Jumping to conclusions in psychosis: A faulty appraisal

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A B S T R A C T
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 schizophrenic 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...
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 symp-
toms 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 Neuropsychi-
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participants also met the following exclusion criteria: absence of
cerebral damage and no clinical evidence of drug abuse during the
course of the study.

1.2.1. Cannabis use

The consumption of cannabis was recorded using the I. 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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