



Developing the Sense of Agency Rating Scale (SOARS): An empirical measure of agency disruption in hypnosis

Vince Polito ^{a,*}, Amanda J. Barnier ^a, Erik Z. Woody ^b

^a Department of Cognitive Science and ARC Centre of Excellence in Cognition and its Disorders, Macquarie University, Sydney, Australia

^b University of Waterloo, Waterloo, Ontario, Canada

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ABSTRACT

Two experiments report on the construction of the Sense of Agency Rating Scale (SOARS), a new measure for quantifying alterations to agency. In Experiment 1, 370 participants completed a preliminary version of the scale following hypnosis. Factor analysis revealed two underlying factors: *Involuntariness* and *Effortlessness*. In Experiment 2, this two factor structure was confirmed in a sample of 113 low, medium and high hypnotisable participants. The two factors, *Involuntariness* and *Effortlessness*, correlated significantly with hypnotisability and pass rates for ideomotor, challenge and cognitive items. Twelve week test-retest correlations showed that *Involuntariness* was highly stable, but *Effortlessness* only moderately stable. Analysis of the combined datasets from Experiments 1 and 2 showed both SOARS scores were significantly related to the derived factors of Woody, Barnier, and McConkey's (2005) 4-factor model of hypnotisability. This scale clarifies conceptual confusion around agentive action and provides empirical support for a multifactorial account of sense of agency.

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1. Introduction

The experience of personal agency, the sense we have of controlling or initiating our actions, has been a topic of substantial research within cognitive science in recent years (e.g., Friston, 2012; Haggard, 2008; Pacherie, 2007). One domain in which marked alterations to sense of agency are regularly reported is that of hypnosis. One of the most striking aspects of hypnosis is the reduced sense of volition that high hypnotisable individuals experience when following suggestions (Hilgard, 1965; Kihlstrom, 1985; Lynn, 1997; Woody & McConkey, 2003). This change in feelings of control over one's actions in hypnosis has been called the 'classic suggestion effect' (Weitzenhoffer, 1974, p. 259) and is considered a defining characteristic of hypnotic behaviour. Kihlstrom (2008, p. 21) described the experiences of high hypnotisable people in hypnosis as involving "subjective conviction bordering on delusion, and involuntariness bordering on compulsion".

There are three challenges to understanding sense of agency in hypnosis. First, there is considerable theoretical disagreement among hypnosis researchers as to how and why hypnosis occurs and, in particular, the causes of alterations in the sense of agency. Second, there is no canonical method for assessing alterations to sense of agency in hypnosis. Third, across both theoretical and empirical research, labels and concepts have been applied inconsistently, leading to confusion over the terminology related to sense of agency.

* Corresponding author. Address: Department of Cognitive Science, Macquarie University, NSW 2109, Australia. Fax: +61 298508062.
E-mail address: vince.polito@mq.edu.au (V. Polito).

1.1. Theories of agency in hypnosis

Several competing theories purport to explain the phenomena of hypnosis and the associated shifts in sense of agency experienced by high hypnotisable individuals. Many of these theories distinguish between executive control and executive monitoring (Barnier & Oakley, 2009; Woody & Sadler, 2008). Executive control involves the voluntary initiation or termination of actions and thoughts. Executive monitoring involves the representation of perceptual and cognitive objects or events in conscious awareness. These processes interact to initiate and control self-generated actions. The various theories propose that hypnosis affects these cognitive systems in different ways.

One widely held view is that hypnosis affects executive monitoring processes while leaving executive control relatively intact (Hilgard, 1979; Kihlstrom, 2008). This position, known as dissociated experience theory (K. Bowers, 1990), claims that, during hypnosis, self-monitoring is impaired. Participants become unaware of particular aspects of their own cognition, including their intentions and volition. This leads to the impression that self-generated actions occur effortlessly although, in actuality, hypnotic responding does require cognitive effort. The involuntariness experienced in the hypnotic context, in this case, reflects a dissociation between experienced and actual levels of cognitive effort.

Social cognitive theories (Lynn, Kirsch, & Hallquist, 2008; Lynn, 1997; Spanos, 1986, 1991) provide another view of disruption to executive monitoring in hypnosis. These theories claim that the interaction of environmental factors (such as the setting in which hypnosis occurs), individual difference factors (such as the personality and motivation of the participant) and social factors (such as the expectations and attributions associated with the relationship between hypnotist and subject) leads to impairments in self-monitoring. Cognitive effort is required for hypnotic responding, but due to this impaired monitoring, the subjective experience of participants is that actions occur effortlessly. The involuntariness experienced in the hypnotic context, in this case, reflects a misattribution of the cause of self-generated actions.

A contrasting view is that hypnosis affects executive control while executive monitoring functions relatively normally (K. Bowers, 1992; Woody & Sadler, 1998, 2008). This position, known as dissociated control theory (Bowers & Davidson, 1991), claims that the hypnotic induction leads to a dissociation between executive control and lower level subsystems of action generation. Because of this dissociation, suggestions from the hypnotist directly activate participants' behaviour, bypassing the normal processes of effortful executive control. The involuntariness experienced in the hypnotic context, in this case, reflects genuinely low levels of cognitive effort. The positions outlined here do not represent a comprehensive account of theories of hypnosis. For other views see Jamieson (2007) and Barnier, Dienes, and Mitchell (2008).

