



**Universiteit Utrecht**

# **Masterthesis**

## **Is social functioning related to the experience of self agency in schizophrenia patients?**

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## Abstract

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Social dysfunction is a core feature in schizophrenia. Research has shown that social cognitive functions act as a direct predictor, mediator, or moderator of social functioning. In this study the experiences of self-agency in schizophrenia were associated to social functioning. A total of 12 patients performed the wheel of fortune task and were asked to fill in the Social Functioning Scale. None of the SFS subscales were positive predictors for the experience of self-agency. The sample size was small and the data did not meet the assumptions for a regression. The data was not normally distributed, so the results cannot be generalized to general population. More experimental research is necessary to examine whether self-agency is related to social functioning in schizophrenia in general. When social functioning is influenced by the abnormal experience of self-agency, this might have implications for future treatment possibilities.

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*Keywords; Schizophrenia, social cognition, self-agency experience, social functioning, SFS,*

## Introduction

Schizophrenia is a psychotic disorder, which is characterized by positive and negative symptoms. Negative symptoms are deficits in behavior and functioning, like affective flattening or impoverishment of speech and language (4th ed., text rev.; DSM-IV-TR; American Psychiatric Association, 2000) whereas positive symptoms are excesses. Delusions and hallucinations are the positive symptoms most commonly associated with schizophrenia. In several positive symptoms like hallucinations, thought insertion or withdrawal and delusions of control, ‘passivity’ experiences in which actions, speech thoughts and emotions are made for them by some external agent (rather than by their own will) can be seen. This is reported by many schizophrenia patients (Blakemore, Wolpert, & Frith, 2002; Moore, & Fletcher, 2012). Disturbances in agency processing may reflect in the experiences of patients in which they feel that they have no control over their own behavior and exhibit difficulties in distinguishing one’s own actions from those of others (Schneider, 1959). These are ‘made’ symptoms in which the patient’s own actions and experiences feel like if they were made by external forces (Frith, 2005). These ‘made’ symptoms are not only linked to a drastic reduction of autonomy, but also to professional and personal achievements and dysfunctions in relationships with family and peers (Walker, Kestler, Bollini, & Hochman, 2004). They also have been related to real-world residential outcome, revealing that they may be difficult to tolerate as part of day-to-day living, negatively interfering with the patients social functioning, even during the stable phase of the disorder (Leifker, Bowie, & Harvey, 2009). Indeed, social functioning is impaired in schizophrenia patients (4th ed., text rev.; DSM-IV-TR; American Psychiatric Association, 2000). Social functioning is defined as the ability to function in different societal roles such as homemaker, employee, student, spouse, family member or friend. Individuals diagnosed with schizophrenia can experience a marked decrease in their social functioning, decreasing their ability to fulfill these roles of employee, student, spouse, parent, or family member (Andrews, 2001). Deficits in social functioning are a core feature of schizophrenia and can be observed in all phases of the disorder (Brissos, Balanza’-Martinez, Dias, Carita, & Figueir, 2011).

Cognitive impairment has been found to be strongly correlated with deficits in psychosocial functioning in patients with schizophrenia (Lipkovich et al, 2009). Research has shown that social cognition functions as a direct predictor, mediator, or moderator of social functioning (Combs, Waguspack, Chapman, Basso, & Penn, 2011). Social cognition is defined as the cognitive processes involved in how they think about themselves, other people, social situations, and interactions (Penn et al, 1997). Disturbed social cognition is regarded by many psychiatrists as a main feature of schizophrenia and result in impaired social skills en social alienation (Schimansky, David, Rössler, & Haker, 2010). Therefore the *social cognition* of patients with schizophrenia becomes an important focus to understand social dysfunctioning (Penn, Corrigan, Bentall, & Racenstein, 1997). Impaired aspects of social cognition in patients with schizophrenia include Theory of Mind (ToM), perspective

taking, empathy, emotion recognition, face recognition, mimicry and imitation, empathy and self-agency. Each of these impairments in social cognition can influence the functioning of patients in their own way. In this study the focus will be on self-agency. Disturbances in agency processing may be reflected in several positive symptoms and are important to investigate as they might underlie poor everyday social interactions (Leifker, Bowie, & Harvey, 2009; Schneider, 1959; Frith, 2005; Water & Badcock, 2008). When social functioning is influenced by the abnormal experience of self-agency, this might have implications for future treatment possibilities.

