Psychiatry Research 242 (2016) 67–74

Contents lists available at ScienceDirect

Psychiatry Research

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

Patients with schizophrenia are less prone to interpret virtual others' empathetic questioning as helpful

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ARTICLE INFO

Article history:
Received 20 January 2016
Received in revised form
13 April 2016
Accepted 17 May 2016
Available online 20 May 2016

Keywords:
Schizophrenia
Theory of mind
Empathy
Virtual agents

ABSTRACT

Individuals with schizophrenia are impaired in their neurocognition and present cognitive biases. These impairments may lead to a deficit in recognizing helping intentions of others. To investigate recognition of help, we designed a card-guessing game (Virtual Help Recognition Paradigm) involving two successive virtual agents asking questions to the participant at different moments of the game. These questions were either empathetic (i.e. on the subject's feelings) or non-empathetic (i.e. on technical aspects of the game). We assessed how much the participant felt that the virtual agent had helped him and, her attitude and personality traits. We measured how much the participant trusted the virtual agent with a monetary allocation procedure. Twenty individuals with schizophrenia and twenty healthy controls were recruited. The controls' ratings demonstrated that they interpreted empathetic questioning as helping and rewarded it positively with an increased monetary allocation. Participants with schizophrenia had a reduced perception of the differences between the two agents. Only the rating concerning the "interest/attention" of the agent toward these participants yielded significant differences among conditions. Hypothetically, individuals with schizophrenia take into account the fact they are the object of another's attention, but may fail to infer a helping intention and to behave accordingly.

1. Introduction

Providing care to individuals with schizophrenia requires establishing clinical relationship to improve the patient's health and to promote recovery. In clinical research, the term *clinical empathy* was coined to qualify the physician's ability to understand the patient's needs and suffering. It is consensually considered as a pivotal construct to describe clinical relationships and thought as a determinant of quality of medical care, and health outcome (Neumann et al., 2009). When asked about the current clinical encounter, patients who are affected by medical conditions rate as "important" the way their general practitioners understood their concerns, showed care, compassion, interest, and helped them take control (Mercer et al., 2011, 2004). Besides these different aspects of a caregiver's attitude, Hojat et al. (2002) underlined the importance of the ability to communicate an intention to help. Since the clinical empathy construct puts the focus on the clinician's skills, it may not account for situations in which the patient's receptivity to the clinician's empathetic behavior is impaired. Far from being anecdotal, such situations may be found in adult pathological conditions such as schizophrenia, characterized by profound impairments of the different dimensions of social cognition.

A wealth of experimental evidence is available showing that individuals with schizophrenia suffer from reduced real life functioning, at least partially caused by social cognitive disorders. There is in an ongoing debate on the different psychological constructs that participate to schizophrenic abnormal social behavior (Pinkham et al., 2014). Among the comprehensive reviews grounded on social neuroscience knowledge, both emotional perception and theory of mind are considered as key deficits (Brunet-Gouet et al., 2011; Green et al., 2015; Ochsner, 2008).

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http://dx.doi.org/10.1016/j.psychres.2016.05.022
0165-1781/

Meta-analyses focusing on facial affect recognition (Ventura et al., 2013), theory of mind (Sprong et al., 2007), and, generally, self-reported empathy (Achim et al., 2011) bring strong arguments in support of these views, especially in patients with negative or disorganized symptoms and reduced functioning (Fett et al., 2011). Within the scope of theory of mind deficits, it is worth noting that individuals with schizophrenia have reduced performances in the attribution of intentions to others. This may be demonstrated when patients are asked to infer the goal of a character in non-verbal tasks (Brunet et al., 2003; Sarfati et al., 1997a, 1997b), or hidden intentions in texts (Corcoran, 2003; Pinkham et al., 2016) and videos (Bazin et al., 2009). A study of 206 patients with schizophrenia cumulating the latter material and a semi-structured interview assessing communication skills (Bazin et al., 2005; Olivier et al., 1997) showed that the impairment in attributing intentions to others was significantly correlated with reduced capabilities to describe someone else's intentional states including the clinician's communicative intentions (Urbach et al., 2013). Hence, social cognitive disorders may also affect communication and, more generally, relationships between patients and caregivers. Though, to the best of our knowledge, the existing literature does not address the question of the determinants that modulate the recognition of another's help in individuals with schizophrenia.

