

## Sense of Agency Across Contexts: Insights From Schizophrenia and Hypnosis

Vince Polito, Robyn Langdon, and Amanda J. Barnier  
Macquarie University

Passivity phenomena in schizophrenia are characterized by a sense of diminished agency. Clinical research into sense of agency has focused primarily on demonstrating impaired monitoring of self-generated actions in patients with passivity symptoms. Less attention has been paid to patients' subjective experiences and clinical correlates of their sense of diminished agency. Our aim was first to investigate sense of agency and clinical symptoms in schizophrenia, both classic passivity phenomena and more general positive symptoms; and second, to contrast the agentive experiences of patients with a previously tested sample of 370 nonclinical, hypnotized participants. Twenty-six patients with schizophrenia completed ratings of classic passivity phenomena and of involuntariness associated with a particular experience of agency alteration. Severity of positive symptoms was also rated. Correlations examined interrelations between these measures. Patients reported considerable levels of involuntariness for both body-related and thought-related symptoms. Overall involuntariness ratings from patients were similar to those of high hypnotizable participants in hypnosis. These results indicate altered sense of agency is associated with a range of experiences in schizophrenia, not just classic passivity phenomena. Moreover, the experience of altered agency in schizophrenia was similar to that seen in hypnosis, suggesting that hypnotic analogues may be a useful way to test theories of passivity-like phenomena.

*Keywords:* control, hypnosis, passivity phenomena, schizophrenia, sense of agency

Passivity phenomena are characteristic symptoms of schizophrenia in which patients report that their actions or thoughts are influenced by, or under the control of, some external entity. These symptoms, sometimes referred to as 'first rank symptoms' of schizophrenia (Koehler, 1979; Waters & Badcock, 2010), were identified by Kurt Schneider to be so fundamental to

schizophrenia that the unequivocal presence of any of these symptoms was deemed sufficient to confirm diagnosis (Mellor, 1970). Although more recent research has shown that passivity phenomena can sometimes occur in other clinical conditions, such as mood disorders (Nordgaard, Arnfred, Handest, & Parnas, 2008) and dissociative disorders (Cardeña, 1994), impairments to sense of self continue to be recognized as a core characteristic of schizophrenia (Sass & Parnas, 2003). In fact, the specific presence of passivity symptoms forms a defining component of modern diagnostic criteria such as required by the *Diagnostic and Statistical Manual of Mental Disorder (DSM)* fifth edition (American Psychiatric Association, 2013) and the International Statistical Classification of Diseases, tenth revision (World Health Organization, 2008).

The general nature of passivity phenomena is that they involve some perceived loss of boundary between self and other, such that patients have difficulty recognizing the source of their own self-generated actions and thoughts as dis-

---

Vince Polito, Department of Psychology and ARC Centre of Excellence in Cognition and its Disorders, Macquarie University; Robyn Langdon and Amanda J. Barnier, Department of Cognitive Science and ARC Centre of Excellence in Cognition and its Disorders, Macquarie University.

This study was supported by the Australian Schizophrenia Research Bank (ASRB), which is supported by the National Health and Medical Research Council of Australia, the Pratt Foundation, Ramsay Health Care, the Viertel Charitable Foundation and the Schizophrenia Research Institute. We thank Steven Lynn, Etzel Cardeña and Quinton Deeley for helpful comments on an earlier version of this article.

Correspondence concerning this article should be addressed to Vince Polito, ARC Centre of Excellence in Cognition and its Disorders, Macquarie University, NSW 2109, Australia. E-mail: [vince.polito@mq.edu.au](mailto:vince.polito@mq.edu.au)

tinct from external influences (e.g., Frith & Done, 1989). These loss of boundary experiences are also associated with alterations to perceived sense of agency, with patients typically reporting that their thoughts or actions feel caused by an external agent. Specific passivity phenomena include the following: (a) ‘made thoughts,’ whereby patients experience their thoughts as influenced or replaced by an external entity; (b) ‘thought broadcast/withdrawal,’ whereby patients believe their thoughts can be ‘heard’ or removed by an external entity; (c) ‘made emotions,’ whereby patients experience their emotions as altered or replaced by an external entity; (d) ‘somatic passivity,’ whereby patients experience particular body parts, organs or body functions as being influenced or controlled by an external entity; (e) ‘made movements,’ whereby patients experience their actions or body movements as influenced or controlled by an external entity; and (f) ‘impulses to act,’ whereby patients believe their capacity to make decisions is influenced or controlled by an external entity (Spence et al., 1997). These classic passivity phenomena might also relate to other symptoms, such as auditory verbal hallucinations, which some theories suggest stem from impaired monitoring of the self-generation of ‘inner speech’ (Jones & Fernyhough, 2007) and give rise to a range of loss of boundary delusions with considerable heterogeneity of specific delusional content (Maes & Van Gool, 2008).

As noted above, difficulties in distinguishing between self-generated and externally generated actions have been associated with passivity phenomena. For example, a major focus for research into altered sense of agency in schizophrenia has been experimental investigation into the processes that lead to misattributions of self-generated acts. These studies have been motivated by the ‘comparator model’ (Feinberg, 1978; Frith, Blakemore, & Wolpert, 2000a). According to the comparator model, whenever a motor command is internally generated it is accompanied by an internal ‘efference copy’ of the motor signals involved. This efference copy is used to predict the sensory consequences of the motor command. If the actual sensory feedback from an action that follows the motor command matches this prediction, then the action is attributed to the self and experienced as self-generated. An externally caused action

(e.g., a knee-jerk reflex action) can also lead to sensory feedback, but in this case, there is no match to an internal prediction of the associated sensory consequences and thus the action is experienced as externally generated. A number of experimental studies have shown that these comparator processes are impaired in patients with passivity phenomena (Blakemore, Smith, Steel, Johnstone, & Frith, 2000; Franck et al., 2001; Lindner, Thier, Kircher, Haarmeier, & Leube, 2005; Mlakar, Jensterle, & Frith, 1994). More specifically, although passivity phenomena have traditionally been explained as stemming from some disorder of self-monitoring, recent research suggests that an impaired prediction of the sensory consequences of a self-generated act, rather than impaired monitoring of the sensory feedback, leads to the misattribution of actions as externally generated in schizophrenia (Synofzik, Thier, Leube, Schlotterbeck, & Lindner, 2010; Frith, 2012).