For dissociated experience and social cognitive theories, reduced sense of agency is due to a disconnection between executive functioning and executive monitoring processes. For the dissociated control theory, a reduced sense of agency in hypnosis is due to a genuine reduction in the level of control individuals have over their actions. In all cases, however, the experience of (high hypnotisable) participants in hypnosis is marked by significant subjective alterations to sense of agency. To be able to differentiate between these accounts we need appropriate ways to index agency alteration.

1.2. Measures of agency in hypnosis

There has been no consensus over the best way to assess alterations to sense of agency in hypnosis and no canonical method has emerged. Despite the fact that agency alterations have been recognised as a central feature of hypnosis (Kihlstrom, 2008; Weitzenhoffer, 1974; Woody & McConkey, 2003), many researchers have focused on participants' subjective experiences more generally. Examples of detailed methodologies for assessing the phenomenology of hypnosis include the Experiential Analysis Technique (Sheehan & McConkey, 1982; EAT: Sheehan, 1992) and the Phenomenology of Consciousness Inventory (PCI: Pekala, 1991). Both of these methods provide a comprehensive overview of participants' experiences during hypnosis and include assessments of sense of agency. Unfortunately both of these techniques require considerable time to administer (the EAT is usually a 1 h interview whereas the PCI is a 53-item measure), and neither has been extensively used in hypnosis research. A more common method for assessing subjective experiences in hypnosis has been simply asking participants to make a single, retrospective, subjective rating of how a particular suggestion felt. These ratings have usually been administered as part of standardised measures of hypnotisability and typically have taken two forms: participants either have been asked to make numerical ratings of the degree to which they experienced involuntariness (or some related construct), or have been presented with several categorical descriptions of their subjective experience and asked to indicate which is the most accurate statement.

One difficulty with research involving numerical ratings is that participants have not always been asked to rate the same thing. The Carleton University Responsiveness to Suggestion Scale (Spanos, Radtke, Hodgins, Stam, & Bertrand, 1983) asks participants to rate the *intensity* with which they experience suggestions; the Creative Imagination Scale (Wilson & Barber, 1978) asks participants to rate the *similarity* of their experience of hypnotic suggestions to equivalent, non-hypnotic, events; adaptations to the Stanford Hypnotic Susceptibility Scale, Form C (SHSS:C; Weitzenhoffer & Hilgard, 1962) proposed by K. Bowers (1981) and P. Bowers (1982) ask participants to rate feelings of involuntariness; and the 'Inner Subjective Experiences Scale' (Kirsch, Council, & Wickless, 1990) asks for composite ratings of both realness and involuntariness.

Although each of these measures taps some aspect of subjective experience in hypnosis, the constructs investigated (intensity, realness and involuntariness) are not equivalent and it is unclear how each relates to sense of agency. Research into the heterogeneity of hypnotic performance has shown that high hypnotisable participants ("highs") use several distinct response styles (Sheehan & McConkey, 1982). For some types of highs, differing aspects of subjective experience could be

related to sense of agency. For example, according to Sheehan and McConkey (1982), highs who use a “constructive” cognitive style experience suggestions as compellingly real, while actively and effortfully constructing and synthesising the experience. These participants might be expected to rate the reality of suggestions as high but report low levels of involuntariness (but see Barnier & McConkey, 1999). Measures that confound sense of agency with the experienced reality of a suggestion would not provide an accurate account of the experiences of such individuals.

Another possibility is that agency alterations associated with different kinds of hypnotic suggestions may have different subjective effects. For instance, a reduction in agency following an ideomotor suggestion (e.g., for arm heaviness) may be experienced as subjective involuntariness, whereas a reduction in agency following a cognitive suggestion (e.g. for a visual hallucination) may be experienced as subjective realness (Barnier et al., 2008). In any case, numerical ratings that conceptualise subjective experience in hypnosis as a unidimensional construct seem to be incomplete and inadequate measures of sense of agency.

Categorical descriptors potentially allow for greater flexibility of responses when assessing subjective experiences. Researchers to date, however, have mainly used category scales only to assess the way in which feelings of involuntariness vary over time (Bowers, Laurence, & Hart, 1988; Kihlstrom, 2002). For example, Bowers et al. (1988) created a ‘choice scale’ with five categorical descriptions of potential subjective experiences, specific to each item on the SHSS:C. This scale was motivated by qualitative data from hypnotised participants indicating that involuntariness was not always experienced in a consistent and uniform manner when responding to suggestions. Along with straightforward response options indicating that actions in hypnosis occurred either deliberately or involuntarily, Bowers et al. included more complicated response options describing mixed feelings of purposeful control and involuntariness, as well as experiences of shifting control (such as participants initiating responses voluntarily only to find that they continued involuntarily). Unfortunately, options such as these, while allowing for nuanced descriptions of the degree to which involuntariness waxes and wanes over time, still conceptualise the range of possible experiences as simply falling on a unidimensional continuum from purposeful to involuntary action.