Self-agency is the experience of causing events in the outside world. We push a button and a coke comes out of a machine or we say something silly and make someone smile. We may be likely to feel that we are the author of these events - whether we truly caused them or not - if we thought about the events just prior to their occurrence, and then perceive that the events do occur. (Aarts, Custers, & Wegner, 2005). A basic sense of self-agency over behavior seems to be established already in early infancy and is further developed during the first years of our lives when people start distinguishing between the outcomes of their own actions and outcomes caused by other agents (Decety & Chaminade, 2003; Rochat & Striano, 2000). This experience of self-agency seems a straightforward affair, but in patients with schizophrenia it can go wrong. Schimansky et al (2010) demonstrated impairment in the sense of agency in schizophrenia in their study. Patients made more mistakes in judging whether feedback in the task was self-generated or other-generated and they took significantly more time to make the judgments than healthy control participants.

Most studies investigated self-agency processing in schizophrenia in relation to sensory motor disturbances. Previous research indicates that disturbed experiences of self-agency in schizophrenia may derive from disturbances in the sensory-motor system that controls voluntary action (Haggard et al., 2003; Voss et al., 2010). While performing a voluntary motor action, the sensory-motor system compares the predicted and actual sensory consequences that follow from that action. To enable people to differentiate between self and other-produced sensory signals, the sensory signals of self-generated movements are attenuated. When the actual sensory consequences match with the predicted consequences, a feeling of self-agency is generated. However, patients with schizophrenia fail to differentiate between the perception of self-produced and externally produced sensory signals (Blakemore & Frith, 2003).

But recent work shows that people can also experience self-agency during situations in which the cause of outcomes is ambiguous. In these cases, the experience of causation of our actions and the resulting effects is an inference because one cannot directly observe causal connections between them, because participants do not have a goal or an expected outcome. So in these situations the motor prediction processes may not inform self-agency and self-agency is experienced outside the context of volitional behavior. These cognitive inferences occur fluently after action performance and, in principle this process can operate outside of conscious awareness (Renes et al, 2013). Consequently, an implicit route and an explicit route, to the experience of self-agency can be defined.

In the explicit route, people infer agency when an actual outcome of an action is in agreement with their intentions to produce the specific action-outcome, so the participants have a goal. In the implicit route, agency inferences are based on matches between actual outcomes of action and pre-activated information (i.e. primed information) about the action outcome (Renes et al, 2013). Renes et al (2013) found that implicit self-agency processing in schizophrenia patients may be disturbed. Healthy subjects show enhanced experienced self-agency when an implicitly preactivated outcome matched the observed outcome compared to an outcome which was not implicitly preactivated. However, schizophrenia patients do not show this effect. These group differences could not be attributed to differences in subjectively reported motivation or attention, suggesting that their implicit processing route to self-agency experiences may be impaired. Schizophrenia patients show a disturbance in implicit self-agency processing in comparison with control subjects (Schimansky et al, 2010; Renes et al, 2013), but no research is done on how the disturbances in experienced self-agency in patients is related to social functioning.

Considering the above, the disturbances in the experience of self-agency may be related to social functioning in schizophrenia patients. Although most studies on schizophrenia assume that there is a correlation between self agency and social functioning in schizophrenia patients, none of them ever demonstrated the existence of this correlation. In this study the correlation between disturbances in experienced self-agency and social functioning within a schizophrenia patients group will be examined. We will focus on the implicit route to the experience of self-agency, as most social interactions occur outside conscious awareness.

Based on the earlier described literature, I hypothesise that poorer social functioning is correlated to a lower degree of experienced self-agency in schizophrenia patients. Hence, the main question in this study is: Can social functioning predict experienced self-agency in schizophrenia patients?

