Narrative identity in schizophrenia

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ABSTRACT

This study examined narrative identity in a group of 81 patients with schizophrenia and 50 healthy controls through the recall of self-defining memories. The results indicated that patients' narratives were less coherent and elaborate than those of controls. Schizophrenia patients were severely impaired in the ability to make connections with the self and extract meaning from their memories, which significantly correlated with illness duration. In agreement with earlier research, patients exhibited an early reminiscence bump. Moreover, the period of the reminiscence bump, which is highly relevant for identity development, was characterized by fewer achievements and more life-threatening event experiences, compared with controls. A negative correlation was found between negative symptoms, number of self-event connections and specificity of narratives. Our results suggest that schizophrenia patients have difficulties to organize and extract meaning from their past experiences in order to create coherent personal narratives.

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1. Introduction

It has long been recognized that schizophrenia is associated with a wide range of impairments in self-awareness and self-reflection abilities, with extreme consequences such as a disturbed sense of personal unity and continuity which are essential aspects of identity (Sass & Parnas, 2003). One's sense of self and identity depends on memories of past experiences and, in particular, on the capacity to consciously remember these experiences (Conway, 2005; Conway & Pleydell-Pearce, 2000; Tulving, 2002). There is evidence that autobiographical memory is impaired in schizophrenia and it has been shown, in particular, that schizophrenia patients have difficulties in recalling specific autobiographical memories, that is, memories for unique episodes that occurred at a specific time and place (Cuervo-Lombard et al., 2007; D'Argembeau et al., 2008; Danion et al., 2005; Neumann, Blairy, Lecompte, & Philippot, 2007; Riutort, Cuervo, Danion, Peretti, & Salame, 2003; Wood, Brewin, & McLeod, 2006) and present a reduced conscious recollection of personal events (Cuervo-Lombard et al., 2007; Danion et al., 2005; Riutort et al., 2003).

Although it is now well established that autobiographical memory is impaired in schizophrenia in terms of specificity and conscious awareness, little is known about how people with schizophrenia construct their sense of self and identity from

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autobiographical memories. Some researchers have conceptualized identity as a narrative that is constructed and revised throughout the lifespan (Habermas & Bluck, 2000; McAdams, 2001). Narrative identity relates to how individuals seek to understand themselves as unique individuals and employ narratives to develop a sense of personal unity across their life-span (McAdams, 2001; Singer, 2004). Despite the variety of methods used to study narrative identity, some consensus and unifying themes across the literature have emerged (Singer, 2004). Firstly, narrative identity is not simply the sum of one's memories, but is based on selective life events. Indeed, autobiographical memory comprises a vast range of personal information and experiences, but only some of them are relevant to the construction of personal identity. For Robinson and Taylor (1998), self-narratives consist of a "set of temporally and thematically organized salient experiences and concerns that constitute one's identity. These autobiographical memories are private and uniquely our own and by examining auto-biographical narratives, we gain access to individuals' construction of their own identity" (p. 126). Secondly, narrative iden-tity depends on our capacity to make sense of and organize past experiences in order to gain insight into our personality, values, and goals (Addis & Tipett, 2008; McAdams, 2001; Singer, 2004). This ability to link the self to experiences has been referred to as "autobiographical reasoning" (Singer & Bluck, 2001).

The reflective process of autobiographical reasoning is considered as one of the major processes through which a personal narrative is developed (Habermas & Bluck, 2000). Autobiographical reasoning encompasses different processes that vary in complexity. At a basic level of autobiographical reasoning, narrative identity is developed through simple connections be-tween past experiences and the self (e.g., "this event made me more independent"), also named self-event connections (McLean, 2008; Pasupathi & Mansour, 2006). Self-event connections are an important type of autobiographical reasoning be-cause they make explicit links between life events and the development of personal characteristics, focusing on personal growth and coherence of self across time (see also McLean, Pasupathi, & Pals, 2007). In addition to making connections be-tween past experiences and the self, people can engage in a more sophisticated reasoning about the past. In particular, Thorne, McLean, and Lawrence (2004) have explored a type of autobiographical reasoning processes, named meaning-mak-ing, which consists of ascribing meaning to memories by extracting lessons about the self, important relationships, or life in general (see also Blagov & Singer, 2004). This process of meaning-making affects the self through the incorporation of life lessons into a personal story that generalizes to similar future experiences.

Few studies to date have explored how individuals with schizophrenia explicitly conceptualize their self through personal memories that involve important themes and concerns. Recently, Lysaker and colleagues (Lysaker, Carcione, et al., 2005; Lysaker, Dimaggio, Buck, Carcione, & Nicolò, 2007; Lysaker, France, Hunter, & Davis, 2005; Lysaker, Wickett, & Davis, 2005) showed that patients with schizophrenia have difficulties in constructing a coherent sense of their life and in portray-ing meaningful connections between their own self and others. Lysaker, Clements, Plascak-Hallberg, Knipscheer, and Wright (2002) have developed a specific tool, the Narrative Coherence Rating Scale (NCRS), to assess the coherence of individuals' accounts of their mental illness. The NCRS is a semi-structured interview composed of three key elements: "Richness of details", "Temporal connections" and "Plausibility" (for a detailed description of the NCRS, see Lysaker, France, et al., 2005; Lysaker, Tsai, Maulucci, & Stanghellini, 2008; Lysaker et al., 2002). In these studies, several factors were associated with impairments of self-experience and narratives coherence in patients with schizophrenia: internalization of stigmatizing beliefs about mental illness (Lysaker, Buck, Taylor, & Roe, 2008), negative and positive symptoms (Lysaker, France, et al., 2005; Lysaker, Wickett, et al., 2005), executive dysfunctioning (Lysaker, France, et al., 2005; Lysaker, Wickett, et al., 2005), and metacognition (deficits in thinking about one's own thinking and the thinking of others) (Lysaker et al., 2007, 2008). Nevertheless, as noted by Lysaker et al. (2008), most research on self-narrative in schizophrenia has been qualitative or limited to hospitalization episodes and events related to illness or recovery. Thus, little is known about the contents of memories selected by patients with schizophrenia to build their sense of personal identity.

