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Jumping to conclusions in psychosis: A faulty appraisal

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ABSTRACT

Schizophrenia patients, particularly those with current delusions, show a cognitive bias known as jumping to conclusions, defined as a decision made quickly on the basis of little evidence. The aim of this work was to examine the underlying mechanisms of this cognitive bias by means of the Picture To Decision Task, which allows one to analyse the effect of the context on decisions made. We compared the performance of this task by 42 psychotic patients, 21 siblings of these patients and 77 controls. The results of the current study suggest that, relative to siblings and controls, patients display a general tendency to jump to conclusions, characterised by overestimating the conviction in their choices at the beginning of the decision process and by a lowered threshold for making decisions in ambiguous contexts, where a greater amount of information is required. These results are interpreted in terms of faulty appraisal, which would be the first mechanism responsible for the Jumping To Conclusions bias. Theoretical and clinical implications are discussed.

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1. Introduction

Several studies have demonstrated that patients with schizophrenia show a reasoning bias known as jumping to conclusions (JTC), defined as a decision made quickly on the basis of little evidence. Schizophrenia patients, particularly those with current delusions, may overestimate and use less information to arrive at a decision in tasks that require them to integrate information to make a response (Huq et al., 1988; Moritz and Woodward, 2005; Moritz et al., 2007; Speechley et al., 2010). Similarly, JTC bias has been reported in close relatives of schizophrenia patients (van Dael et al., 2006) and individuals at a high clinical risk of psychosis (Broome et al., 2007), and it may be associated with higher levels of conviction in paranoid thoughts within the general population (Freeman et al., 2008; Lincoln et al., 2010).

Although there is no unified explanation of the origin of this cognitive bias, two specific formal hypotheses might be considered (Averbeck et al., 2011). The first hypothesis is that patients overestimate the conviction in their choices at the beginning of the decision-making process (Huq et al., 1988; Lincoln et al., 2010; Speechley et al., 2010). The second hypothesis is that they may have a lowered threshold for making decisions, and thus use less information in arriving at a decision, which is consistent with the so-called liberal acceptance account (Moritz et al., 2009; Veckenstedt et al., 2011).

The principal aim of this work is to contrast the two hypotheses cited above by means of a new version of the drawing to decision task. This task has been used previously in the study of another cognitive bias related to JTC called "bias against disconfirmatory evidence" (Moritz and Woodward, 2006) and comprises the metacognitive training program for schizophrenia patients (Moritz et al., 2011). Like the beads task (Huq et al., 1988), which is the task most used in the study of JTC, the principal dependent measures are the plausibility rating of each stimulus presented and the amount of information needed to reach a final decision about the identity of the depiction. These two measures are analysed in two kinds of trial ("cued" and "uncued"; that is, with and without interpretative cues). This is a specific characteristic of the task, allowing us to analyse the effect of the context in which the decisions are made.

Exploration of both hypotheses through the same task can contribute to extending the previous results about JTC bias in two ways. Firstly, they provide a unified explanation of the many proposed causes at the origin of this bias. Secondly, an analysis of the context will allow us to discover if this bias is only present when subjects have

Abbreviations: JTC, jumping to conclusions; DTD, drawing to decision; PR-1, plausibility rating at first stage.

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been instructed to derive their own interpretations about reality, or when the context of a decision has been previously defined by interpretative cues. Moreover, the results from all three groups (schizophrenic patients, their siblings and controls) can be compared to reflect the hypothesised order of liability to psychosis according to the studies cited above.

A second aim of this work is to explore associations between the Jumping To Conclusions parameters of our task, psychotic symptoms, executive functioning and theory of mind. Jumping To Conclusions and theory of mind are typically found to be associated with positive symptoms, and executive functions with negative symptoms. However, empirical evidence for these associations is often not well founded. Recently, Woodward et al. (2009) applied a multivariate approach to assess this pattern of associations. Their results suggest that the JTC bias is related to executive functioning and may be independent of theory of mind deficit and positive symptoms. In short, this is an open question towards which our study may provide new insights.

1.1. Participants

Overall, 140 subjects took part in the study. The clinical group was made up of 42 consecutive subjects attended in the in-patients unit who presented psychosis symptoms (DSM-IV: 295-297-298, and 296 with psychotic codes) (American Psychiatric Association, 2000). The sibling group comprised 21 subjects, while the control group consisted of 77 healthy subjects. None of the patients had been diagnosed more than five years earlier, a datum corroborated by the patients' clinical history and information provided by their relatives. All were inpatients from the psychiatry area of the "Complejo Hospitalario de Jaén" (Spain). All the participants also met the following exclusion criteria: absence of cerebral damage and no clinical evidence of drug abuse during the course of the study.