Although there is considerable evidence for an association between impaired self-monitoring and passivity phenomena, Waters and Badcock (2010) point out that studies employing paradigms motivated by the comparator model have dominated research into altered sense of agency in schizophrenia, to the potential neglect of other lines of inquiry. One consequence of the concentrated focus on comparator model explanations is that more attention has been paid to classic passivity experiences involving overt body actions than to passivity-like experiences involving inner thoughts (e.g., the experience that someone else has inserted thoughts into one’s mind). Some efforts have been made to apply the comparator model to passivity-like phenomena concerning thoughts (Gerrans, 2015; Jones & Fernyhough, 2007; Seal, Aleman, & McGuire, 2004; Sugimori, Asai, & Tanno, 2011), but these approaches have been controversial as it is not clear that thinking has an analogous motor system referent (Vosgerau & Newen, 2007). Researchers who have cast their nets more broadly have suggested that, rather than being solely dependent on intact comparator processes, a normal sense of agency may result from the integration of a range of internal and external cues including internal predictions, proprioceptive feedback, judgments of action consequences and high level inferences about the cause of actions (Moore & Fletcher, 2012; Moore, Wegner, & Haggard,

2009; Synofzik, Vosgerau, & Newen, 2008; Wegner & Sparrow, 2004). Accordingly, it has been suggested that normal sense of agency for overt actions may be more reliant on sensorimotor comparator processes, whereas normal sense of agency for thoughts may depend more on inferential cues related to the social context.

In the current study, we investigated the cognitive processes underlying self-monitoring and self-recognition deficits. Rather than focus only on patients with passivity phenomena, we investigated the phenomenology of agency disruption related to both actions and thoughts for schizophrenia patients more generally; that is, with and without classic passivity symptoms. Schizophrenia presents as a markedly diverse disorder with patients experiencing a wide range of symptoms. Although altered sense of agency is often discussed with reference to classic passivity phenomena (e.g., Franck et al., 2001; Frith et al., 2000a; Spence, 2001), there is some evidence from studies of intentional binding that positive symptoms in schizophrenia more generally might involve agentive alterations. For example, Haggard, Martin, Taylor-Clarke, Jeannerod, and Franck (2003) found that patients with schizophrenia, as a group, perceived the interval between self-generated actions and the effects of those actions to be significantly shorter than did healthy controls. This was a surprising finding, as shorter interval estimates usually indicate an increased sense of agency. Voss et al. (2010) provided an explanation for this result, demonstrating that patients were specifically impaired at predicting the effects of their own actions and that interval estimates were dependent on retrospectively exaggerating the link between actions and their effects. Importantly, Voss et al. showed that the degree to which schizophrenia patients were impaired at predicting the effects of their own actions was associated with their general level of positive symptoms. These findings suggest that, despite the focus on classic passivity phenomena in clinical research into altered agency in schizophrenia, there may be significant alterations of sense of agency associated with a wider range of symptoms than those traditionally conceived as passivity phenomena.

Against this background, we were interested in how patients with schizophrenia generally experience their actions and thoughts, how altered sense of agency relates to a wider range of

experiences than the classic passivity phenomena and, in addition, how these altered agency experiences might compare with experiences of agency alteration in other nonclinical contexts. In particular, researchers in our lab have recently developed the 'Sense of Agency Rating Scale' (SOARS), a measure that indexes alterations in individuals' subjective feelings of control over their self-generated actions (Polito, Barnier, & Woody, 2013). Research using this scale has shown that healthy, high hypnotizable participants experience marked alterations to their sense of agency in the context of hypnosis. Participants responded to a series of hypnotic suggestions as part of a standardized assessment of hypnotizability. The suggestions administered involved ideomotor actions (e.g., raising an arm up toward the ceiling) as well as cognitive and perceptual alterations (e.g., experiencing a fly buzzing around the room). Participants' SOARS scores for these tasks revealed a dramatic reduction in feelings of subjective control and effort for high hypnotizable participants. In addition, high hypnotizable participants indicated that their actions and thoughts in hypnosis (i.e., following a hypnotic induction, while responding to hypnotic suggestions) seemed to occur spontaneously and impulsively, without their conscious intention, and as if caused by an external force. In short, these descriptions were strikingly similar to first person accounts of passivity phenomena in schizophrenia (Maes & Van Gool, 2008; Mellor, 1970).

Further evidence of a connection between the phenomenology of hypnosis and clinical symptoms of schizophrenia comes from research demonstrating the capacity of specific hypnotic suggestions to generate hypnotic analogues of various clinical delusions, including delusions of control (Connors et al., 2014; Deeley et al., 2014; Rahmanovic, Barnier, Cox, Langdon, & Coltheart, 2012; Walsh et al., 2014). In these experiments, hypnotized participants showed behaviors that were functionally equivalent to genuine patients, including their levels of reported conviction in the suggested delusional experiences and their responses when the delusional beliefs were challenged (Barnier, Cox, Connors, Langdon, & Coltheart, 2010; Bortolotti, Cox, & Barnier, 2012). These findings suggest that the agency alterations experienced by high hypnotizable individuals in hypnosis

are similar in character to those reported by some clinical patients with schizophrenia.

### Aims and Hypotheses

In the current study, we wanted to see whether an empirical assessment of sense of agency (using the SOARS) revealed any difference between clinical patients' experiences of passivity phenomena and the reported experiences of high hypnotizable individuals in hypnosis. Rather than asking patients to rate their sense of agency in general (a task that might seem overly vague or difficult to evaluate), we interviewed patients to identify their most salient episode of agency disruption in relation to clinical passivity-like phenomena and used this as the focus for patients' ratings of the intensity of their clinically altered agentive experience.

Our first aim was to investigate relationships between patients' sense of altered agency about the targeted symptom (rated using the SOARS) and their symptoms more broadly, including classic passivity symptoms. We made three predictions concerning these relations. First, based on the considerable evidence showing comparator model deficits associated with overt actions in schizophrenia (Franck et al., 2001; Frith, 2005; Mlakar et al., 1994), we hypothesized that patients who identified a target experience related to body movements would show greater intensity of agency disruption on the SOARS than patients who identified a target experience related to their thoughts. Second, based on the classic conceptualization of first rank symptoms of schizophrenia (Koehler, 1979; Mellor, 1970), we hypothesized a relationship between SOARS ratings of intensity of agency disruption and the number and severity of classic passivity phenomena, as assessed using the Scale for the Assessment of Passivity Phenomena (SAPP: Spence et al., 1997). For clarity, we will refer to this measure as the 'Passivity Scale.' In particular, we expected that patients who had experienced passivity phenomena (according to the Passivity Scale) would report higher SOARS scores for their targeted altered agency experience than those who had not. Third, based on the findings of altered predictive capacities associated with nonspecific positive symptoms of schizophrenia (Voss et al., 2010), we hypothesized a relationship between SOARS scores, which represent intensity of al-

tered agency experiences, and the severity of positive symptoms of schizophrenia more generally.

Our second aim drew on the behavioral data and narrative accounts of healthy controls in hypnosis (e.g., Polito et al., 2013; Polito, Barnier, Woody, & Connors, 2014). Specifically, we expected that the agentive experiences of patients, as assessed using the SOARS in this clinical sample, would be comparable with the temporary experiences of nonclinical participants in hypnosis.

## Method

### Participants

Twenty-six clinical patients (9 female, 17 male; age range = 27 to 68 years; mean age = 46.31 years) with a *DSM-IV* diagnosis of schizophrenia ( $n = 25$ ) or schizoaffective disorder ( $n = 1$ ) took part. Twenty patients were recruited from the volunteer register of the Australian Schizophrenia Research Bank (ASRB), and six were recruited from the Macquarie University Department of Cognitive Science Belief Formation Participant Register. The study was described as research "exploring what the experience of certain symptoms of schizophrenia is like," and each participant was compensated \$30 for taking part.