## **Method**

### *Participants*

In this study 12 schizophrenia patients were included. All patients were male with a mean age of 32 (SD= 7.2) and a mean IQ of 97.3 (SD= 7.7). Inclusion criteria were 1) a DSM-IV diagnosis of schizophrenia, 2) no chronic use of medication, other than psychiatric medication, 3) written informed consent, 4) no major medical history and 5) not in an acute psychotic episode. Patients with, drug or alcohol abuse over a period of six months prior to the experiment, a history of closed-head injury, a history of neurological illness, an endocrinological dysfunction or patients who were unable to give consent were excluded. This sample was part of an ongoing study on self-agency and social functioning, executed at the University Medical Centre Utrecht (UMCU), Brain Centre Rudolf Magnus.

### *Procedures*

All patients were tested at the department of psychiatry. The informed consent was discussed and had to be signed before starting the experiment. Patients received verbal instructions regarding the self-agency task and after the instructions two practice trials followed to see whether the instructions were understood. After the trials the actual agency-task followed and took approximately forty minutes. The Social Functioning Scale (SFS) was filled in either at home by the patients or during the interview at the UMCU. The SFS took ten to fifteen minutes.

### *Measurements*

#### *Self-agency*

The current study included two measures. The patients performed a computerized agency task to measure self-agency experiences. The agency task was an adjusted version of the Wheel of Fortune task used in Aarts et al (2005) see figure 1. Patients had to press a key to cause a square to traverse a rectangular path, consisting of eight white squares, in a counter-clockwise direction. Meanwhile the computer moved another square along the rectangular path at the same speed, but in the opposite direction. When the signal 'stop' appeared in the middle of the path the patients had to press the 'Enter' key to stop the movement of the squares. By performing this action one of the eight white squares turned black, which represents the last position of their own square or the computer's square. When each trial was finished the patient had to report their experience of self-agency, by indicating on a 9 point scale (1= not at all and 9= strongly) to which extent they feel they had caused the position of the displayed black square when they pressed 'Enter' to stop the movement of their square. However, the computer always determined the position of the black square after the 'Enter' key was pressed, so the stops occur independently of the patients' action. The task included 32 trials and the mean scores on this task are the measures for the amount of experienced self-agency and is the dependent variable in this design. The self-agency task measured the implicit route to self-agency. Therefore all the outcomes in the trials were preceded by a prime. Half of the trials included primes that did match with the outcome and the other half included primes that did not match the outcome. Experienced self-agency was measured by the difference between the mean scores on the 8 point scale on matching and non matching trials.

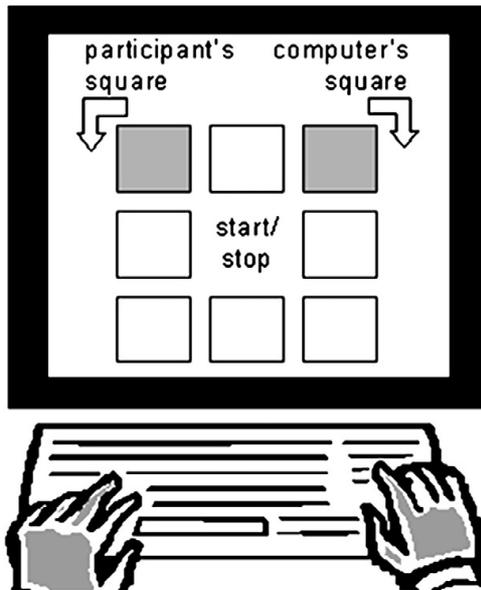


Fig. 1. An illustration of the experimental task showing how the square of the subject and the square of the computer move in opposite direction before participants stop them.

### *Social functioning*

Furthermore, the Social Functioning Scale (Birchwood et al, 1990) was used to measure social functioning in the schizophrenia patients. This questionnaire measures social functioning in the previous week or in the previous three months. The subscales of this questionnaire include: Social Withdrawal (SW), Relationships (R), Social Activities (SA), Recreational Activities (RA), Independence Competent (IC), Independence Performance (IP) and Employment (E). Each subscale is tested with multiple questions. 'How often will you start a conversation at home?' or 'how often will you leave the house for any reason?' are for example questions to measure Social Withdrawal. The answers are multiple-choice and are ordinal ordered. For example 'how often will you leave the house for any reason?' 1) almost never 2) rarely 3) sometimes and 4) often. The answers are scored by a matching number varying from 1 to 4. Each subscale was measured by summing up these numbers to get a total score. The lower the score, the worse the patient's outcome is on each of the subscales. The total SFS score is the sum of all the total subscales scores. The total scores of the subscales and the total SFS score were taken as the measurements for the dependent variable in this design.

