = -0.32$, $p = 0.75$
SAPS Global Rating of Hallucinations	4 (3, 4)	0 (0, 0)	Mann–Whitney $U = 2397$, $P < 0.001$
SAPS Global Rating of Delusions	4 (3, 4)	3 (3, 4)	Mann–Whitney $U = 1597$, $P = 0.003$
Participants with a schizophrenia diagnosis (%)	37[a] (72.55%)	22[b] (46.8%)	Pearson's chi-square ($1, N = 98$) $= 6.76$, $p = 0.009$
Participants who have been in contact with services for 0–4 yrs (%)	10 (19.6%)	11 (23.4%)	Pearson's chi-square ($2, N = 98$) $= 1.19$, $p = 0.551$
Participants who have been in contact with services for 5–10 years (%)	17 (33.3%)	11 (23.4%)	
Participants who have been in contact with services for >10 yrs (%)	24 (47.1%)	25 (53.2%)	

[a] Non-schizophrenia diagnoses in the H group included schizoaffective disorder ($N =$ 5; 9.8%), bipolar affective disorder ($N =$ 3; 5.9%), delusional disorder ($N =$ 1; 2%), and psychotic illness ($N =$ 5; 9.8%).

[b] Non-schizophrenia diagnoses in the NH group included schizoaffective disorder ($N =$ 7; 14.9%), bipolar affective disorder ($N =$ 8; 17.0%), psychotic depression ($N =$ 3; 6.4%), and psychotic illness ($N =$ 7; 14.9%).