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NARRATIVE DEFICITS IN SCHIZOPHRENIA

We propose that the central issue in schizophrenia is deficits in narrative self-knowledge, and subsequent difficulties in imposing narrative meaning on personally important events, related emotions and motives, as well as on the behaviors and psychic states of the partners. The more personal the events, the more vivid and severe are these difficulties. Our experiments show that schizophrenia is related to a lower elaboration of self-knowledge. Elaboration was measured as the strength of effect of self-reference coding on incidental recall (Rogers, Kuiper & Kirker, 1977). In accordance, schizophrenia is related to lower narrative understanding of personal events, an effect revealed in poorer narrative structurization of memories of personal stories, as well as in imagined hypothetical situations of personal relevance. Schizophrenia relates to lower structurization of simulated narrative understanding of events by the partner. Schizophrenia elaboration of self-knowledge seems to mediate in lower narrativity of personal memories, as well as of stories imagined from own and partner's perspective.

Introduction

According to many clinical psychologists and psychotherapists, a strategic factor in schizophrenia disorders is incoherent and vague self-knowledge and self-identity (Kernberg, 1975, 1984; Laing, 1987; Laing & Esterson, 1976). In an introduction to the description of schizophrenia in DSM-IV (1994) and ICD-10 (1993), we find a general observation that a schizophrenic person differs from others – first of all – by an impaired sense of own individuality and autonomy. Very often psychologists dealing with the therapy of schizophrenia indicate as the leading factor in development of schizophrenia a lack of stable and socially supported self-identity that results in inability to understand oneself and partners and to share experiences with them. (Anderson, Reiss, & Hogarthy, 1986; Atkinson, 1986; Bellack, Mueser, Gingerich, & Agresta, 1997; Benedetti & Furlan, 1993; Laing, 1973; Sullivan, 1947). These hypotheses come from clinical practice and are not yet tested within an experimental paradigm.

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On the other hand, recent data point to deficits in general cognitive functioning as the main characteristics of schizophrenia (Heinrichs & Zakzanis, 1998). Memory impairments, primarily long-term, are often found in schizophrenia (Saykin et al., 1994). Deficits in long-term memory are associated with a vocational outcome, community functioning, and quality of life in schizophrenia (Green, 1996; Green, Kern, Braff, & Mintz, 2000). Several reports have described a slowing of processing speed in a number of cognitive tasks as a major cognitive deficit in schizophrenia (Nelson et al., 1990; Schatz, 1998; Van der Does, Dingemans, Linszen, Nugter, & Scholte, 1996). Bre`bion, Amador, Smith, & Gorman (1998) and Bre`bion et al., (2000) concluded that memory deficits in schizophrenia may be partly accounted for by a slowing of processing speed. Although the detailed pattern and underlying factors of these cognitive deficits are not presently known, all of them seem to have a content- and context-free character.

The challenging question is the relationship between these general cognitive deficits – probably due to neurological factors – and low elaborated self–knowledge, as crucial characteristics of schizophrenia. Studies presented below do not address this question directly, being limited to experimental observations of the relationships between elaboration of self-knowledge and schizophrenia and to an inquiry into the underlying mechanism. The analyses concern self-narratives which are especially important and common forms of understanding self-related situations and problems, and which should be particularly affected by the elaboration of self-knowledge. Our general hypothesis is that non-elaborated self-knowledge causes severe deficits in narrative understanding of the self and partners, and these deficits are important factors in the development of schizophrenic disorders[1].