### *Data Analysis*

The data analysis is done with SPSS, version 20. The main construct in this research was social functioning. This construct consists of seven independent variables which are the subscales of the SFS: Social Withdrawal (SW), Relationships (R), Social Activities (SA), Recreational Activities (RA), Independence Competent (IC), Independence Performance (IP) and Employment (I). First, the correlations between the SFS subscales and experienced self-agency were examined and second, a stepwise regression (backward) was used to examine whether one or more of the subscales of social functioning can predict experienced self-agency in the schizophrenia patients.

## Results

The subjects were male and had a mean age of 32 (SD=7.2) and a mean IQ of 97.3 (SD=7.7). None of the subjects were treated in a hospital as a day patient. The SFS scores were not normally distributed. See table 1 for the means and standard deviations of the SFS scores. The scores of the matching effect were also not normally distributed ( $M = .57$ ,  $SD = 2.7$ ,  $N = 12$ ).

Table 1

*Means and standard deviations of the SFS scores.*

	<b>M</b>	<b>SD</b>	<b>N</b>
Social Withdrawal	10.75	2.77	12
Relations	8.25	2.86	12
Social Activities	28.17	7.85	12
Recreational Activities	24.17	6.78	12
Independence Competent	32.75	14.15	12
Independence Performance	24.83	16.65	12
Employment	3.42	.67	12
Total score	132.33	32.43	12

See table 2 for an overview of the correlations between the SFS scores and the matching effect. None of the correlation coefficients were significant. No significant correlation was found between the total SFS score and the mean matching effect ( $r = .071$ ,  $p = .41$ ). The subscales Relations, Social Activities, Recreational Activities and Independence Performance were positive correlated with self-agency experiences. The subscales Social Withdrawal, Independent Competence and Employment were negatively correlated with the experience of self-agency.

Table 2

*Correlations between the SFS subscales and the mean matching effect.*

	Matching- effect	<i>p</i>
Social Withdrawal	-.120	.355
Relations	.173	.296
Social Activities	.060	.400
Recreational Activities	.295	.370
Independence Competent	-.323	.211
Independence Performance	.369	.062
Employment	-.086	.451
Total score	-.125	.349

*Note.* \* $p < .05$ .  $N = 12$

The regression analysis showed that the total SFS score is not a predictor of the self-agency experiences. Table 3 reports the accounted 1.6 % of the amount of variation in the matching effect by the total SFS score. Table 4 reports two different models of a stepwise regression analysis including all SFS subscales. In the first model all the subscales together accounted for 83% of the amount of variation in the outcome variable  $R^2 = .830$ ,  $F(7, 4) = 2.78$ ,  $p > .05$ . This model is not significant and the SFS subscales Social Withdrawal, Social Activities, Recreational Activities and Employment were no predictors for experienced agency. In the second model with only Social Withdrawal, Relations, Independence Performance, Independence Competent and Employment, the explained variance in the model changes ( $\Delta R^2 = .033$ ,  $\Delta F = .963$ ,  $p = .044$ ) and the model is significant. Relations,  $-(\beta = 2.45$ ,  $t(10) = 4.02$ ,  $p = .007$ ) was a significant positive predictor for experience self-agency. See figure 1. Even when the outlier was excluded from the analysis, Relations remained a significant predictor,  $-(\beta = 2.04$ ,  $t(10) = 4.50$ ,  $p = .006$ ). Independence Performance,  $-(\beta = -2.19$ ,  $t(10) = -3.57$ ,  $p = .012$ ) and Independence Competent,  $-(\beta = -2.10$ ,  $t(10) = -4.54$ ,  $p = .004$ ) were significant negative predictors. Social Withdrawal and Employment still were no predictors in the second model. Table 5 shows a regression analysis of reaction time in the self-agency task and the total SFS score. This regression model shows that social functioning is a negative predictor for reaction time,  $-(\beta = -.65$ ,  $t(10) = -2.7$ ,  $p = .02$ ). The reaction time of all trials was taken to measure reaction time.