1.3. Confusion of agency terminology

This methodology review highlights a third challenge to understanding agency in hypnosis. In both theoretical accounts and empirical research, labels and terminology related to sense of agency have been used in inconsistent and potentially incompatible ways. Broadly speaking, hypnosis theorists conceptualise reduced sense of agency as either an illusory misinterpretation of the ease with which self-generated actions occur in the hypnotic context (dissociated experience and social cognitive theories; K. Bowers, 1990; Lynn et al., 2008) or a veridical assessment of the reduced levels of cognitive effort associated with hypnotic responding (dissociated control theory; K. Bowers, 1992). In empirical studies, inconsistent terminology and confounding of constructs such as intensity, realness and involuntariness has led to further confusion about how best to understand the shifts in sense of agency associated with hypnosis.

Research into sense of agency outside the domain of hypnosis has encountered similar conceptual and definitional difficulties. In the broader scientific literature, there are a great many words and phrases that have been associated with the experience of being an agent. Examples include ‘planned’ (Haggard, Poonian, & Walsh, 2009), ‘under control’ (Moretto, Walsh, & Haggard, 2011), ‘predictable’ (Sato & Yasuda, 2005), ‘self-generated’ (Teufel, Kingdon, Ingram, Wolpert, & Fletcher, 2010), ‘willed’ (Langdon, McLaren, Polito, Coltheart, & Ward, 2007), ‘intentional’ (Fotopoulou et al., 2008), ‘voluntary’ (Moore, Wegner, & Haggard, 2009), ‘automatic’ (Haggard & Johnson, 2003), ‘caused by me’ (Synofzik, Vosgerau, & Newen, 2008), ‘responsible’ (Kannape, Schwabe, Tadi, & Blanke, 2010) and ‘intentional’ (Obhi, Planetta, & Scantlebury, 2009). As is the case within the hypnosis literature, researchers have not applied this vocabulary consistently and it has not always been clear if various authors have been discussing the same concepts.

This definitional and conceptual confusion has been noted by several commentators (Bayne & Pacherie, 2007; Bayne, 2006, 2008). Bayne pointed out that due to inconsistencies in the way we define and describe agency, it may be that current theoretical models account for only some aspects of the phenomena and that academic descriptions may not accurately reflect the experienced phenomenology of real life agents. This has led to proposals that there may, in fact, be multiple, distinct components of sense of agency (Gallagher, 2000, 2012; Pacherie, 2007; Synofzik et al., 2008; de Vignemont & Fournieret, 2004). Two multi-dimensional frameworks are particularly useful.

Gallagher (2000, 2012) distinguished between a pre-reflective sense of agency and a reflective sense of agency. Pre-reflective agency consists of a minimal first-order self-awareness whereby individuals recognise themselves as the subject of their experiences. Experience of this pre-reflective sense of agency is not the result of any sort of introspection or monitoring, but is generated through primary sensory-motor processes. Reflective agency, by contrast, is a higher level introspective process that involves retrospective, self narrative explanations and may include descriptions of actions in terms of beliefs, desires or intentions. These two components of sense of agency have different phenomenologies and are based on a range of independent cognitive and motor indicators. The overall sense of agency for any particular action can be based on either one of these aspects of agentive experience, or on an integration of the two.

Synofzik et al. (2008) also proposed two distinct components of sense of agency. They differentiated between ‘feeling of agency’ and ‘judgement of agency’. ‘Feeling of agency’ is a non-conceptual, low level feeling of being the agent of an action. This results from bottom-up integration of perceptual representations of the relationship between self and the world (i.e., internal perceptual signals related to feed-forward cues, proprioception and sensory feedback). ‘Judgement of agency’ is a

conceptual or interpretive judgment of having caused some action. This results from top-down integration of propositional representations of the context in which an action has occurred (i.e. high level representations of intentions, social cues and thoughts). An individual's overall sense of agency in any given situation is the result of integration of these two components.

Although these two models differ in their specific characterisations of the underlying factors, these models both claim there are two components of sense of agency, based on distinct sets of perceptual or cognitive signals. Furthermore, both models claim that sense of agency is not always generated in the same way, but that it results from the integration of the most relevant influences on these two pathways at any given time.

In two experiments we sought to apply this nuanced understanding of the potential components of sense of agency to the hypnotic context. To do this, we constructed a psychometric scale with items based on a broad conceptual understanding of agency to clarify and operationalise the phenomenology of agency change in hypnosis. We undertook an analysis of the recent literature to identify terms and phrases that had been used to describe the phenomenology of being an agent. We then administered the resulting scale to participants during hypnosis.

There are three key advantages to developing and using such a scale in hypnosis. First, people vary considerably in their responsiveness to hypnosis. Individuals who are not very responsive to hypnosis would not be expected to experience any unusual alterations to their regular sense of agency, whereas high hypnotisable participants would be expected to experience a dramatically altered sense of agency. Including participants of differing levels of hypnotisability allowed us to analyse sense of agency in participants undergoing a wide range of experiences.