In a recent and exploratory study, Raffard et al. (2009) carried out an investigation into such memories, which Singer and Salovey (1993) have named self-defining memories (SDMs). SDMs represent exemplar self-narratives that individuals draw onto inform their sense of identity. They have been particularly relevant in understanding the relationship between the self and autobiographical memory in several psychopathological states, such as depression (Moffitt, Singer, Nelligan, Carlson, & Vyse, 1994) and post-traumatic stress disorder (Sutherland & Bryant, 2005). Raffard et al. (2009) showed that patients with schizophrenia recalled as many specific SDMs as healthy controls but the temporal distribution of their memories was shifted towards an earlier life period (an earlier "reminiscence bump") compared to healthy controls (peaking at 15–19 years for patents vs. at 20–24 years for controls). They also reported different types of thematic content (i.e., they recalled fewer memories about past achievements and more memories regarding hospitalization and stigmatization of illness). Further-more, the meaning-making process was severely impaired suggesting that impairments in extracting meaning from personal memories and more generally autobiographical reasoning could represent a core disturbance of autobiographical memory in schizophrenia. This exploratory study (Raffard et al., 2009) demonstrated both the feasibility of the SDM procedure and its relevance for studying narrative identity in individuals with schizophrenia.

In this study, we sought to replicate and extend our previous investigation of SDMs (Raffard et al., 2009), by examining in more detail, and in a larger sample, dimensions of autobiographical memory that play a critical role in the construction of a coherent sense of identity. To this end, in addition to examining specificity, meaning-making, and content, we analyzed nar-ratives for coherence and self-event connections, which as mentioned above are two critical elements of personal narratives, and we also sought to explore the amount of experienced emotion during retrieval of SDMs. Furthermore, we analyzed in more detail the content of SDMs located in the reminiscence bump in schizophrenia. This is an important issue because it has been suggested that most memories from this period are 'self-defining' experiences which play a critical role for the

development and maintenance of a stable sense of self (Conway, 2005). Finally, taking advantage of the large sample size of this study, we were able to explore in more detail the relationships between clinical variables, psychotic symptoms and characteristics of narrative identity in patients with schizophrenia.

2. Methods

2.1. Participants

Participants were 81 outpatients with diagnoses of schizophrenia and 50 healthy participants (see Table 1 for sample characteristics). Patient diagnoses were assessed with the Structured Clinical Interview for *DSM–IV* (SCID; First, Spitzer, Gibbon, & Williams, 1996). The patients were in the stable phase of the illness according to the current treating psychiatrist and as defined by having no hospitalizations or changes in housing in the month prior to entering the study. They were receiving out-patient treatment in the urban community of Montpellier. Exclusion criteria were: (a) known neurological disease, (b) developmental disability and (c) substance abuse in the past month. Patients and controls did not differ in age, level of education, and premorbid IQ, as estimated by the French adaptation of the National Adult Reading Test (Mackinnon & Mulligan, 2005) (all $ts > 0.10$). Levels of depressive symptoms, as assessed by the Beck Depression Inventory-II (Beck, Steer, & Brown, 1998), differed between the two groups with a higher mean depression score in patients with schizophrenia ($M = 11.7$, $SD = 8.7$ vs. $M = 8.0$, $SD = 5.5$, $p = .033$). All participants were native French speakers with corrected or normal vision. All participants provided written informed consent after procedures had been fully explained.

2.2. Materials

2.2.1. Self-defining memories (SDMs) questionnaire (Singer & Moffitt, 1991)

Participants responded to a questionnaire that elicited descriptions of 3 SDMs. The first page of the questionnaire described features of a SDM, adapted from Singer & Moffitt, 1991. A SDM was defined as a memory that is at least one year old, of a specific event in one's life that helps oneself and significant others to understand who one is as a person, that leads to strong feelings, and that has been thought about many times. Memory specificity was not emphasized in the current study (see Section 4).

On each of the next three pages of the questionnaire, participants were asked to describe a SDM, including a caption for the event, their age at the time of the event, where they were, who they were with, what happened, and how they and any other person present responded to the event. Participants were provided one page to describe each memory.

2.2.2. Positive and negative affective states (PANAS; Watson, Clark, & Tellegen, 1988)

The PANAS was administered in order to assess changes in emotional experience following the retrieval of SDMs. This self-reported adjective checklist contains two 10-item subscales designed to measure positive and negative affective states. Each item is rated on a 5-point scale ranging from 1 to 5. Total positive and negative scores range from 10 to 50. It has been translated into French and validated (Gaudreau, Sanchez, & Blondin, 2006).

Table 1
Demographic and clinical characteristics.

Variables	Control subjects	Patients with schizophrenia
Age at testing (years)	33.3 (10.60)	33.04 (11.24; range: 18–59)
Age at onset (years)	–	23.5 (6.5; range: 16–44)
% of females	34	27
Education (years)	12.1 (2.10)	11.59 (2.75)
Duration of illness (years)	–	9.74 (10.41)
Age at onset (years)	–	23.48 (6.53)
Premorbid IQ (f-NART)	108.77 (4.81)	107.61 (7.38)
BDI-II total	7.96 (5.54)	11.70 (8.66)
PANSS Positive	–	17.0 (6.2)
PANSS Negative	–	17.4 (8.1)
PANSS Disorganization	–	24.6 (8.6)
PANSS Excitement	–	14.0 (4.9)
PANSS Emotional Distress	–	16.3 (5.4)
PANSS Total Score	–	68.68 (13.65)
P2 item of the PANSS	–	2.9 (1.4)
N6 item of the PANSS	–	1.9 (1.2)
G12 item of the PANSS	–	4.2 (1.5)

BDI-II: Beck Depression Inventory-II; PANSS: Positive and Negative Syndrome Scale; f-NART: French version of the National Adult Reading Test.
Note. Values are means unless otherwise specified. Standard Deviations are in brackets.