Diagnosis was according to previous administration of the Diagnostic Interview for Psychosis (DIP: Castle et al., 2006) by either the ASRB or researchers of the Department of Cognitive Science, Macquarie University, and confirmed as per current treating psychiatrist. All patients were in receipt of neuroleptic medication at the time of testing. Mean age of onset of illness was 25.15 years ( $SD = 7.46$ ) and mean duration of illness was 21.38 years ( $SD = 9.16$ ). This study was approved by the Macquarie University Human Research Ethics Committee and the Australian Schizophrenia Research Bank.

### Materials

**Scale for the Assessment of Passivity Phenomena (Spence et al., 1997).** This is a 7-item scale rating lifetime passivity phenomena in the domains of thought, impulses to act, actions, emotions, and bodily integrity. We used a modified version including one additional

item investigating passivity-like experience associated with depersonalization (“Have you ever felt as though you were detached from your body or thoughts?”). Patients were asked if they had *ever* had experiences related to each domain and responses were scored: ‘0’ if there was no such experience; ‘1’ if participants reported an external influence over their experience; and ‘2’ if participants reported that their experience was, in fact, that of an external entity. For example, when asking, “Have you ever felt that your thoughts were being influenced or altered in any way?”, a score of ‘1’ was given if participants reported that thoughts were their own, but that those thoughts were influenced by an external entity, whereas a score of ‘2’ was given if participants reported that their thoughts belonged to another entity. The total score, ranging from 0 to 16, was used as a global measure of the number and severity of classic passivity phenomena.

**Scale for the Assessment of Positive Symptoms (SAPS; Andreasen, 1984).** The SAPS is a 34-item interview that indexes the severity of positive symptoms of schizophrenia. The scale includes specific item and global ratings for hallucinations, delusions, bizarre behavior, and positive formal thought disorder. The SAPS is typically used to assess symptom severity within the previous month. In the current study, however, lifetime ratings for the most severe period were recorded in keeping with the measurement of extent of lifetime passivity phenomena according to the Passivity Scale. Severity was rated according to the SAPS manual as: absent (‘0’), questionable (‘1’), mild (‘2’), moderate (‘3’), marked (‘4’), or severe (‘5’).

**Sense of Agency Rating Scale (SOARS; Polito et al., 2013).** The SOARS is a 10-item scale designed to index intensity of subjective alterations to sense of agency related to some specific experience. Participants rate their level of agreement with statements on a 7-point Likert scale ranging from *strongly disagree* to *strongly agree*. The original SOARS comprises two subscales: *Involuntariness* and *Effortlessness*. However, several items in the *Effortlessness* subscale specifically refer to hypnotic suggestion and so this subscale was not included in the present study. The *Involuntariness* subscale comprises five items, such as “I felt that my experiences and actions were not caused by me” and indexes a subjectively experienced reduc-

tion in sense of control over one’s own actions. Patients responded to the *Involuntariness* probes in relation to their most salient experience of agency disruption, as determined by the experimenter (VP) – see below for further detail. Thus the SOARS *Involuntariness* score, ranging from 5 to 35, was a measure of the degree of self-reported reduction in subjective control associated with patients’ most significant symptom of agency disruption.

## Procedure

After initial written contact to obtain informed consent, the first author (VP) conducted a 60-minute structured telephone interview, comprising four sections: (a) basic and clinical demographic information (i.e., age, gender, psychiatric diagnosis, history of illness, current medications, and drug use); (b) administration of the Passivity Scale; (c) administration of the SAPS to rate lifetime symptom severity; and (d) administration of the SOARS probes targeting the participant’s most prominent reported instance of sense of agency alteration associated with their clinical symptoms. Training and supervision for these interviews was provided by the second author (RL), a senior clinical researcher. Training comprised a series of workshops and practice scoring of a series of video recorded patient interviews with comparison of scores and feedback from multiple practicing clinicians.

During administration of both the Passivity Scale and the SAPS interview, the experimenter made notes about the content of patients’ experiences so as to identify a significant occurrence of agency alteration for each individual and then used this specific event as the focus for the SOARS probes about *Involuntariness*. To identify the most suitable passivity-like target experience, we selected the first item patients responded to positively from the following predetermined list, in order of priority: “Made Movements” (Passivity Scale item 5), “Made Hand Movements” (Passivity Scale item 6), “Altered Impulses” (Passivity Scale item 7), “Altered Thoughts” (Passivity Scale item 1), “Altered Emotions” (Passivity Scale item 3), “Mind Reading” (Passivity Scale item 2), “Somatic Passivity” (Passivity Scale item 4), “Depersonalization” (Passivity Scale item 8), “Delusions of Control” (SAPS item 15), “Thought Insertion” (SAPS item 18), “Thought Withdrawal”

(SAPS item 19), “Voices Conversing” (SAPS item 3), “Voices Commenting” (SAPS item 2), “Thought Broadcast” (SAPS item 17), and “Delusions of Mind Reading” (SAPS item 16). Target experiences based on “Made Movements,” “Made Hand Movements,” “Somatic Passivity,” “Depersonalization,” or “Delusions of Control” were classified as agency alterations related to body movements and all other target experiences were classified as agency alterations related to thoughts.

To probe patients’ *Involuntariness* using the SOARS items, the experimenter began by reminding patients of the selected target experience and asking them for further details. For example, participant #20 scored ‘1’ for Made Hand Movements (Passivity Scale item 6), and had described an experience of her hands making gestures automatically. In this case, the experimenter said “Earlier you told me about the experience of your hands making gestures automatically, all by themselves. Think back to that experience. Can you tell me a bit more about what that was like?” If participants expressed uncertainty about the target experience, the experimenter reviewed previous ratings (according to the priority outlined above) to identify an experience the patient was able to recall and describe fluently. Finally, the experimenter administered the SOARS *Involuntariness* subscale, asking patients to rate their sense of agency during the specific target experience.

## Results

Because of skewed data, nonparametric tests were used in the following analyses unless otherwise noted. Table 1 summarizes descriptives for the Passivity Scale score and the SAPS lifetime ratings. Patients reported modest levels of passivity phenomena (e.g., 65.4% of patients

scored four or less on the passivity scale) and mild-to-severe levels of lifetime positive symptoms, with the exception of the lifetime thought disorder rating. With regard to the latter, only 31.8% of participants scored greater than zero for lifetime positive thought disorder.