Second, a typical hypnosis session includes a number of different types of hypnotic suggestions. Specifically, hypnotic suggestions can be roughly categorised into three groups: ideomotor, challenge and cognitive (Hilgard, 1965; Woody & Barnier, 2008). Ideomotor suggestions involve a specific physical movement, such as raising an arm. Challenge suggestions involve participants being told they will have difficulty performing some task, such as opening their eyes, yet being instructed to perform the task anyway. Cognitive suggestions involve experiencing an imagined event, such as a mosquito flying around the room. Empirical studies of sense of agency outside of hypnosis typically involve asking participants to complete a single, albeit carefully manipulated, behavioural illusion task, often providing unexpected sensory feedback in response to participants' actions (Blakemore, Wolpert, & Frith, 1998; Sugimori, Asai, & Tanno, 2011). Investigating agency in hypnosis provides an opportunity to assess participants' responses to a range of striking agency alterations.

Third, although there has been considerable research into involuntariness in hypnosis (K. Bowers, 1981; P. Bowers, 1982; Bowers et al., 1988; Kirsch et al., 1990; Spanos et al., 1983; Wilson & Barber, 1978), this work has progressed, for the most part, separately from recent theoretical and empirical research into sense of agency more broadly. By constructing a scale based on a broad range of research within the cognitive sciences and then applying this specifically to the hypnotic context, we sought to integrate these bodies of research and to clarify some of the terminological and conceptual confusion around sense of agency. Our aim was to develop a new reliable measure that comprehensively sampled the relevant domain of alterations to sense of agency occurring in hypnosis. We did this by performing factor analysis on participants' responses to a wide range of agency descriptors, to clarify the most appropriate terminology to apply to agentive experience during hypnosis.

2. Experiment

In Experiment 1 we constructed a scale to measure sense of agency in hypnosis. We investigated retrospective reports of agency alterations in a large sample of participants experiencing hypnosis for the first time by administering a preliminary 48-item version of the Sense of Agency Rating Scale (SOARS) to participants immediately following the Harvard Group Scale of Hypnotic Susceptibility, Form A (HGSHS:A; Shor & Orne, 1962). This hypnotisability measure is the most frequently used and best normed standardised measure of hypnotisability (Barnier & McConkey, 2004; Woody & Barnier, 2008).

2.1. Method

2.1.1. Participants

We tested 370 undergraduate participants (240 female, 90 male, 40 not specified) at Macquarie University, of mean age 21.46 years ($SD = 5.75$). All participants were enrolled in a second year psychology course and were invited to participate in this research as part of a 2 h class on hypnosis.

2.1.2. Construction of the Sense of Agency Rating Scale

In the first phase of research, we constructed a scale to tap alterations to individuals' subjective sense of agency. We reviewed the psychological (Aarts, Custers, & Wegner, 2005; David, Newen, & Vogeley, 2008; Haggard & Johnson, 2003; Haggard & Tsakiris, 2009; Longo, Schüür, Kammers, Tsakiris, & Haggard, 2008; Tsakiris, Schütz-Bosbach, & Gallagher, 2007), philosophical (Carruthers, 2012; Gallagher, 2012; Hohwy, 2007; Nahmias, Morris, Nadelhoffer, & Turner, 2004; Nichols, 2011; de Vignemont & Fournier, 2004) and neuroscientific (Haggard, 2008; Spengler, Von Cramon, & Brass, 2009; Sperduti, Delaveau, Fossati, & Nadel, 2011; Tsakiris, Longo, & Haggard, 2010; Yomogida et al., 2010; Zhu, 2004) literatures. From this review we identified 24 of the most commonly used words and phrases to describe the subjective experience of agency. For each of these key phrases we generated two statements that could be applicable to an individual's experience of agency in

hypnosis: one that expressed the meaning of the key phrase and one that expressed the opposite meaning. Wherever possible we used antonyms rather than simply negating the key phrase. For example the key phrase 'passive' became 'I felt passive' and 'I felt active'; the phrase 'surprise' became 'I was surprised by my responses' and 'I was able to predict what my responses would be'. This resulted in a total of 48 items describing the experience of being an agent. These are shown in Table 1.

2.1.3. Administration of the HGSHS

A. We tested participants during a regular tutorial class for a unit on social and personality psychology. The HGSHS:A is a standardised measure of hypnotisability and was administered in this case via an audio recording played on CD. Our slightly modified version had been recorded using culturally appropriate Australian English by a voice actor with an Australian accent. The recording consisted of a 12 min hypnotic induction during which participants were instructed to relax, close their eyes and concentrate on the instructions being given, followed by 10 standard hypnotic suggestions: head falling, eye closure, hand lowering, finger lock, moving hands together, communication inhibition, experiencing of fly, eye catalepsy, post-hypnotic suggestion and posthypnotic amnesia. The standard HGSHS:A contains two additional items we did not use here for reasons of time: arm immobilisation and arm rigidity. Following the suggestions, a hypnotic deinduction instructed participants to slowly return to a state of alert wakefulness. Finally, we gave participants a scoring booklet in which they were asked to indicate whether their behaviour passed specific objective criteria for each suggestion (e.g., did they move their hand down at least 6 in. following the suggestion that their arm would feel heavy, or did they completely separate their hands after receiving the suggestion that their fingers would feel tightly stuck together). The number of behavioural criteria passed indicates a participant's hypnotisability.