2.3. Procedure

Participants completed all experimental measures in two experimental sessions, over two consecutive days. The order of task administration for the first session was (a) PANAS at baseline (i.e., before recollection of SDMs), (b) recollection of the 3 SDMs and completion of the PANAS directly after each SDM and (c) f-NART and BDI-II. The second session consisted of the PANSS.

2.4. Scoring of SDMs

Each SDM was scored by the interviewer (S.R) for specificity, meaning-making, and content, following the criteria proposed by Singer and Blagov (2000–2001), Thorne and McLean (2001). For each participant, *Specificity* was assessed by the number of specific memories and *Meaning-making* was assessed by the number of integrated memories (in both cases, scores ranged from 0 to 3). A second independent rater (C.L.), blind to diagnosis but not to the scope of the study, also coded each SDM in order to measure inter-rater agreement (Cohen's Kappa). When the two ratings differed, the final rating was made following discussions between the two raters.

2.4.1. Specificity
Each memory was coded as non-specific (0) or specific (1). A memory was rated as specific if it described an event that happened at a particular place and time and lasted less than a day (Williams & Broadbent, 1986). Non-specific memories included categoric (summaries or categories of repeated events) and extended (descriptions of events that are longer than a day) memories. The Kappa coefficient was .85.

2.4.2. Meaning-making
Meaning-making refers to what the reporter learns or understands from the event. To count a SDM as involving meaning-making, the reporter must explicitly reflect back on the event (e.g., "I learned a lesson..." or "After that event, I came to understand that..."). Each memory was coded for the absence (0) or presence (1) of meaning-making. The Kappa coefficient was .81.

2.4.3. The classification system and scoring manual for coding events in self-defining memories (Thorne & McLean, 2001)
SDMs are scored for event content according to seven categories: life-threatening events, recreation, relationships, achievement/mastery, guilt/shame, drug/alcohol, and an "events not classifiable" category for memories that do not fit into any other category. Life-threatening event include deaths, accidents, assaults, severe episodes of physical or mental illness of someone else or to oneself.

As in our previous exploratory study about SDMs in schizophrenia, we decided to add two other categories that could lead to a better understanding of disturbances of self-representation in schizophrenia: hospitalization/stigmatization of illness and a category involving failure (for a more detailed description and justification, see Raffard et al., 2009). The Kappa coefficient for content was .82.

To investigate the content of SDMs located in the reminiscence bump, the reminiscence bump was estimated using five-year intervals, following Cuervo-Lombard et al. (2007) and Raffard et al. (2009).

2.4.4. Coding manual for connections (McLean, Fernandez, Ngan, Smith, & Teebi, 2005)
This allows the scoring of SDMs for self-event connections according to nine categories mutually exclusive: intimacy/interpersonal, values, outlook, self-esteem/worth, personal growth, interest, personality, behavior, and role. This coding category is used to rate the kind of connection made between the self and an event. The connection must explicitly refer to any point in the narrative when the reporter links some aspect of the event to some aspect of the self (e.g., "I value my independence more maybe or the strength of it"). The agreement between the two raters was good (the Kappa coefficient was .84).

2.4.5. Narrative coherence coding scheme (NaCC; Baker-Ward et al., 2007)
The NaCC was designed to capture multiple and independent aspects of coherence which contributed to how well the story can be understood by a naïve reader. The coherence of SDMs was coded along three dimensions: context, chronology and theme. Each dimension was scored on a 4-point scale (from 0 to 3) on which a higher score indicates a higher level of coherence.

2.4.5.1. Context. Context was scored according to the amount of background information, including placing the event in time, location, and characters involved. A score of 0 was given if there was no information about any of these narrative elements, and a score of 3 was credited if each narrative element was included and was described at a specific level (e.g., mentioning "Grandma's house" would be considered specific, whereas mentioning "a house" would be considered general).

2.4.5.2. Chronology. The temporal dimension indicates how clearly the temporal order of the narrative was represented by the participant. A score of 0 was given to narratives that included only a list of actions without providing any information about the sequence of activities in the event. The maximum score of 3 was earned when the narrative could be almost completely

ordered by the rater with high confidence: information for ordering could be explicitly marked by the participant by temporal terms such as "first" and "then" or through logical connections that necessarily result in the sequence occurring in a particular way, such as "I made a sandwich. We ate our lunch".

2.4.5.3. Theme. The Theme dimension was scored according to the extent to which the participant stayed on topic throughout the narrative, developed the topic, included causal linkages, elaborations of details, and personal evaluations. A score of 0 was given if the narrative was substantially off-topic or included digressions that made the theme difficult to identify. A score of 3 was given if the participant stayed on topic and concluded the narrative by indicating the significance of the event, or linked the event to other autobiographical experiences or the self-concept.

2.4.5.4. Total Coherence Score. A composite score, the Total Coherence Score, ranging from 0 to 9, measuring the overall coherence of the narrative was calculated from the four sub-components. The agreement between the two raters was good (the Kappa coefficient was .81 for Total Coherence Score, .79 for Context score, .84 for Chronology score, and .81 for Theme score).

2.4.5.5. Emotional responses following the retrieval of autobiographical memories. For each SDM, changes in affect were computed by subtracting PANAS ratings made before retrieval from PANAS ratings made after retrieval. This was done separately for positive and negative affect. A memory was coded as positive if the difference between PANAS total positive and total negative scores made before and after retrieval was positive. If the difference between PANAS total positive and total negative scores made before and after retrieval was negative, the memory was coded as negative. A memory was coded as neutral if there was no difference between PANAS total positive and total negative scores made before and after retrieval (i.e., no change in emotional experience).