## Experiences of Altered Agency in the Clinical Sample

We first addressed participants’ SOARS *Involuntariness* ratings about their targeted altered agency experience. The mean *Involuntariness* score for the entire sample was 23.27 ( $SD = 4.70$ ), indicating a considerable level of agency alteration associated with the targeted clinical experiences. Ten patients (38.5%) identified target experiences related to an altered sense of agency for body movements, and 16 patients (61.5%) identified experiences related to an altered sense of agency for thoughts. We found no difference in *Involuntariness* scores for patients who focused on altered agency experiences related to body movements (median = 22.50) as compared with patients who focused on altered agency experiences related to thoughts (median = 23.00),  $U = 76.00$ ,  $p = .845$ . Patients whose target experience involved altered agency related to body movements did have higher Passivity Scale scores (median = 5.00) than patients whose target experience involved thoughts (median = 2.50),  $U = 37.00$ ,  $p = .021$ , but SAPS global ratings did not differ between these two subgroups (all  $p > .225$ ).

Next we compared the SOARS *Involuntariness* scores for the 21 patients who had reported any history of passivity phenomena according to the Passivity Scale (i.e., a Passivity Scale score  $> 0$ ) compared with the five patients who reported no lifetime history of passivity phenomena (i.e., a Passivity Scale score = 0). Al-

Table 1  
Scale for the Assessment of Passivity Phenomena Score and Scale for the Assessment of Positive Symptoms Global Scores

Measure	Mean	SD	Median	Minimum	Maximum
Passivity Scale score	3.65	2.80	3.50	0	10
SAPS hallucinations	2.85	1.64	3.00	0	5
SAPS delusions	4.20	1.38	5.00	0	5
SAPS bizarre behavior	2.09	1.44	2.50	0	4
SAPS positive formal thought disorder	0.68	1.13	0.00	0	4

though we acknowledge the small number in the latter group, it is of note that there was no difference between these subgroups, with the median for the passivity group = 23.00 and median for the no passivity group = 21.00,  $U = 32.00$ ,  $p = .190$ .

Table 2 shows correlations between the Passivity Scale score (indicating number and severity of classic passivity phenomena), the SOARS *Involuntariness* score (indicating intensity of the most significant reported clinical agency disruption), and the SAPS global ratings (indicating lifetime severity of general positive symptoms of schizophrenia). Contrary to expectation, there was no significant association between the Passivity Scale score and the *Involuntariness* rating for the targeted experience. The *Involuntariness* rating was significantly correlated with the lifetime SAPS hallucinations rating ( $\rho = .437$ ,  $p = .026$ ), however, indicating that patients who reported more severe hallucinations at some point in their lives reported a greater level of reduction in their sense of subjective control for the targeted experience. In contrast, Passivity Scale scores were significantly correlated with the SAPS delusions rating ( $\rho = .462$ ,  $p = .020$ ), such that patients who reported greater levels of passivity phenomena were more likely to experience more severe delusions.

### Comparing Schizophrenia and Hypnosis

Finally, we used one-way ANOVA to compare this sample's SOARS *Involuntariness* scores with those of a large sample of healthy participants who had completed a standardized hypnosis screening and rated their experiences in hypnosis using the SOARS (Polito et al., 2013). Participants in the comparison sample were categorized into three levels of hypnotiz-

ability based on a modified 10-item version of the Harvard Group Scale of Hypnotic Susceptibility, Form A (Shor & Orne, 1962). Participants scoring between 0 and 3 were classified as low hypnotizable ( $n = 127$ ), between 4 and 6 as medium hypnotizable ( $n = 181$ ), and between 7 and 10 as high hypnotizable ( $n = 62$ ). *Involuntariness* was shown to correlate positively with hypnotizability in the comparison sample.

An ANOVA comparing the above three non-clinical groups to the clinical sample (i.e., four groups in total: the current clinical sample plus low, medium, and high hypnotizable participants from the nonclinical sample) revealed a significant main effect of group for the SOARS *Involuntariness* ratings,  $F(3, 394) = 54.56$ ,  $p < .0005$ . Simple contrasts with a Bonferroni correction revealed that the current clinical sample reported significantly higher levels of *Involuntariness* ( $M = 23.26$ ,  $SD = 4.60$ ) than the nonclinical low hypnotizable ( $M = 12.98$ ,  $SD = 5.82$ ;  $p < .0005$ ) and medium hypnotizable participants ( $M = 18.83$ ,  $SD = 6.42$ ;  $p = .003$ ). There was no difference, however, between the current sample and the nonclinical high hypnotizable participants ( $M = 23.56$ ,  $SD = 5.82$ ;  $p = 1.000$ ). This result indicates that the agency alterations reported by patients in this study in relation to their most significant clinical agency alteration were more pronounced than those reported by low and medium hypnotizable participants, but comparable with the ratings of the experiences of nonclinical high hypnotizable participants when in hypnosis.

### Discussion

The aim of this study was to examine the relationships between schizophrenia patients' agentic experiences related to a targeted pas-

Table 2  
*Spearman's Correlations Between the Sense of Agency Rating Scale Involuntariness Rating, Scale for the Assessment of Passivity Phenomena Score, and Scale for the Assessment of Positive Symptoms Global Ratings*

Measure	Passivity Scale	Global hallucinations	Global delusions	Global bizarre	Global PFTD
SOARS involuntariness	.308	.437*	.195	.330	.016
Passivity Scale		.144	.462*	.222	.113

\* Correlation is significant at the 0.05 level (2-tailed).

sivity-like phenomenon and their other positive schizophrenia symptoms, including classic passivity phenomena. Our first prediction was that patients whose target experiences were related to their body movements would report greater agency disruption related to those target experiences than patients whose target experiences were related to their thoughts. This prediction was not supported. Patients reported considerable levels of *Involuntariness* regardless of whether their target experience involved agency disruptions for body movements or for thoughts. Integrative accounts of sense of agency (Moore & Fletcher, 2012; Synofzik et al., 2008) suggest that determination of self as the causal force behind thoughts or actions depends on the integration of internal motoric signals, inferential processes, and external cues. According to these models, agency for body actions is determined largely through monitoring motor signals and predicting sensory outcomes. These indicators would be less available for sense of agency concerning thoughts (Vosgerau & Newen, 2007). Sense of agency for thoughts may therefore depend more on inferential and contextual processing of alternate cues (involving, e.g., metacognition; Carruthers, 2012). Importantly, the current study's result concerning *Involuntariness* indicates that the phenomenology of altered agentive experience is equivalent for body-related and thought-related experience, despite these likely depending on integration of distinct indicators and cues.

