



Theory of mind and emotion processing training for patients with schizophrenia: Preliminary findings

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ABSTRACT

Impairments in social cognition are critical predictors of social functioning in patients with schizophrenia. Emotion processing (EP) and theory of mind (ToM) are hypothesized to influence real-world behavior more directly than basic cognition and represent important targets of intervention. The use of video scenes depicting human interactions could constitute an appropriate tool to enhance understanding of the characters' behavior and stimulate inferences on mental states. The aim of our pilot study was to evaluate longitudinally, with a controlled trial, the feasibility and the efficacy of a single-paradigm emotion recognition and ToM training designed for outpatients affected by schizophrenia, with the goal to create an ecological treatment, overcoming artificial laboratory biases, by the use of specific videotaped material. Fifty-two outpatients were randomly assigned to an EP and ToM video-based training ($n = 27$) or to a standard social cognitive rehabilitation treatment ($n = 24$). They were assessed before and after 12 weeks of intervention and compared to a time-matched control group ($n = 24$). Our results show a statistically significant improvement in ToM abilities, confirming the hypothesis of the enhancing potential of social cognitive interventions, but no changes with respect to EP; despite the need for a deeper examination, these data support further development of this treatment approach.

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1. Introduction

A wide array of everyday skills necessary to community living is markedly impaired in patients with schizophrenia (Bellack et al., 2007), and deficient functional outcomes frequently lead to deterioration of quality of life and disability (educational achievement, unemployment or underemployment, social isolation, increased medical morbidity, reliance on caregiver). Many patients exhibit a low level of community functioning even prior to the onset of the first psychotic episode and it generally worsens over the course of the disorder (Addington and Addington, 2000). Social disruption, besides being an important diagnostic criterion, is a treatment-refractory area of dysfunction in patients affected by schizophrenia; social difficulties manifest pre-morbidly and in remitted patients (Bora et al., 2008) and are often present in first-degree relatives of patients diagnosed with schizophrenia (Couture et al., 2006). Disentangling the determinants of poor functional outcome and defining the potentially treatable factors have become a fundamental goal of schizophrenia research.

Patients with schizophrenia have extensively demonstrated cognitive deficits, and several studies have related them to impairment in daily operations (Green, 1996; Green et al., 2000, 2001, 2005; Milev et al., 2005; McClure et al., 2007; Cavallaro et al., 2009; Penadés et al., 2010), although basic neurocognitive deficits account only for 10% to 40% of the variance in functional outcome (Pinkham and Penn, 2006; Fett et al., 2011). There is a growing consensus among researchers about the critical role of a cognitive domain that is deeply associated with social functioning (Brüne and Brüne-Cohrs, 2005). Cognitive processes involved in recognition and interpretation of social stimuli, commonly referred to as “social cognition” (Adolphs, 2001), show signs of mediating the relationship between basic neurocognition and functional outcome (Brekke et al., 2005; Addington et al., 2006). The multifaceted construct of social cognition refers to mental operations underlying social interactions, such as perceiving, interpreting and generating responses to intentions, dispositions and behaviors of others (Brothers, 1990; Fiske and Taylor, 1991; Kunda, 1999). Patients with schizophrenia manifest impairment in several aspects of social cognition (Brüne and Brüne-Cohrs, 2005; Penn et al., 2006), often early in the course of illness and even as prodrome. Among these, the abilities to decipher facially expressed emotions and to reflect upon one's own and other persons' mental state including desires, beliefs, knowledge, intentions and feelings (theory of mind or ToM; Frith and Frith, 2003) are particularly relevant. Emotional processing (EP) and ToM are hypothesized to influence real-world behaviors more directly than neurocognition and psychopathology (Penn et al., 1996; Couture et

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al., 2006; Gur et al., 2006; Pinkham and Penn, 2006; Mehl et al., 2010), and both accordingly rank as key predictors of impaired interpersonal functioning and as good targets for social cognitive intervention. Several experiments revealed the improving potential of social cognition targeted training, demonstrating that brief experimental manipulations as well as more intensive psychosocial interventions can enhance patients' social cognitive abilities (Horan et al., 2009), both through single function- and broad-based strategies of treatment (Kurzban et al., 2010; Kurtz and Richardson, 2011).

Facial affect recognition (EP) is enhanced by means of attentional shaping and monetary reinforcement (Penn et al., 2000; Combs et al., 2006), micro-expression training tools (METT: Russell et al., 2006, 2008) and training for affect recognition (TAR: Wölwer et al., 2005). Similarly, the introduction of verbalization and explicit manipulation of information about others' mental states significantly improved performance of patients affected by schizophrenia in a comic strip task assessing ToM skills (Sarfaty et al., 2000).

Among broad-based treatments, some interventions combine cognitive and social-cognitive training, such as integrated psychological therapy (IPT: Brenner et al., 1992) and cognitive enhancement therapy (CET: Hogarty et al., 2004). Twelve weeks of the social perception subprogram of IPT improved the perception and interpretation of social situations in 20 out-patients with schizophrenia relative to controls (Garcia et al., 2002).

Hogarty et al. (2004) tested the improvement of social cognition in patients with schizophrenia by a multidimensional and developmental approach that integrates computer-assisted training in neuro-cognition with social-cognitive group exercises focused on formation of problem solving skills aimed at real-life social dilemmas (CET, cognitive enhancement therapy). The experimental group obtained better results on social cognition and Social Adjustment scores compared with a group receiving state-of-the-art enriched supportive therapy.