1.2. Procedure

Assessment of the patients' psychotic symptoms was carried out on their arrival at the Hospital. Each patient underwent a semi-structured interview that included the modules of psychotic symptoms and mood state of the Structure Clinical Interview for DSM-IV (First et al., 1997).

The presence and intensity of psychotic symptoms were assessed by means of the PANSS scale at admission to hospital (Kay et al., 1987). The PANSS has been validated in a Spanish population of schizophrenic patients (Peralta and Cuesta, 1994). Sibling and control groups were screened through the Mini International Neuropsychiatry Interview (MINI; Sheehan et al., 1998). We applied the five factor PANSS model described by van der Gaag et al.(2006).

All patients carried out the different experimental tasks on the discharge day. The Pictures Decision Task and The Degraded Facial Affect Recognition task were applied to the three groups (control, sibling and psychosis groups). The Hinting Task and The Attentional Network Task were applied only to the psychosis group.

1.2.1. Cannabis use

The consumption of cannabis was recorded using the L section of the International Diagnostic Interview (Robins, et al., 1988). We classified subjects as "heavy users of cannabis" when the frequency of use during the period of maximum consumption was daily or nearly daily for at least a month (Ruiz-Veguilla et al., 2009).

1.2.2. The Pictures Decision Task

Our experimental task is a version of the picture task created by Moritz et al. (2007). Six experimental trials, following two practice trials, were presented. Every trial consisted of a sequence of eight stages, each showing a common object that was increasingly disambiguated by decreasing degrees of visual fragmentation: new object features were added to each new picture until, eventually, the entire object was displayed in the final stage. The objects were depicted as post-edit simple black and white drawings. Instructions and trials were presented using a Microsoft computer. The trials were run in a fixed order: half the trials (1st, 3rd and 5th) were accompanied by six interpretative cues about the identity of the object displayed over the eight stages; we call these "cued trials". In these trials, participants chose one of the eight cues and their plausibility was then rated using a five-point Likert scale (1 = dismissed, 2 = unlikely, 3 = possible, 4 = likely, 5 = positive decision). In the remaining trials (2nd, 4th and 6th), no interpretative cues were provided (uncued trials) and the participants were instructed to derive their own interpretations, which were subsequently rated for plausibility in the same way as for the cued trials. Once a decision was made that met with the highest plausibility rating (pressing F5; positive decision), that trial ended and a new trial was presented. Examples of the task can be seen in Appendices 1 (cued trial) and 2 (uncued trial).

In this task, different parameters could be calculated and then used to provide further insight into the underlying mechanisms of JTC bias. Specifically, five parameters were calculated: Jumping To Conclusions at first stage (JTC-1), Plausibility Rating at first stage (PR-1), Draws To Decision (DTD), Time Response at first stage (TR-1) and Time Response for Draw To Decision (TR-DTD).

Jumping To Conclusions at first stage (JTC-1) was defined in at least one of the six experimental trials, with only the first stage being needed to decide with absolute certainty the identity of the particular object (by pressing "F5" = positive decision). This cut-off was adopted because it was considered to be the most definite expression of such a reasoning bias and because it is very similar to the parameters used in the Beads Task.

Plausibility Rating at first stage (PR-1) was defined as the mean plausibility rating at the first stage for cued and uncued trials (range 1 to 5). Hence, this parameter serves as a measure of the level of conviction of beliefs when there is only a little information, which serves a measure of the first hypothesis proposed in the introduction of this work.

Draws To Decision (DTD) was defined as the mean number of stages for cued and uncued trials necessary for the participant to reach a final decision about the identity of the objects with absolute certainty (range 1 to 8; the total number of stages per trial), which serves as a measure of the second hypothesis proposed. Finally, Time Response analyses (TR-PR1 and TR-DTD) were conducted in order to explore whether patients were faster than siblings and controls, which might reveal differences between groups for time response parameters. The results for the remaining experimental parameters could then be better explained in terms of impulsivity.

1.2.3. The Attentional Network Task

The Attentional Network Task (ANT) was used to assess the functioning of three attentional networks of the Posner's attentional model (alertness, executive control and orientation) (Posner and Petersen, 1990). The function of the executive control network is processing task-relevant information, and it is intimately associated with executive functions (Posner and Fan, 2005). The function of the orientation network is to select sensory stimuli, whereas the function of alertness is to obtain and maintain a state of vigilance. The task was to identify, as soon as possible, the direction in which an arrow appearing in the center of the screen was pointing (left or right). The efficiency of the three attentional networks was calculated from the latency of responses in the different experimental conditions. Each experimental session involved a practice block of 24 trials, and three experimental blocks comprising 96 trials each.

1.2.4. The Hinting task

Theory of mind was assessed with the Hinting task as described by Corcoran et al., in which an individual is required to infer real

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