The Positive and Negative Syndrome Scale (PANSS; Kay, Fiszbein, & Opler, 1987) is a 30-item rating scale designed to assess symptom levels. All 30 items are rated on a 7-point scale (1 = absent; 7 = extreme). The PANSS was completed by a clinically trained research staff on the basis of a semi-structured interview. Severity of symptoms was rated by clinicians blind to the individuals' task performance. For the purpose of this study we utilized a well-validated five-factor model of the PANSS which can be described as follow (Van der Gaag et al., 2006): "Positive Symptoms" which include symptoms such as hallucinations and delusions; "Negative Symptoms" which include symptoms such as blunted affect; "Disorganization Symptoms" which include symptoms such as difficulty in abstraction, and conceptual disorganization; "Excitement Symptoms" which include symptoms such as excitement and hostility; and "Emotional Symptoms" which include symptoms such as anxiety and guilt. The reliability and internal consistency of the French adaptation of the PANSS is good (Lançon, Reine, Liorca, & Auquier, 1999).

2.4.5.6. Verbal output measures. In order to assess the "retrieval fluency" of each participant, we measured the number of words produced for the 3 SDMs. Furthermore, we used the P2 item (disorganization of thought and language) and the item N6 (lack of spontaneity and flow of conversation) of the PANSS in order to assess verbal output impairments in individuals with schizophrenia at a clinical level (see Table 1 for mean values).

2.4.5.7. Insight. Insight into illness was assessed by the G12 insight item of the PANSS which is considered as a valid measure of insight showing high correlations with other insight scales (Sanz, Constable, Lopez-Ibor, Kemp, & David, 1998). PANSS item G12 rated 'impaired insight and judgment' from 1 (no impairment) to 7 (severe impairment) (see Table 1 for mean value).

2.5. Statistical analyses

Violations of normality and/or homogeneity of variance were detected for all variables. Therefore, group differences in the number of specific memories, in coherence, in number of meaning-making, and total number of self-event connections were analyzed with Mann–Whitney *U* tests. Furthermore, we also computed the number of memories belonging to the different subtypes of self-event connections across the whole sample of memories produced by schizophrenia patients and healthy controls and analyzed these data using Chi-square tests (i.e., using memory as the unit of analysis). Similarly, thematic contents, experienced emotion were analyzed with Chi-square tests (using memory as the unit of analysis). Correlations with symptomatology and clinical variables were evaluated with Spearman Rank correlation. Values for phi, a chi-square based measure of association ranging from −1 to 1, were also included in the Table 2.

3. Results

3.1. Patient and control group comparisons (see Table 2)

3.1.1. Specificity and meaning-making processes

Patients with schizophrenia (*M* = 1.70, *SD* = 1.14) did not differ from control participants (*M* = 1.92, *SD* = 1.05) concerning the number of specific SDMs reported (*U* = −.993, *p* = .321, *r* = 0.09). By contrast, a group difference was noted for

Table 2
SDMs characteristics for participants with schizophrenia and control participants.

	Control subjects	Patients with schizophrenia	χ^2	p	Φ
Percentages of self-event connection types					
Intimacy/interpersonal	33.3	16	15.82	<.001,	0.35
Values	13.3	2.5	17.72	<.001,	0.37
Outlook	36	10.3	38.18	<.001,	0.54
Self-esteem/worth	13.2	2.5	6.43	.021,	0.22
Personal growth	28.7	5.8	39.24	<.001	0.55
Interest	6	5.8	.01	1	0.027
Personality	8.7	6.2	.872	.464	0.08
Percentages of neutral/ positive/negative SDMs for each content category					
Life-threatening events	6/50/44	4/43/53	.42	.81	0.09
Exploration/Recreation	13/26/61	12/42/46	1.89	.39	0.12
Disrupted relationship	4/54/41	9/55/36	.79	.67	0.08
Achievement	0/60/40	5/48/47	2.42	.26	0.14
Guilt/Shame	0/0/0	25/50/25	0	1	0
Not classifiable events	0/47/53	10/51/39	2.2	.33	0.13
Failure	0/0/100	10/20/60	.63	.73	0.07
Hospitalization/Stigmatization	0	0	–	–	
Drug, alcohol, tobacco abuse	0	0	–	–	
Percentages of SMDs for each content category in the reminiscence bump					
Life-threatening events	4.7	23	6.48	<.01	0.22
Exploration/Recreation	14	16.4	.11	>.50	0.03
Disrupted relationship	27.9	26.2	.036	>.50	0.02
Achievement	34.9	8.2	11.56	<.001	0.30
Guilt/Shame	2.3	3.3	.08	>.50	0.02
Not classifiable events	14	11.5	.14	>.30	0.03
Failure	2.3	6.6	.98	>.30	0.09
Hospitalization/Stigmatization	0	1.6	.71	>.30	0.07
Drug, alcohol, tobacco abuse	0	3.3	1.43	>.20	0.1
Proportion of SMDs for each content category across the lifespan					
Life-threatening events	12	21.8	6.01	<.014	0.21
Exploration/Recreation	15	23.9	3.29	.07	0.16
Disrupted relationship	29.3	19.8	.102	.74	0.03
Achievement	25.4	8.6	18.96	<.001	0.38
Guilt/Shame	30.7	19.3	5.973	<.001	0.21
Not classifiable events	11.1	12.3	.05	.81	0.02
Failure	0.7	5.3	2.88	.06	0.15
Hospitalization/Stigmatization	0	3.3	2.29	.09	0.13
Drug, alcohol, tobacco abuse	0	1.6	1.12	.3	0.09
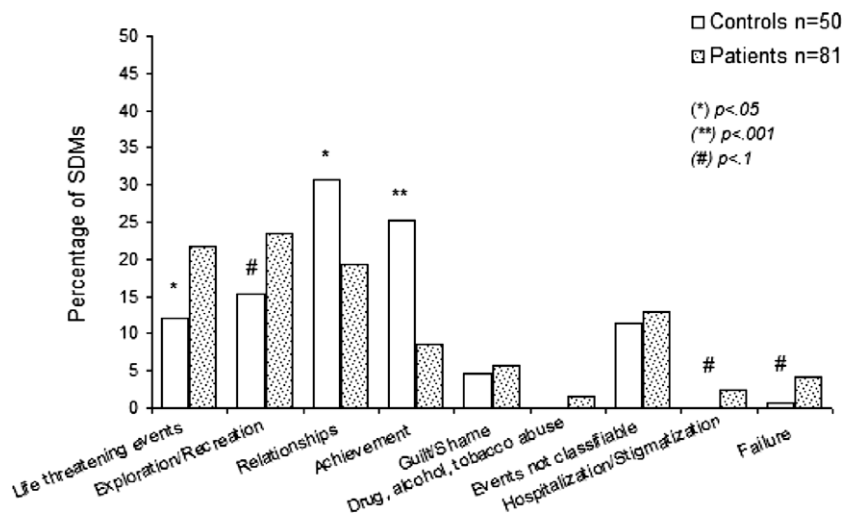
Fig. 1. Percentage of SDMs according to their content in patients with schizophrenia and controls participants.