2.1.4. Administration of the SOARS

After completing the HGSHS:A scoresheet, we asked participants to complete the 48-item SOARS. Items were presented in a pseudo-random order, such that alternate versions of each key phrase were never presented in succession. Participants indicated on a seven point Likert scale their level of agreement with each statement, ranging from "strongly disagree" (1) to "strongly agree" (7). We titled the scale 'Inner Subjective Experiences' and included the following instructions:

In this section we are interested in your inner, subjective experiences during hypnosis. We are as interested in vague, ambiguous experiences as we are in clear and powerful experiences. It is important to us to have your honest, candid report of the nature of your own experience, so that we can gain an accurate, scientific understanding of these phenomena.

Below are a series of statements about your experience. Please rate how much you agree with each statement, with a rating of '1' meaning that you strongly disagree, '4' meaning that you neither agree nor disagree and '7' meaning that you strongly agree.

You don't need to think too much about each statement, just circle the number that seems most accurate.

Table 1
Key phrases and corresponding scale items.

Key term	Negative item	Positive item
Effortful	My experiences and actions occurred effortlessly	My experiences and actions required my effort
Planned	My responses were unplanned	I planned my responses
Under control	My experiences and actions were not under my control	My experiences and actions were under my control
Surprising	I was able to predict what my responses would be	I was surprised by my responses
Self-generated	My experiences and actions felt coerced	My experiences and actions felt self-generated
Easy	Following suggestions was hard	Following suggestions was easy
Compliance	Things just happened to me	I tried to do the things I was asked
Willed	My experiences and actions did not feel willed by me	My experiences and actions felt willed by me
Chosen	I did not choose how to respond	I chose how to respond
Intentional	My responses were not intentional	I responded intentionally
Deliberate	I responded automatically	My responses were deliberate
Purposeful	My experiences and actions occurred by themselves	My experiences and actions were purposeful
Voluntary	My responses were involuntary	My responses were voluntary
Caused	I felt that my experiences and actions were not caused by me	I felt that my experiences and actions were caused by me
Inevitable	My experiences and actions felt like they occurred by chance	My experiences and actions felt inevitable
Absorbing	I was mostly just playing along	I was mostly absorbed in what was going on
Reluctant	I embraced the suggestions freely	I was reluctant to follow suggestions
Responsible	I was not responsible for my experiences	I was responsible for what I experienced
Robotic	I felt in charge of my actions	I felt like a robot or marionette
Passive	I felt active	I felt passive
Self initiated	I did not initiate my actions or experiences	My actions and experiences were initiated by me
Understood	I didn't know why things happened the way they did	I knew why everything was happening
Ordinary	My responses felt very different to normal everyday experiences	My responses felt very similar to normal everyday experiences
Unavoidable	I could decide whether or not to respond	My responses felt unavoidable

2.2. Results

We first subjected responses to items on the preliminary SOARS to an exploratory factor analysis. We then investigated relationships between the derived factors and both hypnotisability scores and pass rates for hypnotic items of different types.

2.2.1. Exploratory factor analysis (EFA)

We used EFA to assess the underlying factor structure of the 48-item SOARS. Kaiser–Meyer–Olkin (KMO) sampling adequacy (0.964) and Bartlett's sphericity tests ($\chi^2(1128) = 10934.54, p < .001$) indicated that factor analysis was appropriate. Due to overlap in definitions of agency and interchangeability of terms in the literature, the dimensions underlying experience of agency were not expected to be entirely independent. We used principal axis extraction with promax rotation to derive oblique factors. Analysis of the scree plot indicated a two or three factor solution. Investigating items in the three factor solution, however, showed that one of the identified factors was a response style artefact (Zeller & Carmines, 1980). The SOARS consisted of positive and negative versions of 24 key phrases. In the three factor solution, these polar item pairs loaded onto distinct factors. For example the item 'my experiences and actions did not feel willed by me' had a loading of .634 on factor one, whereas the item 'my experiences and actions felt willed by me' had a loading of .746 on factor two. A two factor solution provided a more consistent theoretical interpretation. In the two factor solution, positive and negative items derived from the same phrase tended to load on a single factor. This solution accounted for 48.21% of the total variance in SOARS scores. Correlation between the two factors was 0.554.

Items loading on the first factor described a change in the automaticity with which actions occurred and focused on an external locus of control. This factor represented a change in attributions of personal influence over actions; we named it *Involuntariness*. Items loading on the second factor described the ease with which actions occurred and focused on the passive experience of events as they took place. This factor represented feelings of absorption in the task at hand; we named it *Effortlessness*.

We constructed a shorter, consolidated, 10-item version the SOARS by selecting five of the highest loading items from each factor for which there were no cross loadings greater than .30, ensuring an equivalent mix of positively and negatively phrased items. These items are shown in Table 2. Both factor-derived subscales showed good internal consistency (subscale 1 alpha = .907; subscale 2 alpha = .734). Scores ranged from 5 to 35 for both *Involuntariness* ($M = 17.59, SD = 7.16$) and *Effortlessness* ($M = 22.77, SD = 5.51$). We used this 10-item SOARS in Experiment 2.