Schizophrenia and deficits in self-narrative knowledge

An individual understands events and oneself by imposing a narrative form on incoming stimuli (Bruner, 1984, 1991; Sarbin, 1986). Within a narrative frame reality is understood in terms of plots composed of characters and their intentions and problems they meet when trying to realize these intentions (Bruner, 1991; Mancuso & Sarbin, 1983; Trzebiński, 2002a). Narrative knowledge seems to be a major, and the earliest, learned form of memory organization (Bruner & Lucariello, 1989; Nelson, 1989, 1993; Schank & Abelson, 1995). In self-narratives the self plays the role of the main character in personal histories. Self-narratives seem to be the primal and earliest form of self-identity and understanding of important personal matters. (Gergen & Gergen, 1984; McAdams, 1989; 1999; Polkinghorne, 1991; Trzebiński, 2002b). Knowledge which takes part in and regulates processes of self-narrative understanding, itself has a narrative structure. It enables one to "read" personally important events as stories, and oneself as their main character with specified ideals, goals, emotions and possibilities of action. Others are considered within such a framework as partners in a story (Gergen & Gergen, 1986). Narrative self-knowledge organizes self-identity proc-

[1] In the studies presented below I have collaborated with my students, Małgorzata Frankowska and Agnieszka Czechowska, with cooperation of The Psychoneurological Institute of Warsaw Medical University.

esses in comprehensible and socially understandable ways (Crites, 1971; McAdams, 1989). Data indicate (McAdams, 1999; Michenbaum & Fitzpatrick, 1992; Trzebinski, 1998; Trzebiński, 2002b) that, within a narrative framework, the individual's life domains and life as a whole become subjectively more meaningful. These meanings may be successfully negotiated with partners and supported by them. Close partners' self-identities have mostly narrative form and mutually shared contents. Narrative-based motivations and actions may be partly independent of situational pressures, oriented toward more distant goals and more predictable from partners' perspectives. The more narrative is a given person's understanding of personal events and life tasks, the more coherent are this person's goals, and the more effective the realization of these goals, at least in a stable environment.

We assume that the level of elaboration of narrative self-knowledge is a crucial factor in schizophrenia disorders. Lower elaboration of narrative self-knowledge leads, consequently, to deficits in narrative understanding of oneself and partners (Greenberg, 1994). Schizophrenia may result from pervasive difficulties in imposing narrative meaning on own emotions and intentions, as well as on relations with the social environment in domains of personal importance. Consequently, a schizophrenic person has troubles in understanding partners, both their behaviors toward himself or herself and their psychic processes. Being unable to understand himself or herself when interacting with another person also means inability to understand the partner, mainly because of problems with differentiation of own and the other person's thoughts, emotions and attitudes toward the event. Also, a schizophrenic individual should be unable to simulate mentally his or her partner's narrative understanding of the partnership relations and the surrounding events. Hence, a schizophrenic person is impaired when attempting to communicate own experiences and needs to others and to understand their experiences and needs. Whatever the basis of these narrative deficits and difficulties, they reinforce the spiral of schizophrenia, because they separate a person from others and block their help.

We have attempted to verify four hypotheses derived from the above assumptions:

1. Schizophrenia is related to lower elaboration of self-knowledge. The level of self-knowledge elaboration is indicated by the strength of the effect of self-reference coding on incidental recall (Kuiper & Rogers, 1979; Rogers, Kuiper, & Kirker, 1977). We expected that schizophrenic patients would reveal a weaker self-reference effect in comparison to the general population.

2. Schizophrenia is related to lower narrative understanding of personal events. This effect will result in worse narrative structurization of memories of personal histories as well as of imagined hypothetical situations.

3. Schizophrenia results in a lower structurization of simulated narrative understanding of events by the partner.

4. Elaboration of self-knowledge plays an important mediating role both in the case of self-narratives and of partner's simulated narratives. The weaker the effect of self-reference coding on remembering, the weaker the narrative structurization of remembered and imagined personal histories, as understood from own and partners' perspective.

Experiment 1

The aim of the first study was to verify if schizophrenia is related to a lower narrative structure of self-related memories.

Method

Age and level of education matched schizophrenic patients of a Warsaw psychiatric public hospital ($N = 30$) and control subjects ($N = 30$) from the accident department of another public hospital in Warsaw participated in an individually arranged study. Schizophrenia patients were diagnozed according to DSM IV instructions and were recommended for the research by a hospital psychologist as persons with good contact with others, without cognitive impairments and drug abuse. All participants were assured that the research had only scientific objectives, and were not related to hospitalization.