meaning-making ($U = -4.878$, $p < .001$, $r = -.43$). Patients with schizophrenia made fewer meaning-making ($M = 0.54$, $SD = 0.76$) than control participants ($M = 1.36$, $SD = 0.96$).

3.1.2. Content of memories

The percentages of SDMs according to their content are presented in Fig. 1. Group differences were noted for three content dimensions. Firstly, the proportion of SDMs characterized by Achievement content was lower for patients with schizophrenia (8.6%) than for control participants (25.3%) ($\chi^2 = 18.96$, $d.f. = 1$, $p < .001$). Secondly, the proportion of SDMs characterized by Relationships content was lower for patients with schizophrenia (19.3%) than for control participants (30.7%) ($\chi^2 = 5.973$, $d.f. = 1$, $p < 0.015$). Finally, patients (21.8%) recalled more SDMs characterized by Life-threatening events ($\chi^2 = 6.01$, $d.f. = 1$, $p = .014$) than controls (12%). Statistical tendency (patients > controls) was noted for Exploration/Recreation ($\chi^2 = 3.29$, $d.f. = 1$, $p = .07$), Failure and lack of achievement contents ($\chi^2 = 2.88$, $d.f. = 1$, $p = .06$) and Hospitalization/Stigmatization ($\chi^2 = 2.29$, $d.f. = 1$, $p = .09$). There was no group difference in the report of SDMs characterized by Guilt/Shame ($p = .81$), Drug, alcohol, tobacco abuse ($p = .3$) and not classifiable events ($p = .74$).

3.1.3. Total number of self-event connections and types of self-event connection

In total, participants with schizophrenia made fewer self-event connections than controls ($M = 2.1$, $SD = 1.5$ vs. $M = 2.8$, $SD = 1.7$, $U = -2.211$, $p = .027$). When examining the different types of self-event connections, we found that the proportion of connections characterized by Intimacy content was lower for patients with schizophrenia (16%) than for control
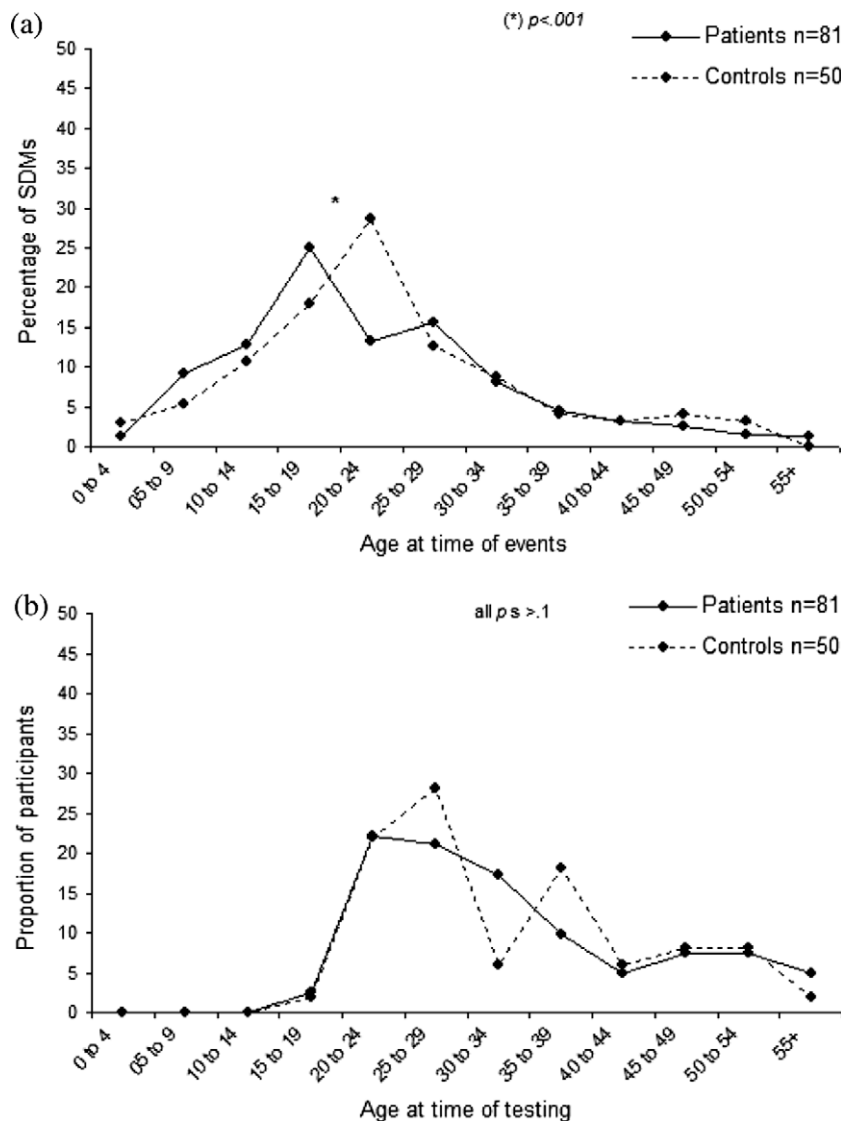

Fig. 2. (a) Temporal distribution of recalled events for control participants and patients with schizophrenia and (b) age of participants at the time of testing.

participants (33.3%) ($p < .001$). The proportion of connections characterized by Values was lower for patients with schizophrenia (2.5%) than for control participants (13.3%) ($p < .001$). The proportion of connections characterized by Outlooks was lower for patients with schizophrenia (10.3%) than for control participants (36%) ($p < .001$). The proportion of connections characterized by Personal Growth was lower for patients with schizophrenia (5.8%) than for control participants (28.7%) ($p < .001$). The proportion of connections characterized by Self-esteem was lower for patients with schizophrenia (2.5%) than for control participants (13.3%) ($p = .021$). No group differences were noted for interest (respectively 5.8% for patients and 6% for controls ($p = .99$) and for Personality (respectively 6.2% for patients and 8.7% for controls ($p = .464$).