Other rehabilitation programs incorporate multiple interventions, each designed for a specific domain of social cognition. Mazza et al. (2010) developed a group treatment based on observation of photos, paintings, figures and strips and imitation of facial emotion expressions. Sixteen out-patients with schizophrenia who completed the Emotion and ToM Imitation Training (ETIT), compared to a Problem Solving training group, improved on measures of emotion recognition, ToM, cognition, flexibility and social functioning. However, most of these studies relied on complex verbal descriptions or impoverished social stimuli that are far from real human relations. Video scenes showing interactions between human beings have been considered more ecological stimuli than comic strips and powerful enough to detect ToM abnormalities in patients affected by schizophrenia (Bazin et al., 2009). Videotape has been used by several authors for assessment of social understanding and problem solving skills in schizophrenia (Kayser et al., 2006), but it is currently utilized for training purposes only by relatively few research groups and could constitute a promising tool of social cognition enhancement. Penn et al. (2005, 2007), Combs et al. (2009), Roberts and Penn (2009), and Roberts et al. (2010) developed the social cognition and interaction training (SCIT), a 20-week intervention package targeting dysfunctional social-cognitive processes which includes specialized videos among stimuli and addresses several aspects of social cognition: EP, ToM and attributional bias (AB). The SCIT consists of three phases: 1) emotion training (defining emotions, emotion mimicry and understanding suspiciousness), 2) figuring out situations (social cognitive biases) and 3) integration (putting into practice in real life what has been learned). It includes videos, photographs and computerized stimuli and the general goal is to train patients to become better "social detectives". An uncontrolled pilot study (Penn et al., 2005) that was conducted on seven inpatients showed improvement attributable to the SCIT in AB and ToM but not in EP; in a subsequent study (Combs et al., 2007a) a SCIT modified intervention was administered to 18 inpatients and demonstrated to enhance ToM and EP compared with treatment as usual (TAU). In a quasi-experimental study recently

conducted study (Combs et al., 2009), the authors evaluated a sample of 31 out-patients receiving SCIT plus TAU vs. a TAU-only group; SCIT participants significantly improved on the facial EP task but not on the other two targeted functions. Roberts et al. (2010) also performed a SCIT feasibility study in a community setting with positive findings.

In spite of these positive findings, it remains unclear how the multi-component stimuli adopted weigh on the different results and how many outcomes reflect basic neurocognition changes or on symptomatology. Therefore, Horan et al. (2009) conducted a randomized controlled clinical trial on 31 outpatients with psychotic disorders assigned to a new 6-week intervention designed to train four domains (facial EP, ToM, AB and social perception (SP) or to a time-matched control condition (illness self management and relapse prevention skills training); social cognitive intervention consisted of newly developed didactic presentations and exercises that incorporated digitized still photos, sets of written vignettes that describe different social situations and film clips drawn from existing sources, SCIT included. Individuals who received the social cognitive intervention showed significant improvement in EP skills, not attributable to changes in basic neurocognition nor symptomatology.

Due to the "embedded nature" of training procedures within multi-component programs, it is difficult to attribute specifically any intervention effects to the sub-modules of treatment and to differentiate among the achieved results all individual contributions owing to each type of stimuli. Moreover, the possibility of incurring artificial laboratory bias is existing as the didactic method applied is not ecological, far from the abilities carried out during normal daily interactions. The advantages of using film clips as single and ecological rehabilitation paradigm allowed to work in the context of "social attunement" (Stanghellini and Ballerini, 2002; 2011a; 2011b), a concept borrowed from phenomenology which indicates an immediate, pre-reflexive and anti-predicative ability to make emotional contact and understand intuitively the mental manifestations of others. In movies, indeed, the process of attunement is facilitated by the convergence of structural and thematic elements (framings, visual details, speech prosody, colors and music, speed of action, etc.) on the construction of scenes' meaning. Coherently, as shown by Mazza and colleagues and in the frame of the Embodied Simulation Theory of ToM (Gallese and Goldman, 1998), the observation and understanding of emotions and interactions can induce changes in social cognition anomalies of patients affected with schizophrenia.

The usefulness of video as single stimuli has been shown by Kayser et al. (2006). The authors trained 8 schizophrenic patients to analyze videos, chosen from recent French cinema movies, paying particular attention to the characters' mental states. Despite the ToM training shortness, 12 short video scenes presented in two sessions, the video group significantly improved in communication abilities and intentions attribution measures.

These encouraging disclosures resulting from various studies point out some limits (sample size, training brevity, absence of time-matched active control group, recruitment of inpatients, failing in improving all targeted social abilities) and the variability in treatment stimuli makes the comparison difficult, but if taken together they highlight the feasibility of effective treatments and support further efforts in this direction.

Therefore, the aim of our pilot study was to evaluate longitudinally, with a controlled trial, the feasibility and the efficacy of a single-paradigm emotion recognition and ToM training designed for schizophrenic outpatients, with the goal to create an ecological treatment, overcoming artificial laboratory biases, by the use of specific videotaped material and to evaluate the effect of a single paradigm on different targets of intervention.

2. Methods

2.1. Subjects

Seventy six outpatients were recruited from the Department of Clinical Neurosciences, San Raffaele Hospital, Milan. They all met DSM IV-R criteria for schizophrenia, as

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