2.2.2. Relationship between SOARS, hypnotisability and hypnotic suggestions

We first investigated relationships between the SOARS factors (*Involuntariness* and *Effortlessness*) and hypnotisability as measured by the HGSHS:A. Participants in this sample crossed the full range of hypnotisability, scoring between 0 and 10 on the HGSHS:A ($M = 4.46, SD = 2.18$). Both *Involuntariness* ($r(364) = .555, p < .001$) and *Effortlessness* ($r(361) = .387, p < .001$) correlated significantly with the HGSHS:A, indicating that increased hypnotisability corresponded with alterations to both components of sense of agency.

Next we investigated whether sense of agency was related to pass rates for different types of hypnotic suggestions (i.e., ideomotor, challenge, and cognitive). Ideomotor items in the HGSHS:A were 'head falling', 'eye closure', 'hand lowering' and 'moving hands together'. Challenge items in the HGSHS:A were 'finger lock', 'communication inhibition' and 'eye catalepsy'. Cognitive items in the HGSHS:A were 'experiencing of fly', 'posthypnotic suggestion' and 'amnesia'. *Involuntariness* correlated significantly with pass rates for ideomotor items ($r(361) = .460, p < .001$), challenge items ($r(365) = .404, p < .001$) and cognitive items ($r(367) = .276, p < .001$). Comparing these relationships showed that the correlation between *Involuntariness* and

Table 2
Factor loadings of items selected for the SOARS after promax rotation.

Item	Factor	
	1	2
<i>Involuntariness</i>		
2. I chose how to respond*	−0.868	0.050
5. My experiences and actions were under my control*	−0.851	0.001
6. I felt that my experiences and actions were not caused by me	0.821	0.046
3. My experiences and actions felt self generated*	−0.810	0.068
9. My responses were involuntary	0.749	0.060
<i>Effortlessness</i>		
4. I embraced the suggestions freely	−0.163	0.736
7. My experiences and actions occurred effortlessly	−0.002	0.637
1. Following suggestions was hard*	0.098	−0.628
8. I was mostly absorbed in what was going on	−0.049	0.594
10. I was reluctant to follow suggestions*	0.002	−0.452

Note. Items marked with an asterisk (*) are reverse scored.

ideomotor items as well as the correlation between *Involuntariness* and challenge items were significantly stronger than the correlation between *Involuntariness* and cognitive items ($z = 3.24, p = .001$; $z = 2.27, p = .023$). In other words, participants who reported higher levels *Involuntariness* were more likely to pass all types of items. However, the relationship between *Involuntariness* and cognitive items was not as strong as for other types of items.

Effortlessness also correlated significantly with pass rates for ideomotor items ($r(358) = .385, p < .001$), challenge items ($r(362) = .265, p < .001$) and cognitive items ($r(364) = .166, p = .001$). Comparing these relationships showed that the correlation between *Effortlessness* and ideomotor items was significantly stronger than the correlations with challenge ($z = 2.04, p = .041$) or cognitive items ($z = 3.57, p < .0005$). So whereas participants who reported higher levels *Effortlessness* were more likely to pass all types of items, this relationship was particularly pronounced for ideomotor items.

This new scale, constructed from terminology based on agency research outside of hypnosis, when applied here in the hypnotic context, was significantly related to hypnotisability scores. Furthermore, both SOARS subscale scores showed a significant association with each type of hypnotic suggestion (ideomotor, challenge, and cognitive).

3. Experiment

In Experiment 2 we sought to confirm the factor structure of the SOARS. We administered the 10-item SOARS to participants immediately following the Stanford Hypnotic Susceptibility Scale, Form C (SHSS:C; Weitzenhoffer & Hilgard, 1962). This hypnotisability measure, administered in an individual rather than a group setting, provides a more detailed assessment of hypnotisability than the HGSHS:A, especially of cognitive items. Individual testing also avoids some potential problems with demand characteristics, which may occur in a group screening (Barnier & McConkey, 2004). As well as completing the SOARS following hypnosis, participants in this study completed a qualitative interview in which they described their experience of agency change.

3.1. Method

3.1.1. Participants

We tested 113 undergraduate participants (82 female, 31 male) at Macquarie University, of mean age 21.35 years ($SD = 5.56$). Participants were prescreened for hypnotisability on the HGSHS:A (Shor & Orne, 1962) in Experiment 1. Our sample consisted of 42 low hypnotisable participants (HGSHS:A scores less than or equal to 3), 39 medium hypnotisable participants (HGSHS:A scores between 4 and 6) and 32 high hypnotisable participants (HGSHS:A scores between 7 and 10). We paid participants \$20 for taking part.

3.1.2. Administration of the SHSS:C (Weitzenhoffer & Hilgard, 1962)

We first administered a tailored version of the SHSS:C, which included 11 standard suggestions and 2 customised suggestions that were part of a separate experiment (and will not be considered further). The SHSS:C consisted of a standard hypnotic induction, hypnotic suggestions, and a deinduction. Suggestions in this measure were: hand lowering, moving hands apart, mosquito hallucination, taste hallucination, arm rigidity, dream, age regression, leg immobilisation, negative visual hallucination, anosmia and posthypnotic amnesia. The hypnotist scored participants' responses to each suggestion against specific criteria. For example, did participants react to a bottle of wintergreen oil (a strong smelling essence) placed near the nose when given the suggestion that they would lose their sense of smell; did they twitch or move their hand when given the suggestion that a mosquito was landing on it?