Our second prediction was that there would be a relationship between intensity of agency disruption, as assessed using the SOARS *Involuntariness* score for a targeted experience and the number and severity of different passivity phenomena. This prediction was not supported, nor was there any difference in SOARS *Involuntariness* scores for participants who had experienced any of the more classic passivity phenomena compared to those who had not. We suggest three potential explanations for these surprising findings. First, participants in this study were not prescreened for their specific symptoms. Consequently, it turned out that, despite reporting significant levels of delusion (SAPS lifetime delusion severity  $M = 4.20$ ), Passivity Scale scores in this sample were only moderate. Specifically, 65.4% of patients scored four or less on the Passivity Scale. This may be due to

generalized difficulties in recall apparent in patients with schizophrenia (Lee & Park, 2005), although by way of comparison, Maruff et al. (2005) used a cut-off score of five or greater on a shortened version of the Passivity Scale as inclusion criteria for patients with passivity phenomena in their study. It may be that there was not enough variation in scores of global passivity in our sample to properly assess the relationship with sense of altered agency concerning a targeted experience. Second, the SOARS *Involuntariness* rating and the Passivity Scale score are conceptually quite different. Whereas the Passivity Scale provided a measure of the number and severity of a range of passivity symptoms over a patient's lifetime, the SOARS *Involuntariness* score measured the intensity of the most significant recalled lifetime occurrence of a single passivity-related clinical symptom. Thus, it appears that the intensity of a single passivity-like experience and the scope of all passivity experiences are unrelated in our clinical sample. Consistent with this suggestion, it also appears that patients with schizophrenia can experience quite intense sense of agency alterations even in the absence of classic passivity phenomena, as occurred, for example, with the patients with zero Passivity Scale score (see also Maeda et al., 2013). This possibility is taken up in greater detail in addressing our next prediction.

Our third prediction was that there would be a relationship between sense of agency disruption and severity of general positive symptoms. This prediction was only partially supported, however, by a significant correlation between the SOARS *Involuntariness* rating and the SAPS global hallucinations rating. There were no significant relationships with the other SAPS global scores. A relationship with the SAPS global delusions rating may have been difficult to establish given the generally high delusions ratings (and consequent high negative skew: refer again to Table 1). Similarly, the SAPS global score for positive formal thought disorder was also highly skewed, although in the positive direction. Nevertheless, the finding of a relationship between hallucinations and agency alteration is of interest; recall that the greater the severity of patients' lifetime hallucinations, the greater their level of agency disruption related to a targeted passivity-like experience. That there were no other relations with positive

symptoms may be partially consistent with the intentional binding research of Haggard et al. (2003), Voss et al. (2010), and Maeda et al. (2013), who have previously shown various changes in sense of agency for patients in schizophrenia, in general; that is, that were not specific to patients experiencing passivity phenomena. The current findings support the notion that altered sense of agency may be a more general occurrence in schizophrenia, rather than being restricted to patients with classic passivity symptoms.

We also compared the agentic experiences of patients in this clinical sample with the experiences of nonclinical participants in hypnosis. We found that patients showed significantly greater levels of SOARS *Involuntariness* ratings for their targeted passivity-like experience than both low and medium hypnotizable participants showed in their ratings of hypnosis, but very similar ratings to high hypnotizable, nonclinical participants. In other words, patients' ratings of their sense of agency during their most significant reported episode of clinical agency alteration were similar to high hypnotizable participants' ratings of their experiences in hypnosis. More generally, this result provides further evidence that the phenomenology of agency alteration can be quite similar across clinical and nonclinical contexts, regardless of the specific antecedent causes.

There are three major implications from this study's findings. First, alterations to sense of agency may be a general occurrence in schizophrenia and not just a feature of classic passivity symptoms. The strongest evidence for this claim comes from consistent *Involuntariness* scores across patients regardless of the presence or absence of classic passivity phenomena. Passivity phenomena do involve very clear impairments in self versus other recognition and patients' narrative accounts of these symptoms emphasize altered experiences of agency (Maes & Van Gool, 2008; Mellor, 1970). It is not surprising then that these particular symptoms have been associated with alterations in sense of agency in the clinical literature on passivity (e.g., Hauser et al., 2011; Lindner et al., 2005; Synofzik et al., 2010). This narrow conception of the scope of symptoms associated with altered sense of agency has likely been further emphasized by the focus within clinical agency research on comparator model explanations of

self-monitoring impairments as the fundamental cause of passivity phenomena (Waters & Badcock, 2010). The current findings suggest, however, that patients with schizophrenia also can experience a reduced sense of agency when classic passivity symptoms are absent. There has been very little systematic investigation into sense of agency associated with the nonclassic passivity-like symptoms of schizophrenia. Studies that have investigated altered sense of agency in schizophrenia more broadly (Voss et al., 2010) have provided evidence that altered agency is associated with positive symptoms of schizophrenia in general. A promising direction for future research may be further examination of sense of agency experiences associated with symptoms not typically considered to involve a loss of boundary between self and other, such as delusions of guilt or disturbed speech.

The second implication of this study is that the phenomenology of agency alteration is similar for experiences related to body movements and thoughts, and similar across both clinical and (some) nonclinical individuals. With regard to the former, we found that potentially quite different clinical instances of impairments to the sense of self agency (i.e., body-related vs. thought-related: Vosgerau & Newen, 2007) led to equivalent subjective experiences of aberrant agency. Even more significantly, however, our results showed that schizophrenia patients' ratings of agency alterations were quite similar to nonclinical high hypnotizable participants' reported experiences in hypnosis.

At first glance, it seems surprising that individuals' experiences in both cases would be so similar. After all, patients typically report agency alterations as highly disturbing and distressing (Mullins & Spence, 2003), whereas this is not the case for hypnosis. However, it has been proposed that the normal sense of agency is a stable and consistent aspect of consciousness, applicable to self-generated actions in any context (Bayne, 2008). One possible interpretation of the similarity between the patients' and nonclinical, high hypnotizable participants' ratings of altered agency is that similar cognitive processes may underlie agency alteration in both schizophrenia and in hypnosis, however patients—perhaps because of their other symptoms—may evaluate and interpret these alterations very differently. Indeed the 'dissociated control' and 'dissociated experience' theories of

hypnotic responding are conceptually very similar to the comparator model account of passivity experiences in schizophrenia (see [Woody & Sadler, 2008](#) for a detailed discussion of the similarities). Briefly, these hypnotic theories distinguish between executive control, which involves the voluntary initiation or termination of actions and thoughts, and executive monitoring, which involves representation of perceptual and cognitive objects in conscious awareness. Dissociated control theory claims that hypnosis influences executive control processes, leading to changes in the way actions are produced. Dissociated experience theory claims that hypnosis influences executive monitoring processes, leading to changes in the way that self-generated actions are perceived. In both cases, these alterations are thought to influence sense of agency. This dual-process model of executive functioning is consistent with the comparator model account of producing motor actions and monitoring the effects of those actions. If the same (or similar) cognitive processes underlie both passivity symptoms in schizophrenia and hypnotic responding, then it is not surprising that the phenomenology of agency is similar in these different contexts. There is some support for this proposed similarity from imaging data. [Blakemore, Oakley, and Frith \(2003\)](#) found activation in the parietal cortex and the cerebellum during hypnotic responding, and these are areas that have previously been associated with disrupted comparator model processes in schizophrenia ([Blakemore, Wolpert, & Frith, 2000](#); [Frith, Blakemore, & Wolpert, 2000b](#)).