Methodologically, the design of controlled experimental paradigms focusing on recognition of help raises some practical difficulties, as they require situations in which the subject receives another agent's help. Such a situation requires the subject to interact with another person, with a sufficient degree of realism, to interpret his/her helping intention. In previous work, we argued for the usefulness of virtual reality settings involving affective agents for the investigation and remediation of chronic mental disorders (Oker et al., 2015b). An original paradigm based on a card-guessing game allowed a second-person perspective interaction with a virtual agent, with satisfying measured levels of social presence. In healthy subjects, the virtual agent's emotional cues were considered as helpful for that they conveyed ostensive information to produce successful guesses (Oker et al., 2015a). From these researches, we concluded that simple card-guessing interaction was appropriate for eliciting complex social inferences including recognition of help, and to investigate the factors that modify these inferences.

2. Objectives and hypotheses

The present study investigates whether individuals with schizophrenia have a reduced ability to recognize other's help. Building upon previous studies based on a virtual card game, the paradigm (Virtual Help Recognition Paradigm) was modified to generate a feeling of uncertainty about the virtual agent's helping intention. The contrast between conditions during which the agent exhibited interest in the participant's feelings (empathetic behavior) or in technical aspects of the game (non-empathetic behavior) allowed to compare two levels of empathetic attitude. We recorded the effects of the condition after each game session on ratings of the virtual agent's behavior, including helping intention and empathetic attitudes. We also measured how much the participant trusted the virtual agent with a simplified monetary allocation procedure.

The preliminary objective concerned the methodological validity of the paradigm: in healthy participants, the agents' empathetic attitude compared with a non-empathetic behavior should be interpreted as helpful even in the absence of an improved performance at the card game. The helping intention should be "rewarded" with increased monetary allocation. Concerning patients with schizophrenia, our hypothesis stated that the difference between empathetic and nonempathetic agents would generate abnormal patterns of ratings. An ancillary objective consisted in finding putative correlates between recognition of help and scores in attribution of intentions, emotion recognition, self-reported empathy, attributional bias, or real-life functioning.

3. Material and methods

3.1. Participants

A population of 20 individuals with schizophrenia diagnosed by a trained psychiatrist according to DSM-V and 20 healthy controls (with no history of psychiatric or neurological condition) comparable for age, sex and educational level was recruited. All participants gave their written informed consent according to the regulations. The following inclusion criteria were applied: age greater than or equal to 18 and less than 65 years, French native language speaking. The following exclusion criteria were checked at the inclusion visit: coma history, epilepsy, head trauma with loss of more than 10 min of consciousness, electro-convulsive therapy during the past month, substance use disorders in the last six months, uncorrected hearing or vision disorders.

3.2. Materials

3.2.1. Clinical evaluation

An experienced psychiatrist evaluated symptoms with the Positive and Negative Syndrome Scale (PANSS) (Kay et al., 1987) and functioning with the Personal and Social Performance scale (PSP) (Morosini et al., 2000).

3.2.2. Cognitive assessment

The cognitive assessment used the following tools:

- An estimation of premorbid intelligence levels in French speakers (fNART), (Mackinnon and Mulligan, 2005);
- Questionnaire of Cognitive and Affective Empathy (QCAE): a 31-items empathetic dispositions scale rated on a 4-degrees Likert scale, which was designed for subjects with schizophrenia and distinguishes cognitive empathy and affective empathy (Reniers et al., 2011);
- Shortened version of Ambiguous Intention Hostility Questionnaire (AIHQ): the ambiguous situations were retained (situation number 3, 5, 8, 10, 13) and two scores were rated, Hostility Bias and Intentionality Score, from 1 not at all hostile (an accident) to 5 very hostile (the other person intended to hurt the subject) (Combs et al., 2007);
- Facial Expressions Recognition Test (TREF): this color-photographs material assesses the ability to recognize six universal emotions (joy, anger, sadness, fear, disgust, and contempt) (Gaudelus et al., 2015);
- Intention attributions to others (V-Comics): a comic strip task evaluating the 3rd-person perspective attribution of intentions (AI) and understanding of physical causality with characters (PC-Ch) or with objects (PC-Ob) (Brunet et al., 2003);
- Trustworthiness assessment: the participants had to indicate their level of trust while seeing for the first time a picture of the face of the virtual character on a 0–10 scale (refer to Adolphs et al., 1998 for a similar procedure).

3.3. Experiment: the Virtual Help Recognition Paradigm

3.3.1. Setting

The participants were seated in front of a personal computer