We considered participants who scored in the same category on both the HGSHS:A and the SHSS:C as having their hypnotisability confirmed. Confirming the hypnotisability of participants first screened in a group setting with an individualised screening such as the SHSS:C is best practice in hypnosis research (Kihlstrom, 2008). We confirmed 23 participants as low (SHSS:C less than or equal to 3), 19 as medium (SHSS:C scores between 4 and 6) and 27 as high hypnotisable (SHSS:C scores between 7 and 11). Hypnotisability was not confirmed for 44 participants.

3.1.3. Administration of the SOARS

We asked participants to complete the 10-item SOARS derived from Experiment 1, consisting of 5 items for the *Involuntariness* subscale and 5 items for the *Effortlessness* subscale. Items are shown in Table 2. Participants indicated their level of agreement with each statement with regards to their experience during the preceding hypnosis session. Participants rated each item on a seven point Likert scale, ranging from "strongly disagree" (1) to "strongly agree" (7).

3.1.4. Open interview

After completing the SOARS, we asked participants to describe their experiences during hypnosis, especially how their actions might have been similar or different to performing actions normally and how in control or responsible they felt during the experiment. We asked participants: (a) to describe how it felt to hear and follow suggestions, (b) how performing actions here was similar or different to performing actions normally, (c) to describe being hypnotised, and (d) how in control or responsible they felt for what occurred.

3.2. Results

We first subjected responses to items on the SOARS to confirmatory factor analysis (CFA). We then investigated relationships between the SOARS scores and both hypnotisability scores and pass rates for hypnotic items of different types.

3.2.1. CFA of the SOARS

We used CFA to ensure that the factor structure for sense of agency identified in Experiment 1 was applicable to this sample. CFA was conducted using AMOS (version 19). The range of scores for *Involuntariness* was 5 to 35 ($M = 19.20$, $SD = 6.05$). The range of scores for *Effortlessness* was 13–35 ($M = 26.32$, $SD = 4.46$). The two factor model showed good fit, $\chi^2(34, N = 115) = 48.35$, $p = .053$, comparative fit index = .958 and root-mean-square error of approximation = .061. Intercorrelation between the two factors (*Involuntariness* and *Effortlessness*) was .373. The two factor structure therefore appears to be a stable and replicable model of sense of agency.

3.2.2. Relationship between SOARS, hypnotisability and hypnotic suggestions

We first investigated relationships between the SOARS factors (*Involuntariness* and *Effortlessness*) and hypnotisability as measured by the SHSS:C. Participants in this sample crossed the full range of hypnotisability, scoring between 0 and 11 on the SHSS:C ($M = 5.86$, $SD = 2.94$). Both *Involuntariness* ($r(113) = .426$, $p < .001$) and *Effortlessness* ($r(113) = .356$, $p < .001$) correlated significantly with the SHSS:C, confirming that increased hypnotisability corresponded with alterations to both components of sense of agency.

Next we investigated whether sense of agency was related to pass rates for different types of hypnotic suggestions. Ideomotor items in the SHSS:C were ‘hand lowering’ and ‘moving hands apart’. Challenge items were ‘arm rigidity’, ‘leg immobilisation’, and ‘anosmia’. Cognitive items were ‘mosquito hallucination’, ‘taste hallucination’, ‘dream’, ‘age regression’, ‘negative visual hallucination’, and ‘posthypnotic suggestion’. *Involuntariness* correlated significantly with pass rates for ideomotor items ($r(112) = .281$, $p = .003$), challenge items ($r(112) = .393$, $p < .001$) and cognitive items ($r(112) = .333$, $p < .001$). *Effortlessness* correlated significantly with pass rates for ideomotor items ($r(112) = .321$, $p = .001$), challenge items ($r(112) = .238$, $p = .011$) and cognitive items ($r(112) = .306$, $p = .001$). Comparing these relationships showed that no correlation was significantly stronger than any other. Participants experiencing greater levels of *Involuntariness* and *Effortlessness* were more likely to pass all item types.

3.2.3. Responses to open interview

Participants’ responses in the open interview gave some insight into their interpretation and understanding of their experiences during hypnosis. To assess the validity of the SOARS, we were interested in the responses of participants with particularly low or high *Involuntariness* and *Effortlessness* scores. Participants who scored in the lowest quartile for *Involuntariness* (scores less than 16) typically described their actions as occurring with a high level of control, for example: “I’d say most of the things you told me to do, I did voluntarily”; or due to a conscious desire to comply with the hypnotist’s instructions, for example: “I was agreeing or complying to requests, not doing things involuntarily”. Participants who scored in the highest quartile for *Involuntariness* (scores greater than 23) by contrast, described their actions as occurring without deliberate control, for example: “you feel like you can’t do anything but listen to what’s being said and do what’s being said”; and without conscious planning, for example: “It feels a lot like an impulse. You sit here and someone tells you that your arm feels heavy and then your arm will feel heavy.” Participants who scored in the lowest quartile for *Effortlessness* (scores less than 23), described fairly normal experiences during hypnosis, characterised by feelings of control, for example: “Most of the time I felt I could do anything”; and “I felt very in control”. Participants who scored in the highest quartile for *Effortlessness* (scores greater than 29), however, described their actions as occurring spontaneously, for example: “I didn’t tell my body to do them, they were just happening”; and without specific intentions, for example: “It felt like I was just doing it without saying ‘move my arm’ or anything - like I wasn’t doing it consciously but my body was just doing it”. Overall, participants’ accounts of their experiences in hypnosis supported our theoretical framework. Individuals with low SOARS scores reported fairly normal feelings of control characterised by deliberate and purposeful actions. Participants with high *Involuntariness* scores reported an altered sense of agency characterised by actions that felt externally caused and that occurred impulsively.