Table 3

*Predicting the Self-Agency score: stepwise regression analysis (backward)*

	B	$\beta$	t	R <sup>2</sup>	$\Delta R^2$	F	p
1.				.016		.159	
Total SFS score	.01	-.13	.40				.698

Table 4

*Predicting the Self-Agency score: stepwise regression analysis (backward)*

	B	$\beta$	t	R <sup>2</sup>	$\Delta R^2$	F	p
1.				.830		2.78	.170
Social Withdrawal	-.29	.29	-.87				.431
Relations	2.65	2.8	3.49				.025
Social Activities	-.14	-.39	-.67				.540
Recreational Activities	-.03	-.08	-.21				.842
Independence- Performance	-.41	-2.1	-3.08				.037
Independence- Competent	-.34	-2.1	-4.05				.015
Employment	-2.85	-.70	-2.1				.102
2.				.795	-.033	4.64	.044*
Relations	2.33	2.45	4.02				.007*
Independence- Performance	-.42	-2.19	-3.57				.012*
Independence- Compentent	-.34	-2.10	-4.54				.004*
Social Withdrawal	.23	.23	1.07				.327
Employment	-2.10	-.51	-2.21				.069

Note. \* $p < .05$ .  $N = 12$

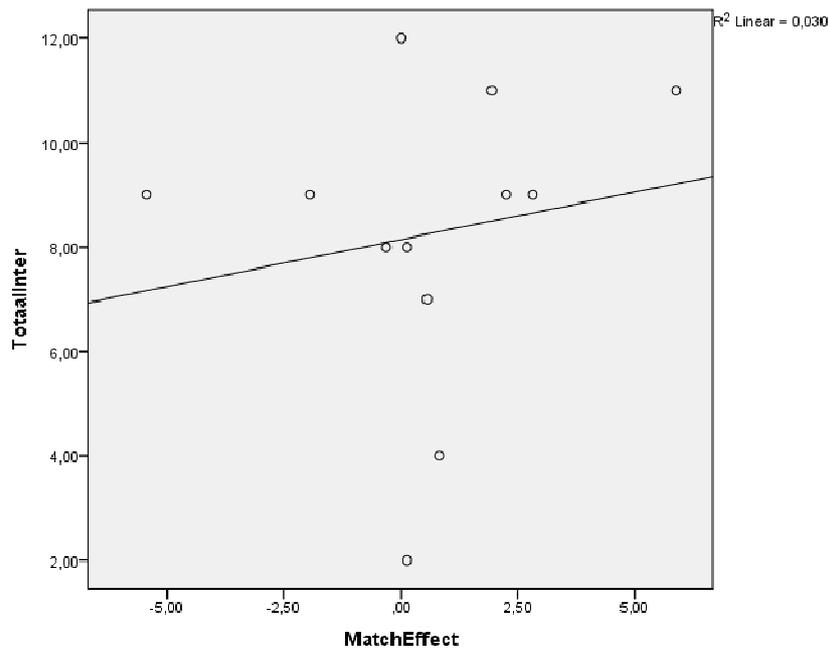


Figure 1. Scatterplot of the scores on the subscale relations and the matching effect scores.

Table 5

Predicting the reaction time on the self-agency task by the total SFS score: stepwise regression analysis (backward)

	B	$\beta$	t	R <sup>2</sup>	$\Delta R^2$	F	p
1.				.422		7.3	
Total SFS score	-.65	-.41.7	-2.7				.02*

Note. \* $p < .05$ .  $N = 12$

## Discussion

The goal of the present study was to investigate the sense of self-agency in schizophrenia patients and whether this experience of self-agency can be predicted by social functioning.

It was expected that in schizophrenia patients better social functioning would be associated with more experienced self-agency, so the social functioning scale and the subscales would be a positive predictors of the self-agency experience. The results demonstrated that the subscale Relations was a positive predictor for the experience of self-agency. Social functioning is defined as the ability to function in different societal roles such as homemaker, employee, student, spouse, family member

or friend (Andrews, 2001). While being in such relations social interaction is involved. As most social interactions occur outside conscious awareness, the focus was on implicit route to the experience of self-agency to understand social functioning. Therefore finding Relations is a positive predictor for the implicit experience of self-agency strokes with our expectation. The total SFS score and the other SFS subscales were no predictors of the experience of self-agency. Independence Performance and Independent Competent were negative predictors for the experience of self-agency. These findings do not correspond with the expectation.