3.1.4. Coherence of memories

Group differences were noted for all aspects of narrative coherence. Memories of schizophrenia patients were less coherent with regard to Context ($M = 4.0$, $SD = 2.1$ vs. $M = 5.3$, $SD = 1.7$, $U = -3.730$, $p < .001$, $r = -0.32$), Chronology ($M = 4.7$, $SD = 2.5$ vs. $M = 7.3$, $SD = 1.8$, $U = -5.562$, $p < .001$, $r = -0.49$) and Theme ($M = 3.9$, $SD = 1.4$ vs. $M = 6.0$, $SD = 1.7$, $U = -6.485$, $p < .001$, $r = -0.57$).

3.1.5. Amount of experienced emotion during retrieval

The proportion of neutral, positive and negative SDMs did not differ between groups ($\chi^2 = 2.25$, $d.f. = 2$, $p = .324$). Patients with schizophrenia produced 8.6% of neutral, 45.7% of positive and 45.7% of negative SDMs; control participants 4.7% of neutral, 48.7% of positive and 46.7% of negative SDMs. Furthermore, the valence did not differ between the two groups with respect to content [Life-threatening events ($p = .81$), Exploration/Recreation ($p = .39$), Disrupted relationships ($p = .67$), Achievement ($p = .26$), Guilt/Shame ($p = 1$), not classifiable events ($p = .33$), or Failure ($p = .73$)]. Statistics could not be computed for Hospitalization/Stigmatization and Drug, alcohol, tobacco abuse because control participants did not produce SDMs characterized by these contents.

3.1.6. Reminiscence bump

As illustrated in Fig. 2a, the density function curve shows that for control participants the reminiscence bump peak was in the 20–24-year period, whereas for participants with schizophrenia the bump peak was in the 15–19-year period. There was a significant difference between groups concerning the number of memories referring to the 20–24 year period, ($\chi^2 = 13.44$, $d.f. = 1$, $p < .001$). No significant difference was observed for the other periods (0–4 years: $p = .31$; 5–9 years: $p = .24$; 10–14 years: $p = .64$; 15–19 years: $p = .12$; 25–34 years: $p = .50$; 30–34 years: $p = 1$; 35–39 years: $p = 1$; 40–45 years: $p = 1$; 45–49 years: $p = .57$; 50–54 years: $p = .46$). 55 to + years: $p = .44$). Note that the number of participants who were aged between 15 to 19, 20 and 24, and so on at the time of testing did not differ between the two groups (Fig. 2b).

3.1.7. Content in the respective bumps (Controls: 20–24 years; Patients: 15–19 years)

Group differences were noted for two content dimensions. The proportion of SDMs characterized by Achievement content was lower for patients with schizophrenia (8.2%) than for control participants (34.9%) ($p < .001$). The opposite pattern was noted for Life-threatening events ($p < .01$), with the proportion of SDMs characterized by Life-threatening event content being lower for control participants (4.7%) than for patients with schizophrenia (23%). There was no group difference in the report of SDMs characterized by Exploration/Recreation ($p > .5$), Disrupted relationships ($p > 0.5$), Guilt/Shame ($p > .5$), Drug, alcohol, tobacco abuse ($p > .20$) not classifiable events ($p > .30$), Hospitalization/Stigmatization ($p > .30$) and Failure ($p > .30$).

3.2. Relationships between SDM characteristics and clinical variables

We examined the relationships between clinical variables (Age at onset, Duration of illness, and BDI-II scores; see Table 1 for mean values) and the SDM measures. In patients with schizophrenia there was a significant negative correlation between duration of illness and number of meaning-making ($r_s = -.26$, $p = 0.019$). A significant positive correlation was found between age at onset and Total Coherence Score ($r_s = .24$, $p = .03$), and Chronology score ($r_s = .23$, $p = .035$). With regard to other measures, no correlation achieved statistical significance (all $ps > .10$). In addition, total number of words produced for the 3 SDMs considered to reflect verbal fluency did not correlate significantly with coherence scores (all $ps > .1$). In the control group, none of the correlations between depression, number of words produced for each memory, and the SDM measures (meaning-making, specificity, number of self-event connections, coherence characteristics) achieved statistical significance (all $ps > .10$).

3.3. Relationships between SDM characteristics, symptomatology, insight and verbal output measures

3.3.1. Relationships between SDM characteristics and symptomatology

In the patient group there was a significant negative correlation between Specificity and PANSS Negative scale ($r_s = -.229$, $p = .040$) and a trend towards a positive correlation between specificity and PANSS Positive scale ($r_s = .193$, $p = .085$) (see Table 1 for mean values to PANSS scales).

A negative correlation was found between PANSS Negative scale and number of self-event connections ($r_s = -.239$, $p = .032$), with higher negative symptom levels being associated with fewer number of self-event connections. No significant

correlation was found between number of words produced and negative symptoms as well as between number of words and number of self-event connections (r_s = .43, p = .711; r_s = .170, p = .129 respectively). No significant result was found between PANSS subscales (Positive, Negative, Disorganization, Excitement, and Emotional Distress) and other characteristics of memories (all $ps > .10$).