An alternate explanation for the consistency of ratings across clinical and hypnotic contexts is that similar agentive experiences might result from quite different physiological and psychological mechanisms. In other words, different mechanisms might underlie passivity phenomena and hypnotic responding, but the subjective experiences that result may be similar. ‘Cue integration’ accounts provide a framework for how this might occur ([Moore & Fletcher, 2012](#); [Synofzik et al., 2008](#)). According to these accounts, sense of agency is not dependent on any one specific set of cognitive processes but results from integration of the most salient of a range of potential internal and external cues. For example, low-level motor system signals may be an important indication of self-

generated actions, but in cases where these signals are unavailable or less reliable, sense of agency may be influenced more by inferential or situational cues ([Wegner & Sparrow, 2004](#)). Cue integration models thus have the potential to explain normal and altered sense of agency in a wide range of contexts, although to date they have not been employed in any detailed analysis of hypnosis. This would be a promising line of future research.

The final implication of this study is to highlight the potential of hypnosis to create and study cognitive and perceptual changes. An emerging field of research is the use of hypnosis to model psychopathology ([Bell, Oakley, Halligan, & Deeley, 2011](#); [Oakley & Halligan, 2013](#)). An assumption of these models is that hypnosis creates a compelling facsimile of clinical phenomenology. The current findings support this assumption and demonstrate that hypnotic models mirror the phenomenology of patients’ experience of altered agency in schizophrenia. The implication of this similarity is that these symptoms can be studied, at least on a functional level, within the context of hypnosis. At the surface level, empirical measurement using the SOARS indicates that experiences of *Involuntariness* are equivalent in schizophrenia and in hypnosis (for high hypnotizable participants). As with all hypnotic models, however, it is an open question how deep this similarity goes. It may be that hypnotic models activate the same or similar cognitive processes as clinical conditions. A more extreme possibility is that these models may even depend on the same or similar neural physiology ([Oakley, 2006](#); [Walsh, Oakley, Halligan, Mehta, & Deeley, 2015](#); [Woody & Szechtman, 2011](#)). In any case, even at the surface, functional level, the similarity of these contexts highlights the utility of hypnosis as a methodological tool for studying psychopathology and testing theoretical and practical elements of interventions that may be suitable for patients.

There were a number of limitations to this current study, and in light of these, it must be acknowledged that the current results should be considered as only a preliminary indication of promising relationships worthy of further study. The most obvious limitation was the relatively small clinical sample. A further limitation was the restricted range found for some of the symptom ratings of primary interest. This was a

likely consequence of drawing our participants from volunteer registers, such that only participants who were relatively high functioning and capable of participating in a telephone interview took part. As a consequence of the relatively high functioning status of our participants, we modified the instructions of the SAPS and Passivity Scale to investigate lifetime ratings of symptoms and lifetime experiences of passivity phenomena. These modifications likely influenced the pattern of results. Future research with a more diverse sample of patients, investigating only recent symptoms and experiences, would provide an important replication of the current study's findings. A further complication was that some of our patients seemed to exhibit some difficulty in completing the SOARS. When scoring data we noticed that a subset of participants provided responses that seemed inconsistent with their descriptions of symptoms earlier in the interview. Follow-up interviews with these patients revealed some confusion in their understanding of SOARS items, particularly when asked to make ratings of negatively phrased items (e.g., "you felt that your experience of <event/symptom> was not caused by you"). Future application of the SOARS in a clinical setting would benefit from careful explanation of each scale item and confirmation that patients have properly understood what is being asked and/or rephrasing items for a clinical sample. Notably, this study focused on an investigation of sense of agency as indexed only by the SOARS *Involuntariness* subscale. This subscale taps agency alteration characterized by feelings of subjective control. Previous research has highlighted that sense of agency is best understood as a multifactorial construct with at least two components—*Involuntariness* and *Effortlessness* (Polito et al., 2013, 2014). The latter could not be examined in the current study because the wording of several of the SOARS *Effortlessness* items was not suited to the symptoms of schizophrenia. Since completing this research we have developed a general version of the SOARS *Effortlessness* subscale suitable for nonhypnotic contexts. This will be published in a forthcoming study (the scale items are available to interested researchers on request). A final limitation is that the experimenter was not blind to the hypotheses of the study. Although a strict interview protocol was followed, results may have been influenced by inadvertent re-

searcher bias. Future research would be strengthened by using independent interviewers.

Despite these limitations, the current study highlights significant relationships between sense of agency and clinical symptoms in schizophrenia through three important findings. First, we showed that patients experience alterations in their sense of agency associated with schizophrenia regardless of whether their targeted passivity-like symptom was among the classic passivity phenomena. Second, we outlined converging evidence for the idea that the subjective characteristics of altered sense of agency are stable and consistent regardless of the event that leads to the sense of agency alterations (i.e., whether about body-related or thought-related events) and across clinical and nonclinical contexts. Finally, a comparison of the agentive experiences of patients and nonclinical high hypnotizable participants showed that these two groups reported equivalent alterations of agency. This similarity provides strong support for the use of hypnosis to test theories of passivity phenomena, consistent with the general utility of hypnosis in increasing our understanding of clinical conditions and for evaluating theoretically sound, clinically relevant interventions.

## References

- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.
- Andreasen, N. C. (1984). *Scale for the assessment of positive symptoms*. Iowa City, IA: University of Iowa.
- Barnier, A. J., Cox, R. E., Connors, M., Langdon, R., & Coltheart, M. (2010). A stranger in the looking glass: Developing and challenging a hypnotic mirrored-self misidentification delusion. *International Journal of Clinical and Experimental Hypnosis*, 59, 1–26. <http://dx.doi.org/10.1080/00207144.2011.522863>
- Bayne, T. (2008). The phenomenology of agency. *Philosophy Compass*, 3, 182–202. <http://dx.doi.org/10.1111/j.1747-9991.2007.00122.x>
- Bell, V., Oakley, D. A., Halligan, P. W., & Deeley, Q. (2011). Dissociation in hysteria and hypnosis: Evidence from cognitive neuroscience. *Journal of Neurology, Neurosurgery, & Psychiatry*, 82, 332–339. <http://dx.doi.org/10.1136/jnnp.2009.199158>