Subjects were asked to describe a well-remembered personal history that happened during the last year. Each individual was given a pen and paper and asked to describe the history up to the next day. The following day the descriptions were collected and given to two blind judges who separately evaluated them on a narrative scale. Another person calculated the number of nouns, adjectives and verbs used in each description. The judges were given a description of the narrative structure of a text, and a description of a 5-point scale. They had passed training in using this scale on material collected in a pilot study. They were instructed that the narrative structurization of a history is higher the more coherent and clear the characters' motives and the plot which is a problem or a trouble which preoccupies the characters with these motives. Correlation of scores by the two judges was high (Pearson's $r = 78$). The narrativity index for a subject was calculated as the sum of the two scores with a range of 0-10.

Results

The number of words in a description measured the richness of vocabulary which was analyzed as a potential underlying factor responsible for expected differences in narrativity between schizophrenic patients and non-schizophrenics.

A 2 (schizophrenic vs. non-schizophrenic subjects) x 2 (high vs. low number of words) analysis of variance (ANOVA) on narrative scores yielded a strong main effect of schizophrenia, in which schizophrenic patients scored lower ($M = 4.75$, $SD = 1.29$) than non-schizophrenics ($M = 7.23$, $SD = 1.36$), $F(1, 58) = 22.45$, $p < 0.001$. The results are illustrated in Figure 1.

The main effect of vocabulary was not significant, $F(1,58) = 1.02$, $p < 0.10$, neither was schizophrenia x vocabulary interaction, $F(1,58) = 0.36$, $p < 0.10$. An additional analysis did not yield a significant difference between schizophrenic and non-schizophrenic patients in the number of words used in descriptions: $M = 21.44$, $SD = 2.29$ vs. $M = 23.08$, $SD = 2.36$; $F(1, 58) = 1.13$, $p < 0.10$. Overall, the results indicate a lower narrative structurization of personal histories written by schizophrenics in comparison to non-schizophrenic patients and show that this difference is not related to the number of words used in descriptions.

Figure 1. Narrativity and vocabulary of personal stories written by schizophrenic and control patients

Experiment 2

To what extent is the above effect related to the level of elaboration of self-knowledge?

We suppose that, if the observed narrative deficits are pervasive and relate to important domains of a person's life, they are caused by characteristics of self-knowledge. Therefore, we expected that the level of elaboration of self- knowledge would be lower in schizophrenia than in the general population, and related to the level of narrativity of personal histories. The next study addressed this expectation.

Method

Age, sex and level of education matched 25 schizophrenic patients and 25 control subjects participated in an individually scheduled study. The procedure for acquiring patients for the experiment was similar to that used in the former study and were hospitalized in the same psychiatric unit. The controls were acquired among students from the Warsaw area.

Subjects were asked to describe a personal history that had happened during the last two years and which he or she well remembers. After finishing the description, the subject was given successively two lists of 30 adjectives on each. In each case the subject was instructed to read the words carefully, then, in one case, to choose 8 adjectives which describe most accurately the history just described and, in the other, to choose 8 adjectives that associated best with the notion of "a forest". The order of

presentation of the lists was randomized across subjects. Next, the subjects performed a simple anagram test that took around 15 minutes, and then were asked to recollect and to write down on a page as many words as they remembered from the first, and then, the second list.