3.3.2. Relationships between SDM characteristics and verbal output measures

There was a negative correlation between specificity and the item N6 of The PANSS (lack of spontaneity and flow of conversation; see Table 1 for mean value) (r_s = −.36, p = .001) with lower level of communicative spontaneity being associated with fewer number of specific SDMs reported. No significant result was found between verbal output measures (number of words, the item P2 and the item N6 of the PANSS) and other characteristics of memories (all $ps > .10$).

3.3.3. Relationships between SDM characteristics and insight

We examined the relationships between the G12 insight item of the PANSS (see Table 1 for mean value) and the SDM measures. Interestingly, a negative correlation was found between number of self-event connections and level of insight (r_s = −.243, p = .031) with lower insight level being associated with fewer number of self-event connections. No significant result was found between insight and other characteristics of memories (all $ps > .10$).

4. Discussion

Although autobiographical narratives play a crucial role in the construction of identity, few studies have explored such personal narratives in schizophrenia. In this study we investigated this issue using the recall of self-defining memories (SDMs), SDMs being exemplar memories of experiences that individuals draw onto inform their sense of identity. We explored dimensions of SDMS that are critical for narrative identity, such as autobiographical reasoning (Singer, 2004), narrative coherence (Baker-Ward et al., 2007), the reminiscence bump (Conway, 2005), and their relationships with schizophrenic symptomatology.

The present findings replicate and extend the findings reported in our previous investigation of SDMs in schizophrenia (Raffard et al., 2009). In line with our previous study, we found that patients with schizophrenia made fewer meaning-making than control participants, exhibited an earlier reminiscence bump (peaking ages 15–19), recalled fewer SDMs concerning achievement and relationship events and more memories regarding life-threatening events. In addition, this study examined in more detail two dimensions of autobiographical memory that play a critical role in the construction of a coherent sense of identity, namely self-event connections and narrative coherence. We found that individuals with schizophrenia made fewer self-event connections than control participants. Furthermore, a higher level of negative symptoms was associated with a decrease in the number of self-event connections reported by the participants, a result particularly important for our understanding of the construction of narrative identity in schizophrenia. Importantly, self-event connections were not associated with measures of verbal output impairments (as assessed by the number of words produced, the item disorganization of thought and language and the item lack of spontaneity and flow of conversation of the PANSS). This finding suggests that self-event connection deficits cannot simply be accounted for by verbal output impairments.

Creating and maintaining a continuous and stable sense of self across time requires not only the retrieval of specific past events but also the ability to create coherent links between the current self and past experiences (e.g., McAdams, 1993; McLean, 2008; McLean & Fournier, 2007). By showing that this process is disturbed in schizophrenia, our findings suggest that schizophrenia patients may have difficulty in creating a coherent life story, which might contribute to their perturbed sense of personal continuity across time. The results thus provide evidence that schizophrenia may not only be associated with impairments of immediate self-awareness (e.g., an impaired sense of self-agency; Gallagher, 2000) but also with disturbance of the temporal dimension of self that assures a stable and coherent sense of identity.

Importantly, we also found that schizophrenia patients recalled self-narratives that were less coherent that healthy controls. As proposed by Burch, Jaafar, West, and Bauer (2008), coherent narratives consist in the inclusion of sufficient background information and particularly clear temporal sequencing to succeed in explaining to a naïve listener the personal significance of the experience and its meaning to the individual. As assessed by the method proposed by Baker-Ward et al. (2007) we found that participants with schizophrenia described personal narratives that were less contextualized, less chronologically ordered, and thematically less developed than healthy controls. Overall, patients tended to recall narratives that included only a list of actions with few details about the sequence of activities and few contextual details (e.g., about time, location, or the characters involved). This reduced coherence of narratives in schizophrenia is in line with the early view of Bleuler (1950) who proposed that "loosening of associations" expressed through incoherent thoughts and behaviors is a fundamental symptom of schizophrenia. Nevertheless, it should be noted that no relationship was found between the PANSS Disorganization subscale and the different aspects of coherence of self-narratives. The use of a more specific scale such as the Scale for Assessment of Thought Language and Communication (Andreasen, 1984) to assess the relationships between formal thought disorder and the coherence of narratives may be of interest in future studies.

Following the work of Lysaker and colleagues (Lysaker et al., 2008; Lysaker, France, et al., 2005), we also examined whether the coherence of narratives was associated with the level of insight into illness (as measured by item G12 of the PANSS). No significant correlation was found between any measure of coherence scores and insight. This finding is some-

what different from that of Lysaker et al. (2008) who found in their study that patients with low insight recall stories about illness with fewer details and logical connections than patients with high insight. However, we found a negative correlation between insight and number of self-connections, suggesting a relationship between insight and the ability to make links between the self and past experiences in schizophrenia.

We also found that schizophrenia patients recalled fewer achievement episodes and more stressful ("life-threatening") events than the control group for the period of the reminiscence bump. There is evidence that the reminiscence bump is a critical period for the formation and maintenance of a stable sense of identity (Conway, 2005; Rathbones, Moulin, & Conway, 2008). It has been suggested that the reminiscence bump corresponds to a period of life when people make a lot of novel experiences (beginning college, falling in love) and these experiences would be preferentially encoded in memory (the "Novelty-Encoding Hypothesis"; Tulving & Kroll, 1995). An alternative and complementary explanation, the life scripts hypothesis, has been proposed by Berntsen and Rubin (2004). A life script is a schema of normative events that are culturally expected to occur at given times in the lifespan, such as marriage, having children or leaving one's parents' home. Life scripts may influence the encoding and retention by providing more importance and more opportunities for rehearsal of events that are culturally expected and considered as social achievements. The lower rate of life achievements found in our study for schizophrenia patients might be attributable to the disruption in those expected normative events during illness onset. Research indicates that early psychological abnormalities are often present several years before the prodromal phase of the disease (Jones, Rodgers, Murray, & Marmot, 1994), leading to isolation and social withdrawal. Whereas adolescence and early adulthood are periods when many culturally expected social achievements typically happen, abnormal behaviors such as withdrawal or isolation may structure patients' lives in a manner that limits exposure to achievement events and, consequently, the encoding of such events in autobiographical memory (Horan et al., 2005; MacCabe et al., 2008).