- Blakemore, S. J., Oakley, D. A., & Frith, C. D. (2003). Delusions of alien control in the normal brain. *Neuropsychologia*, *41*, 1058–1067. [http://dx.doi.org/10.1016/S0028-3932\(02\)00313-5](http://dx.doi.org/10.1016/S0028-3932(02)00313-5)
- Blakemore, S. J., Smith, J., Steel, R., Johnstone, C. E., & Frith, C. D. (2000). The perception of self-produced sensory stimuli in patients with auditory hallucinations and passivity experiences: Evidence for a breakdown in self-monitoring. *Psychological Medicine*, *30*, 1131–1139. <http://dx.doi.org/10.1017/S0033291799002676>
- Blakemore, S. J., Wolpert, D., & Frith, C. (2000). Why can't you tickle yourself? *NeuroReport: For Rapid Communication of Neuroscience Research*, *11*, R11–R16. <http://dx.doi.org/10.1097/00001756-200008030-00002>
- Bortolotti, L., Cox, R. E., & Barnier, A. J. (2012). Can we recreate delusions in the laboratory? *Philosophical Psychology*, *25*, 109–131. <http://dx.doi.org/10.1080/09515089.2011.569909>
- Cardeña, E. (1994). The domain of dissociation. In S. J. Lynn & J. W. Rhue (Eds.), *Dissociation: Clinical and theoretical perspectives* (pp. 15–31). New York, NY: Guilford Press.
- Carruthers, G. (2012). A metacognitive model of the sense of agency over thoughts. *Cognitive Neuropsychiatry*, *17*, 291–314.
- Castle, D. J., Jablensky, A., McGrath, J. J., Carr, V., Morgan, V., Waterreus, A., . . . Farmer, A. (2006). The diagnostic interview for psychoses (DIP): Development, reliability and applications. *Psychological Medicine*, *36*, 69–80. <http://dx.doi.org/10.1017/S0033291705005969>
- Connors, M. H., Barnier, A. J., Langdon, R. A., Cox, R. E., Polito, V., & Coltheart, M. (2014). Delusions in the hypnosis laboratory: Modeling different pathways to mirrored-self misidentification. *Psychology of Consciousness: Theory, Research, and Practice*, *1*, 184–198.
- Deeley, Q., Oakley, D. A., Walsh, E., Bell, V., Mehta, M. A., & Halligan, P. W. (2014). Modeling psychiatric and cultural possession phenomena with suggestion and fMRI. *Cortex*, *53*, 107–119. <http://dx.doi.org/10.1016/j.cortex.2014.01.004>
- Feinberg, I. (1978). Efference copy and corollary discharge: Implications for thinking and its disorders. *Schizophrenia Bulletin*, *4*, 636–640. <http://dx.doi.org/10.1093/schbul/4.4.636>
- Franck, N., Farrer, C., Georgieff, N., Marie-Cardine, M., Daléry, J., d'Amato, T., & Jeannerod, M. (2001). Defective recognition of one's own actions in patients with schizophrenia. *The American Journal of Psychiatry*, *158*, 454–459. <http://dx.doi.org/10.1176/appi.ajp.158.3.454>
- Frith, C. (2005). The self in action: Lessons from delusions of control. *Consciousness and Cognition*, *14*, 752–770. <http://dx.doi.org/10.1016/j.concog.2005.04.002>
- Frith, C. (2012). Explaining delusions of control: The comparator model 20 years on. *Consciousness and Cognition*, *21*, 52–54. <http://dx.doi.org/10.1016/j.concog.2011.06.010>
- Frith, C. D., Blakemore, S., & Wolpert, D. M. (2000a). Explaining the symptoms of schizophrenia: Abnormalities in the awareness of action. *Brain Research Reviews*, *31*(2–3), 357–363. [http://dx.doi.org/10.1016/S0165-0173\(99\)00052-1](http://dx.doi.org/10.1016/S0165-0173(99)00052-1)
- Frith, C. D., Blakemore, S. J., & Wolpert, D. M. (2000b). Abnormalities in the awareness and control of action. *Philosophical Transactions of the Royal Society of London Series B, Biological Sciences*, *355*, 1771–1788. <http://dx.doi.org/10.1098/rstb.2000.0734>
- Frith, C. D., & Done, D. J. (1989). Experiences of alien control in schizophrenia reflect a disorder in the central monitoring of action. *Psychological Medicine*, *19*, 359–363. <http://dx.doi.org/10.1017/s003329170001240x>
- Gerrans, P. (2015). The feeling of thinking: Sense of agency in delusions of thought insertion. *Psychology of Consciousness: Theory, Research, and Practice*, *2*, 291–300. <http://dx.doi.org/10.1037/cns0000060>
- Haggard, P., Martin, F., Taylor-Clarke, M., Jeannerod, M., & Franck, N. (2003). Awareness of action in schizophrenia. *NeuroReport: For Rapid Communication of Neuroscience Research*, *14*, 1081–1085. <http://dx.doi.org/10.1097/01.wnr.0000073684.00308.c0>
- Hauser, M., Knoblich, G., Repp, B. H., Lautenschlager, M., Gallinat, J., Heinz, A., & Voss, M. (2011). Altered sense of agency in schizophrenia and the putative psychotic prodrome. *Psychiatry Research*, *186*, 170–176. <http://dx.doi.org/10.1016/j.psychres.2010.08.003>
- Jones, S. R., & Fernyhough, C. (2007). Thought as action: Inner speech, self-monitoring, and auditory verbal hallucinations. *Consciousness and Cognition*, *16*, 391–399. <http://dx.doi.org/10.1016/j.concog.2005.12.003>
- Koehler, K. (1979). First rank symptoms of schizophrenia: Questions concerning clinical boundaries. *The British Journal of Psychiatry*, *134*, 236–248. <http://dx.doi.org/10.1192/bjp.134.3.236>
- Lee, J., & Park, S. (2005). Working memory impairments in schizophrenia: A meta-analysis. *Journal of Abnormal Psychology*, *114*, 599–611. <http://dx.doi.org/10.1037/0021-843X.114.4.599>
- Lindner, A., Thier, P., Kircher, T. T. J., Haarmeier, T., & Leube, D. T. (2005). Disorders of agency in schizophrenia correlate with an inability to compensate for the sensory consequences of actions. *Current Biology*, *15*, 1119–1124. <http://dx.doi.org/10.1016/j.cub.2005.05.049>