A measure of elaboration of self-knowledge

To measure the level of self-knowledge elaboration, we used a paradigm of studies on the role of self-reference in the coding process on subsequent recall of the material (Kuiper & Rogers, 1979; Rogers, Kuiper, & Kirker, 1977). It has appeared in many studies that self-reference enhances incidental memory for stimuli as compared to other non-self references. This "effect of self-reference on recall" is explained by the relatively higher level of elaboration of self-knowledge in comparison to other systems of knowledge. The more elaborated a given knowledge system, the deeper the stimuli processing during coding (Craigh & Lockhart, 1972), and therefore better memory, including incidental memory, for the stimuli processed within a frame of this system. Self-knowledge, at least in our culture, is highly elaborated and this fact is responsible for the widely observed effect. In our study, in agreement with Roger, Kuiper and Kirker's (1977) conceptualization, strength of the self-coding effect on memory was measured as the number of properly recollected words from the self-related list as compared to the number of recollected words from the neutral (a forest) list. The higher the first number of words, as compared to the second, the stronger the effect, and therefore the better elaboration of self-knowledge.

Scores of narrativity

As in the previous study, narrativity of personal histories was assessed by two independent and blind judges who were trained in evaluation of subjects' descriptions on four 5-point scales: (a) global narrativity measured in the same way as in experiment 1, (b) the importance of the main character (a subject) in ongoing events of a history, (c) articulation of emotions of the character, (d) level of arrangement of the temporal and cause-and-effect sequence of the events. There was a high internal consistency of these four scales (Cronbach's alpha = 0.67) and high inter-judge correlation of scores: Pearson's r from 0.83 to 0.89. A subject's index for each narrative measure was calculated as the sum of the scores from the two judges.

Results

A 2 (schizophrenia vs. controls) x 2 (type of coding reference: the self and a forest) analysis of variance (ANOVA) were the dependent variable was the number of recalled words yielded significant main effects of schizophrenia ($F(1,48)=17.45$; $p<0.0001$), and type of reference ($F(1,48)=5.17$; $p<0.02$). However, these effects are explained by the strong interaction of these two factors: $F(1,48)=20.68$; $p<0.0001$). As shown in Figure 2, among schizophrenic patients no self-reference effect can be detected, but this effect is quite strong among controls.

The result shows that incidental memory for words among schizophrenic patients is lower than among non-schizophrenic, and besides this fact schizophrenic patients

Figure 2. Number of words recalled by patients and control subjects in dependence on the frame of reference during coding

display a much weaker self-reference memory effect than control subjects. In fact, in this study this effect was not detectable among schizophrenic patients. We consider this result as an indicator of a significantly lower elaboration of self-narrative knowledge in schizophrenics as compared to the general population.

The next questions deal with the level of narrativity in histories seen by schizophrenia patients and control persons and with the role of self-knowledge elaboration in the above difference. A score of the relative strength of self-reference coding was calculated as a ratio of the sum of words remembered from the self-reference list to the sum of words remembered from the neutral reference list. The higher the score, the relatively stronger the self-reference effect. To create a second factor in the ANOVA, the subjects were divided on those with high vs. low self-reference memory, on a median basis.

A 2 (schizophrenia vs. controls) x (low vs. high self-reference effect) analysis of variance (ANOVA) was performed on four indices of narrativity of personal descriptions as dependent variables. In all four cases, ANOVA yielded strong schizophrenia effects. As Figure 3 indicates, descriptions by schizophrenic patients vs. by controls are less narrative $F(1,42) = 37.51$, $p < 0.0001$, their main character plays a less important role $F(1,42) = 33.86$ $p < 0.0001$, articulation of the character's emotions and motivation is lower $F(1,42) = 27.82$ $p < 0.0001$, also the level of sequence of history events is lower $F(1,42) = 26.18$ $p < 0.0001$.

These data provide clear support for the results of the previous study. To analyze the role of the strength of self-reference effect for narrativity we first checked the

Figure 3. Narrativity of stories written by patients and control subjects

correlation between these variables. All correlation between the score of self-reference effect and four indices of narrativity of personal histories was significant and positive: for global narrativity: $r = 0.41$, $p < 0.005$; importance of the character $r = 0.32$, $p < 0.03$; elaboration of emotions and motives $r = 0.45$, $p < 0.002$; arrangement $r = 0.40$, $p < 006$. These correlations suggest that the level of elaboration of self-structure – at least the part of it pertinent to a given personal history – is positively related to narrative structurization of the cognitive representation of this history.