In addition to retrieving fewer achievements, schizophrenia patients recalled more life-threatening events than controls concerning the period of the reminiscence bump. This result is in accordance with epidemiological studies which have shown that patients with schizophrenia are at increased risk of victimization (Schomerus et al., 2008) and are exposed to significant trauma both after and before the onset of their disorder (Van Zelst, 2008). Nevertheless, to date, little is known about how such events might affect the sense of identity and the course of the disease in schizophrenia. From a self-narrative perspective, our study suggests that life-threatening events may represent a core feature of the sense of self in schizophrenia.

Contrary to previous studies which did not find a relationship between memory specificity and psychotic symptomatology (Danion et al., 2005; Neumann et al., 2007; Riutort et al., 2003), this study showed that negative symptoms were associated with lower levels of specificity of autobiographical memories. These differences between studies may partly be due to the different methodological approaches used to elicit the memories. Contrary to studies that investigated the ability of schizophrenia patients to access specific memories, in our study participants were not explicitly required to recall specific memories and they were not prompted to recall an episode that took place at a specific time and place. Therefore, it can be argued that previous studies assessed participants' ability to retrieve specific events, whereas this study assessed the spontaneous tendency to retrieve specific memories, which requires the ability to self-initiate complex retrieval processes to access specific events, a mechanism that might be affected by negative symptoms (Tsakanikos & Claridge, 2005). As a result, patients with negative schizophrenia would have a tendency to refer to more abstract and overgeneral memories to define their self, which might contribute to impoverish the self-concept, as well as social interactions (Bluck, 2003) and social problem solving (Sutherland & Bryant, 2008).

Changes in experienced emotions following the retrieval of self-defining memories did not differ between the two groups. Although decreases in emotional experience has been considered as a core feature of schizophrenic symptomatology, there is evidence that patients report similar emotional experiences at the moment of stimulus exposure as do healthy participants (Cohen & Minor, in press; Herbener, Rosen, Khine, & Sweeney, 2007). In addition, in accordance with our study, Gruber and Kring (2008) showed that participants with schizophrenia and control participants reported comparable intensity of feelings when narrating emotional life events.

An additional finding of this study was that meaning-making process and duration of illness were negatively correlated suggesting a negative influence of the evolution of the disease on the ability to incorporate past experiences into a personal story. In addition, a positive correlation was found between age at onset and SDMs coherence score. These results could have some clinical implications concerning management of patients with schizophrenia, suggesting that working on developing the ability to construct a biographical coherence through autobiographical reasoning may be fruitfully integrated in the early phase of the psychological treatment.

Contrary to our expectations and previous findings from Raffard et al. (2009), we did not find that patients with schizophrenia differed significantly from controls with regard to the number of stigmatization and hospitalization contents. This result might be due to insight deficit (Amador et al., 1994). Another possible explanation would be the use of sealing-over strategies in schizophrenia patients. Sealing over is defined as a way of coping with the psychotic illness by minimizing the significance of symptoms and leading to a lack of curiosity about psychotic experiences (Tait, Birchwood, & Trower, 2003). Therefore, absence of stigmatization/hospitalizations between the two groups might indicate the use of sealing-over strategies as a way of coping with difficult emotions and feelings associated with the recollection of memories about illness. It would be interesting to explore in future studies the relationships between coping styles, insight and life story construction in patients with schizophrenia.

Taken together, our findings have implications for clinical practise. Schizophrenia often involves the experience of the self as diminished (Lysaker & Lysaker, 2002). Although effective, interventions such as cognitive behavioral therapy typically

focuses on specific symptoms without taking into account the patient's disturbances in self-representations. As suggested by our results, it might be profitable to develop interventions targeting processes that play key roles in the construction of narrative identity, such as autobiographical reasoning and memory specificity. Metacognitive training (Moritz & Woodward, 2007) and training the ability to retrieve specific past events (Blairy et al., 2008) appear to be promising avenues in developing such interventions.

Finally, several limitations should be considered in interpreting the present findings. First, it must be noted that memories were not checked with relatives/friends and, consequently, we cannot be totally sure that the events recalled actually occurred. However, patients with schizophrenia are not particularly prone to produce more false memories than controls (Elvevåg, Fisher, Weickert, Weinberger, & Goldberg, 2004; Moritz, Woodward, Cuttler, Whitman, & Watson, 2004; Moritz, Woodward, & Rodriguez-Raecke, 2006), despite an over-confidence bias in their memory errors (Moritz et al., 2006). Furthermore, using a cueing recall task seven days after the initial assessment to check that schizophrenia participants recalled the same personal events as in the initial test phase, Danion et al. (2005) did not find evidence of autobiographical confabulations in participants in schizophrenia. Yet, further studies about self-defining memories need to be conducted to confirm such results. Second, the method used in this study elicited only three different self-defining memories and it is likely that numerous aspects of participants' narrative identity across the lifespan have not been taken into account. Third, even if our study is the first to demonstrate that life-threatening events represent a core feature of SDMs and sense of identity in schizophrenia, the consequences of this finding for clinical evolution, quality of life, and social adaptation remain to be evaluated. Fourth, participants had to provide written descriptions of SDMs, as is usually done in research in SDMs. It remains possible, however, that writing the memories may have been difficult for patients, so that our results should be replicated when memories are described orally. Finally, it would be interesting in future studies to include a psychopathological comparison group. Indeed, the centrality of life-threatening events or the lack of achievement experiences in self-representations may not be specific to schizophrenia. For example, risks of life-threatening behaviors are high among bipolar disorder patients (Khalsa et al., 2008), especially in the onset of the disease (Malkoff-Schwartz et al., 2000), and it might be that those events central to self-representations in this pathology. Future studies are needed to address this issue.

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