Several factors could have accounted for the unexpected results. One explanation might be that the SFS was maybe not the right instrument to use in this study. The subscales Independence Performance and Independent Competent for example are rather about independency and how patients function on their own than about social functioning and social interaction. The SFS does not measure the ability of schizophrenia patients to function in a social setting. Social functioning was defined as the ability to function in different societal roles such as homemaker, employee, student, spouse, family member or friend. Individuals diagnosed with schizophrenia can experience a marked decrease in their social functioning, decreasing their ability to fulfill these roles (Andrews, 2001). Numerous instruments exist to measure social functioning, e.g. the Social Functioning Exam, the Social Functioning Scale, the Social Functioning Schedule, the Social Adaptation Scale II and the Social Activities Satisfaction Instrument. However, most of them assess social impairment and misadaptation rather than the disability to perform a social task such as leisure activity or to keep up relationships with others (Pinsonnault, 2009). The SFS mainly measures the outcomes in social functioning in daily life, but not how well schizophrenia patients function in social interaction. So in this study it would have been a better option to measure the construct social functioning with another instrument. The social-SMAF was built to target disability, not impairment, in social functioning and could be used as assessment for social functioning (Pinsonnault, Dubuc, Desrosiers, Delli-Colli, & Hebert, 2009).

One of the results was in line with previous findings. Schimansky et al (2010) showed that schizophrenia patients not only had an abnormal sense of self-agency, but also had deviated reaction times. They took significantly more time to make the self-agency judgments. The results in this study show that the schizophrenia patients significantly took longer to make judgments about their experienced self-agency when they had a lower total SFS score. Lower reaction time predicts lower social functioning in schizophrenia patients and may be part of the abnormalities in self-agency experiences found by Schimansky et al, 2010).

As noticed earlier, schizophrenia patients have the experience that actions, speech thoughts and emotions are made for them by some external agent rather than by their own will during e.g. hallucination, thought insertion or withdrawal and delusions of control (Blakemore, Wolpert, & Frith, 2002; Moore, & Fletcher, 2012). Therefore one can say that an abnormal sense of agency is more prominent in schizophrenia patients who suffer from positive symptoms. In this study patients were not selected by their clinical background, so patients with and without positive symptoms were

included. Further research could focus on testing a specific patients group who in particular suffer from positive symptoms based on the earlier studies to examine a correlation between the experience of self-agency and social functioning.

It also has been suggested that male and female schizophrenia patients differ in clinical aspects. Both, clinical impression and empirical assessment, point to more withdrawn, passive, and typical symptoms in male and more florid, active, and atypical symptoms in female schizophrenics (Lewine, 1981). These symptom differences between female and male schizophrenics are conceptualized in terms of "negative" and "positive" symptoms (Lewine, 1981), with female schizophrenics suffering more from positive symptoms. Negative symptoms usually are more pronounced in male schizophrenic patients (Hansen et al, 2013). Women with schizophrenia also have probably, better outcome, and social functioning than men (Xiang et al, 2010). Considering the above further research could focus on a more specific patient group which includes males and females or only females to see whether experienced self-agency is linked to positive symptoms and social functioning. Because of the small sample used in this study and the absence of women the power level is too small to examine the effects of symptoms and gender.

This study also has some other limitations. First, this study had a small sample size which is less accurate than a large sample size. When the sample size decreases, the error between the sample mean and the population mean increases, the rule known as the law of large numbers. Second, the data did not meet the assumptions for a regression analysis. Therefore the results cannot be generalized to schizophrenia patients in general.

Because the results cannot be generalized, the outcome of this study does not mean that a positive correlation between social functioning and the experience of self-agency does not exist at all, but it does not exist in this study. Experimental research with a larger sample is necessary to examine whether self-agency is related to social functioning in schizophrenia in general. When social functioning is influenced by the abnormal experience of self-agency, this might have implications for future treatment possibilities.

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