However, a more detailed view on this relationship was provided by analyses of variance. As expected, in the case of all indices of narrativity, ANOVA yielded significant main effects of the self-reference recall: global narrativity $F(1,42) = 37.52$, $p < 0.0001$; importance $F(1,42) = 33.86$, $p < 0.0001$; elaboration of emotions and motives $F(1,42) = 27.82$, $p < 0.0001$; arrangement $F(1,42) = 26.18$, $p < 0.0001$. More importantly, ANOVA yielded also significant effects of interaction of schizophrenia x strength of self-reference recall: for narrativity $F(1,42) = 4.07$, $p < 0.05$, for character importance $F(1,42) = 6.71$ $p < 0.01$, for elaboration of emotions and motivation $F(1,42) = 3.32$ $p<0.07$, for events' orderliness $F(1,42) = 3.71$ $p < 0.06$). These interactions seem to explain all observed relationships. As Figure 4 shows, different aspects of narrativity relate positively to the strength of self-reference memory but especially, or even only, among schizophrenic patients.

The results support the hypothesis that the level of elaboration of self-knowledge is an important factor mediating in the observed lower self-narrative competency in schizophrenia.

It appeared that schizophrenic patients, in comparison to the general population, reveal lower elaboration of the self-structure, as measured by strength of the self-reference memory.

This corresponds with schizophrenics' sharply diminished capacity for narrative structurization of personal histories that indicates difficulties in narrative understanding of personally important events and problems. Moreover, among schizophrenia patients, the less elaborated the self-knowledge, the less narrative the descriptions of personal histories. The last mentioned relationships were not observed among the control subjects. This fact may probably be explained by restricted impact of self-knowledge elaboration on narrativity: it may facilitate narrativity up to some level, but beyond it, the role of elaboration is diminished and its further increase is not correlated with higher structurization of self-narrative understanding. This problem will be addressed below in the general discussion.

Experiment 3

It is commonly observed that schizophrenic persons have trouble with developing close interactions and maintaining intimate communication within the family and with friends. They also have problems in establishing close relationships with a new partner. As clinicians suggest, this caused in part by difficulties in interpretation of others' actions and mental processes. Some of them suggest also that these difficulties are consequences of more severe deficits in self-knowledge organization and impairment in self-understanding. Partners are understood mainly from the perspective of their role in the person's plans, motives and actions or their role in events that are important for that person. If there are difficulties in narrative understanding of one's own plans, motives and actions, the understanding of others is vague and incoherent as well.

The main objective of the third experiment was to check whether lower self-narrative competency in schizophrenia corresponds with lower narrative understanding of partners and if these later deficits are related to the lower self-knowledge elaboration in a schizophrenic person. Besides this objective, we have tried to provide a less emotional context and more standardized content constraint on personal histories to be described by the subjects.

Method

Age, sex and level of education matched 22 schizophrenic patients and 22 control subjects who participated in an individually scheduled study. The patients were hospitalized in the psychiatric unit of a Warsaw public hospital; controls were recruited from students in a continuing education program in the Warsaw area. As in our former two studies, the patients were recruited under the supervision of a hospital psychologist who knew them for a longer time and was familiarized with the experimental tasks. Only patients with no cognitive, emotional or communication disturbances took part in the study. Subjects were explained that the research had only scientific purposes and, in the case of the patients, were assured that the collected material would not relate to the hospitalization and would be kept from the hospital personnel.

Figure 4. Different aspects of narrativity of stories written by patients and control subjects in dependence on elaboration of self-knowledge

At the beginning a subject was given two lists with adjectives similar to ones given in experiment 2 except for the number of words – now there were 20 words. As in the former experiment, the subject had two tasks. In the case of one list he or she was asked to mark 8 words that best described him or her, and in case of the other list the task was to mark 8 adjectives that most adequately described best liked personality traits, according to the subject. Task order was randomized across subjects. The procedure of self-reference coding of adjectives was similar to that originally used by Rogers and collaborators: the reference was the self "in general". It would allow observing the self-reference effect in schizophrenia vs. general population by exactly the same procedure as the original and most widely used one.