- Maeda, T., Takahata, K., Muramatsu, T., Okimura, T., Koreki, A., Iwashita, S., . . . Kato, M. (2013). Reduced sense of agency in chronic schizophrenia with predominant negative symptoms. *Psychiatry Research*, *209*, 386–392. <http://dx.doi.org/10.1016/j.psychres.2013.04.017>
- Maes, J., & Van Gool, A. (2008). Misattribution of agency in schizophrenia: An exploration of historical first-person accounts. *Phenomenology and the Cognitive Sciences*, *7*, 191–202. <http://dx.doi.org/10.1007/s11097-007-9082-y>
- Maruff, P., Wood, S. J., Velakoulis, D., Smith, D. J., Soulsby, B., Suckling, J., . . . Pantelis, C. (2005). Reduced volume of parietal and frontal association areas in patients with schizophrenia characterized by passivity delusions. *Psychological Medicine*, *35*, 783–789. <http://dx.doi.org/10.1017/S0033291704003113>
- Mellor, C. S. (1970). First rank symptoms of schizophrenia. I. The frequency in schizophrenics on admission to hospital. II. Differences between individual first rank symptoms. *The British Journal of Psychiatry*, *117*, 15–23.
- Mlakar, J., Jensterle, J., & Frith, C. D. (1994). Central monitoring deficiency and schizophrenic symptoms. *Psychological Medicine*, *24*, 557–564. <http://dx.doi.org/10.1017/S0033291700027719>
- Moore, J. W., & Fletcher, P. C. (2012). Sense of agency in health and disease: A review of cue integration approaches. *Consciousness and Cognition*, *21*, 59–68. <http://dx.doi.org/10.1016/j.concog.2011.08.010>
- Moore, J. W., Wegner, D. M., & Haggard, P. (2009). Modulating the sense of agency with external cues. *Consciousness and Cognition*, *18*, 1056–1064. <http://dx.doi.org/10.1016/j.concog.2009.05.004>
- Mullins, S., & Spence, S. A. (2003). Re-examining thought insertion. Semi-structured literature review and conceptual analysis. *The British Journal of Psychiatry*, *182*, 293–298. <http://dx.doi.org/10.1192/bjp.182.4.293>
- Nordgaard, J., Arnfred, S. M., Handest, P., & Parnas, J. (2008). The diagnostic status of first-rank symptoms. *Schizophrenia Bulletin*, *34*, 137–154. <http://dx.doi.org/10.1093/schbul/sbm044>
- Oakley, D. A. (2006). Hypnosis as a tool in research: Experimental psychopathology. *Contemporary Hypnosis*, *23*, 3–14. <http://dx.doi.org/10.1002/ch.34>
- Oakley, D. A., & Halligan, P. W. (2013). Hypnotic suggestion: Opportunities for cognitive neuroscience. *Nature Reviews Neuroscience*, *14*, 565–576. <http://dx.doi.org/10.1038/nrn3538>
- Polito, V., Barnier, A. J., & Woody, E. Z. (2013). Developing the Sense of Agency Rating Scale (SOARS): An empirical measure of agency disruption in hypnosis. *Consciousness and Cognition*, *22*, 684–696. <http://dx.doi.org/10.1016/j.concog.2013.04.003>
- Polito, V., Barnier, A. J., Woody, E. Z., & Connors, M. H. (2014). Measuring agency change across the domain of hypnosis. *Psychology of Consciousness: Theory, Research, and Practice*, *1*, 3–19. <http://dx.doi.org/10.1037/cns0000010>
- Rahmanovic, A., Barnier, A. J., Cox, R. E., Langdon, R. A., & Coltheart, M. (2012). “That’s not my arm”: A hypnotic analogue of somatoparaphrenia. *Cognitive Neuropsychiatry*, *17*, 36–63. <http://dx.doi.org/10.1080/13546805.2011.564925>
- Sass, L. A., & Parnas, J. (2003). Schizophrenia, consciousness, and the self. *Schizophrenia Bulletin*, *29*, 427–444. <http://dx.doi.org/10.1093/oxford-journals.schbul.a007017>
- Seal, M. L., Aleman, A., & McGuire, P. K. (2004). Compelling imagery, unanticipated speech and deceptive memory: Neurocognitive models of auditory verbal hallucinations in schizophrenia. *Cognitive Neuropsychiatry*, *9*(1–2), 43–72. <http://dx.doi.org/10.1080/13546800344000156>
- Shor, R. E., & Orne, E. C. (1962). *The Harvard Group Scale of Hypnotic Susceptibility, Form A*. Palo Alto, CA: Consulting Psychologists Press.
- Spence, S. (2001). Alien control: From phenomenology to cognitive neurobiology. *Philosophy, Psychiatry, & Psychology*, *8*, 163–172. <http://dx.doi.org/10.1353/ppp.2001.0017>
- Spence, S. A., Brooks, D. J., Hirsch, S. R., Liddle, P. F., Meehan, J., & Grasby, P. M. (1997). A PET study of voluntary movement in schizophrenic patients experiencing passivity phenomena (delusions of alien control). *Brain: A Journal of Neurology*, *120*, 1997–2011. <http://dx.doi.org/10.1093/brain/120.11.1997>
- Sugimori, E., Asai, T., & Tanno, Y. (2011). Sense of agency over thought: External misattribution of thought in a memory task and proneness to auditory hallucination. *Consciousness and Cognition*, *20*, 688–695. <http://dx.doi.org/10.1016/j.concog.2010.12.014>
- Synofzik, M., Thier, P., Leube, D. T., Schlotterbeck, P., & Lindner, A. (2010). Misattributions of agency in schizophrenia are based on imprecise predictions about the sensory consequences of one’s actions. *Brain: A Journal of Neurology*, *133*, 262–271. <http://dx.doi.org/10.1093/brain/awp291>
- Synofzik, M., Vosgerau, G., & Newen, A. (2008). Beyond the comparator model: A multifactorial two-step account of agency. *Consciousness and Cognition*, *17*, 219–239. <http://dx.doi.org/10.1016/j.concog.2007.03.010>
- Vosgerau, G., & Newen, A. (2007). Thoughts, motor actions, and the self. *Mind & Language*, *22*, 22–43. <http://dx.doi.org/10.1111/j.1468-0017.2006.00298.x>

- Voss, M., Moore, J., Hauser, M., Gallinat, J., Heinz, A., & Haggard, P. (2010). Altered awareness of action in schizophrenia: A specific deficit in predicting action consequences. *Brain: A Journal of Neurology*, *133*, 3104–3112. <http://dx.doi.org/10.1093/brain/awq152>
- Walsh, E., Mehta, M. A., Oakley, D. A., Guilmette, D. N., Gabay, A., Halligan, P. W., & Deeley, Q. (2014). Using suggestion to model different types of automatic writing. *Consciousness and Cognition*, *26*, 24–36. <http://dx.doi.org/10.1016/j.concog.2014.02.008>
- Walsh, E., Oakley, D. A., Halligan, P. W., Mehta, M. A., & Deeley, Q. (2015). The functional anatomy and connectivity of thought insertion and alien control of movement. *Cortex*, *64*, 380–393. <http://dx.doi.org/10.1016/j.cortex.2014.09.012>
- Waters, F. A. V., & Badcock, J. C. (2010). First-rank symptoms in schizophrenia: Reexamining mechanisms of self-recognition. *Schizophrenia Bulletin*, *36*, 510–517. <http://dx.doi.org/10.1093/schbul/sbn112>
- Wegner, D. M., & Sparrow, B. (2004). Authorship processing. In M. Gazzaniga (Ed.), *The cognitive neurosciences* (pp. 1201–1209). Cambridge, MA: MIT Press.
- Woody, E. Z., & Sadler, P. (2008). Dissociation theories of hypnosis. In M. R. Nash & A. J. Barnier (Eds.), *The Oxford handbook of hypnosis: Theory, research and practice*. Oxford, UK: Oxford University Press. <http://dx.doi.org/10.1093/oxfordhb/9780198570097.013.0004>
- Woody, E. Z., & Szechtman, H. (2011). Using hypnosis to develop and test models of psychopathology. *Journal of Mind-Body Regulation*, *1*. Retrieved from <http://mbr.synergiesprairies.ca/cjh/index.php/mbr/article/view/468>
- World Health Organization. (2008). *ICD-10: International statistical classification of diseases and related health problems* (10th Rev. ed.). New York, NY: Author.

Received July 25, 2014

Revision received February 22, 2015

Accepted July 10, 2015 ■