After finishing this task the subject was asked to write four stories that fit two specified interpersonal scripts. In one case the subject was asked to imagine and describe a story where a close person unexpectedly becomes unpleasant to the subject. In another case a different close person becomes suddenly exceptionally nice and helpful to the subject. The subject was instructed that the story should tell why it had happened, and how it had ended. After writing each story, the subject was asked to imagine the same story from the perspective of his or her partner and to rewrite it accordingly. Writing all four stories took approximately 30 minutes. At the end, the participant was asked to recall and write down all the words he or she remembered from the first and then from the second list provided at the beginning. We assumed that the hypothetical nature of the stories would result in a lower level of emotions related to personal problems. This was a factor worth noting, especially in the case of schizophrenic patients.

The narrativity of the descriptions was evaluated independently by two blind judges who were trained in evaluation procedure consisting of five scales: (1) general narrativity, (2) importance of the main character in the story, (3) articulation of character's emotions, (4) clarity of the character's motive, (5) level of distinction of the main character from the partner in terms of content of emotions, motivation and thoughts. All scales had 5 points. The inter-judge correlation was high and ranged from r Pearson 0.76 to 0.86. The subject's narrativity index on each scale was calculated as the sum of scores given by two judges. The self or the partner was considered as the main character of the story, depending on the perspective required in the story construction. Two stories were written from own perspective and their two versions written from the partner's perspective. Analysis did not yield significant differences between the two thematic constraints (unexpected unpleasant vs. pleasant behavior of the partner) for the dependent variables.

Results

A 2 (schizophrenia vs. controls) x 2 (coding reference) was performed on the number of recalled words. ANOVA yielded a strong significant main effect of both factors (schizophrenia: $F(1,42) = 14.60$, $p < 0.001$; coding reference: $F(1,42) = 14.45$, $p < 0.001$) but the most important factor was their interaction: ($F(1,42) = 8.81$, $p<0.004$).

Figure 5. Number of words recalled by patients and control subjects in dependence on the frame of reference during coding

As indicated in Figure 5, the results are in agreement with those obtained in experiment 2. Schizophrenic patients recalled fewer words then controls, and self-reference words were better recalled, but mainly the self-reference memory effect revealed clearly among controls was detectable among schizophrenic patients.

Schizophrenia and narrativity of stories written from own and partner's perspective. It was expected that narrativity in schizophrenia would be lower than in general population not only in the case of stories seen from own perspective but also from that of the partner. It was expected also that the level of self-knowledge elaboration would be a mediating factor in the lower narrativity of both kinds of stories, at least among schizophrenic patients.

A 2 (schizophrenia) x 2 (types of perspective) x 2 (level of self-elaboration) analysis was performed on five scores of narrativity. The level of self elaboration was measured as the relative strength of the self-reference memory (calculated in the same way as in experiment 2), and has two values: low vs. high self elaboration. As expected, the ANOVA yielded a strong main effect of schizophrenia for 5 scores of narrativity: global narrativity $F(1,40) = 27.66$, $p < 0.0001$, importance: $F(1,40) = 29.33$, $p < 0.0001$, elaboration of emotions: $F(1,40) = 46.76$, $p < 0.0001$, clarity of a motivation: $F(1,40) = 65.78$, $p<0.0001$, distinctiveness of the character: $F(1,40) = 34.99$, $p<0.001$. Results strongly support the former observations: schizophrenia relates to lower narrativity of personal-related histories.

The more important question was, however, whether this is limited only to own version of the history or if this effect is revealed also in the case of an imagined partner's vision of the same history. The ANOVA results support the second possibility.

For the two scores of narrativity: (a) importance of the character and (b) articulation of emotions, the narrativity in schizophrenia is even lower in the case of the partner's imagined vision of a story than in that of own perspective. No such difference is significant for the control subjects. The effects of interaction of schizophrenia and perspective are significant for the first score: $F(1,40) = 4.58$, $p < 0.04$ as well as for the second score: $F(1,40) = 5.32$, $p < 0.02$. The results are illustrated in Figure 6.

For the next three scores of narrativity the interaction of schizophrenia and perspective is nonsignificant: for global narrativity $F(1,40) = 0.26$, $p = 0.58$, for clarity of motives $F(1,40) = 0.91$, $p = 0.28$, for distinctness of the character $F(1,40) = 0.68$, $p = 0.42$, which means that narrativity of personally relevant stories in schizophrenia is lower than for the general population, and it does not depend on the perspective on the story.

In conclusion, these results show that schizophrenic patients, as compared to the general population, reveal lower narrative ability in understanding personally important events as well as the partner's possible way of narrative interpretation; for the latter kind of understanding, the difference between schizophrenia and the normal population seems to be even greater.

Elaboration of self-knowledge, perspective of imagining a story and narrativity of this story

It was expected that the level of elaboration of self-knowledge, measured by the strength of self-reference memory, is positively related to the level of narrativity of personal stories and that, particularly in the case of schizophrenic patients, the lower elaboration will relate to lower narrativity. Moreover, this mediating role of self-knowledge elaboration should occur in the case of personal also stories seen from own point of view as well as the simulated vision of the partner.

As for the results of experiment 2, the correlation between the strength of self-reference memory and all scores of narrativity were positive and significant both in case of own perspective and that of the partner (Pearson's r ranged from 0.32 to 0.56 across the scores). However, it is ANOVA that revealed the true character of these relationships.

The 3 factor ANOVA does not yield a significant main effect of self-reference recall on any narrativity score, but significant – although marginally in some cases – are the effects of interaction of schizophrenia and self-elaboration on all narrativity indices: global narrativity $F(1,40) = 3.41$, $p = 0.07$, importance of a main character: $F(1,40) = 4.10$ $p = 0.07$; articulation of main character's emotions $F(1,40) = 5.11$, $p = 0.05$, clarity of motives: $F(1,40) = 2.77$ $p = 0.10$; and distinctiveness of the main character: $F(1,40) = 5.16$, $p = 0.02$. However, ANOVA does not reveal 3- factor interaction, where perspective joins schizophrenia x level of self-elaboration factors. The pattern of differences for all five scores of narrativity shows that, independently of the perspective imagining a given story (self vs. partner) there is a consistent relation observed among schizophrenic persons: the lower their self-reference recall, the lower the narrativity of their stories. No such difference is significant for the control subjects. The result is congruent with the data from experiment 2, and, moreover, confirms the hypothesis that elaboration of self-knowledge affects not only self-under-

Figure 6. Main character importance and articulation of emotions in stories written by patients and control subjects, in dependence on the perspective of imagining the story

standing but also understanding others. The relationships between schizophrenia, self elaboration and type of perspective is exemplified in Figure 7 showing articulation of emotions of the main character (self vs. partner).

In conclusion, the level of elaboration of self-knowledge seems to explain consistent differences between schizophrenic patients and the general population in the quality of narrative interpretation of personally relevant events seen both from own perspective and the imagined perspective of the partner. Self-knowledge elaboration drops sharply in schizophrenia as compared to the general population, and this factor is negatively related to the measured aspects of narrativity of stories with a personal content, no matter if they are understood by oneself or understood as a cognitive simulation of the partner's narrative interpretation of the same events.

General discussion

The results support the hypotheses about narrative deficits in schizophrenia and their underlying mechanism. The data show consistently that narrativity of personal stories is sharply lowered in schizophrenic individuals as compared to the general population. This difference is revealed both in the recall of stories and in the mental simulation of hypothetical personal stories. Moreover, this difference is not restricted to self-narratives. It is also revealed in simulated narrative understanding by a partner of events in a personal story: the partner's perspective on the story has also a weak narrative structure in schizophrenia.

Experiments 2 and 3 provide other important observations. Self-reference recall is lower in schizophrenic patients than in the general population. This incidental memory effect is widely observed in the general population and is considered an indicator of higher elaboration of self-knowledge in relation to other knowledge systems of an individual. We have used the relative level of self-reference recall as an indicator of the level of elaboration of self-knowledge. The results of experiments 2 and 3 suggest that the elaboration of the self-structure is substantially lower in schizophrenia than in general. This fact may indicate a psychological mechanism involved in schizophrenia disorders. An individual's self-knowledge is a central factor in the narrative understanding of personal tasks and problems and in planning their realization and solution. It is a main factor in understanding and regulating interpersonal behavior. The results of experiments 2 and 3 confirm our hypotheses that lower elaboration of self-knowledge and impairment in narrative understanding of personal situations and those of partners in schizophrenia are strictly related. Self-reference recall and narrativity of personal histories were both lower in schizophrenia than in the general population, and the first factor was positively related to narrativity in schizophrenia.

This last relationship was not observed among control subjects probably for two reasons, both procedural. The first one is that the control subjects had a relatively high level of self-knowledge elaboration, and probably this factor facilitates narrativity up to some level beyond which the role of elaboration is diminished and a further increase is not correlated with higher structurization of self-narrative understanding.

Figure 7. Articulation of emotions of a main character in stories written by patients and control subjects depending on level of elaboration of self-knowledge and perspective of imagining the story

The second possible reason is an insufficient variance in the level of self-referenced recall within control subjects. It may be assumed, however, that in both cases more subtle indices of narrativity and more complex self-relevant events and problems to be understood will allow for detecting the above relationship across a full range of the self-elaboration level.

The results support our assumption that narrative deficits in schizophrenia have a more fundamental character than language or interpersonal disorders, because they are based on deficits in self-knowledge organization. Low elaboration of self-knowledge affects all processes where this knowledge plays an important role. We have observed them in recall of personal histories and in imagining a hypothetical self-relevant situation. But it should affect as well all aspects of experiencing and understanding personal situations and tasks as well as planning one's own future and goal realizations. Low elaboration should impair all forms of mental simulations where a person tries to understand, justify or evaluate self-relevant possibilities in the past or those projected in the future. The important spheres where narrative deficits in schizophrenia are revealed are social interactions. When a person is unable to impose narrative meaning upon self-identity within a given social situation, he or she consequently is unable to understand partners in this situation, for example, partners' narrative interpretations of ongoing events. It impairs social relations of schizophrenic person who is unable to communicate to others own experiences and intentions and to gain social support and help. These social deficits may additionally enforce the spiral dynamics of disorder development.

The present results raise questions about the genesis of schizophrenia. Despite the recently prevailing interest in neurological and formal cognitive factors in schizophrenia, the presented data may call for a more careful examination of the psychological mechanism centering around a person's emotions and motives, and related cognitive control processes. All these processes depend, first of all, on the level of elaboration of self-knowledge and the quality of self-narrative competencies. Although our data do not relate directly to the genesis of schizophrenic disorders, they provide a clue that one possible underlying mechanism may start from early factors blocking elaboration of self-narrative knowledge and self-narrative competencies.

The question posed by the present data concerns the possible relation between general cognitive deficits in schizophrenia which are reported in the literature and the impairments caused by self-narrative deficits. It seems that the causal links between them may be two-directional. Self-narrative deficits may indirectly affect a very broad range of knowledge domains and cognitive operations because of the major role of self-knowledge in social and cognitive development. For example, early acquired self-narrative deficits may lead – among others – to impaired social relations with family members, teachers and partners in exploring the world. Possible consequences may thus produce dispersed effects.

On the other hand, difficulties in imposing meaning on one's own emotions and motives within a broader context of own values, social roles and social interactions may result from, or may be facilitated by, more fundamental content-free deficits in cognitive operations that may have a neurological and genetic basis.

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