Table 3

Correlations between SOARS scores and Woody et al.’s (2005) 4-factor model of hypnotisability.

Factor	Involuntariness	Effortlessness
Direct motor	0.549***	0.451***
Motor challenge	0.416***	0.317***
Perceptual-cognitive	0.423***	0.362***
Posthypnotic amnesia	0.360***	0.260**

Note: $n = 112$.

** $p < 0.01$.

*** $p < 0.001$.

Participants with high *Effortlessness* scores reported an altered sense of agency characterised by the experience of spontaneous movements that occurred without their conscious control.

The factor structure of the SOARS, with two distinct aspects to sense of agency (*Involuntariness* and *Effortlessness*) was confirmed in Experiment 2. Participants in a more difficult hypnosis session with a greater proportion of cognitive suggestions reported significant levels of both *Involuntariness* and *Effortlessness*. Both factors again correlated significantly with hypnotisability as measured by the SHSS:C. SOARS scores also were related to pass rates for ideomotor, challenge and cognitive items in the SHSS:C. These findings were supported by qualitative data from participants indicating that higher SOARS scores corresponded to marked reductions in the subjective sense of agency during hypnosis.

4. Combined analysis

For our final set of analyses we examined the reliability and applicability of the SOARS in a combined dataset of HGSHS:A and SHSS:C items. This analysis allowed a more detailed examination of the relationship between sense of agency and hypnotisability. Hypnotisability is usually expressed as a general capacity to experience hypnotic suggestions. In addition to this general capacity, however, a number of theorists have conceptualised hypnotic ability as also involving specific component abilities corresponding to the ideomotor, challenge and cognitive categories outlined above. More recently [Woody, Barnier, and McConkey \(2005\)](#) proposed a four factor model of the component abilities of hypnotic responding, based on a comprehensive empirical analysis of 5 years of hypnosis experiments (over 616 participants). The four factor model includes three factors that are very similar to the traditional account (direct motor action, motor challenge and perceptual-cognitive) and one additional factor: Posthypnotic Amnesia. Results from Experiments 1 and Experiment 2 indicated two stable subscales comprising the SOARS: *Involuntariness* and *Effortlessness*. Here we investigated relationships among these SOARS subscales and Woody et al.'s four factor model of hypnotic ability.

4.1. Method

4.1.1. Creating the dataset

We generated a combined dataset comprising participants' responses to all hypnotic items from both the HGSHS:A and SHSS:C and SOARS factor scores from Experiments 1 and 2. There were 112 participants with complete records from both experiments. The average interval between Experiment 1 and Experiment 2 was 12 weeks.

4.1.2. Component hypnotic abilities

Scores for the direct motor action, motor challenge and perceptual-cognitive factors were derived by calculating the number of relevant items passed in each category. For the direct motor factor, the relevant items were 'head falling', 'eye closure', 'hand lowering' and 'moving hands together' from the HGSHS:A and 'hand lowering', and 'moving hands apart' from the SHSS:C. For the motor challenge factor, the relevant items were 'finger lock', 'communication inhibition' and 'eye catalepsy' from the HGSHS:A and 'arm rigidity' and 'leg immobilization' from the SHSS:C. For the perceptual-cognitive factor, the relevant items were 'fly hallucination' and 'posthypnotic suggestion' from the HGSHS:A and 'mosquito hallucination', 'taste hallucination', 'dream', 'age regression', 'anosmia' and 'negative visual hallucination' from the SHSS:C. The Posthypnotic Amnesia factor score was derived by calculating the total number of items that were not successfully recalled following the amnesia suggestions in both hypnotisability screenings (i.e. 21 minus the total number of items recalled in both measures). In [Woody et al. \(2005\)](#), the motor challenge factor also included the items 'arm immobilization' and 'arm rigidity' from the HGSHS:A scale. The modified version of the scale used in Experiment 1 did not include these items so they could not be included in the factor scale calculation.

4.2. Results

4.2.1. Stability of the SOARS

Overall, *Involuntariness* scores were slightly higher in Experiment 2 ($M = 19.20$, $SD = 6.05$) compared to Experiment 1 ($M = 18.64$, $SD = 7.42$) although this difference was not significant, $t(112) = 1.13$, $p = .262$. *Effortlessness* scores were significantly higher in Experiment 2 ($M = 26.32$, $SD = 4.46$) compared to Experiment 1 ($M = 22.96$, $SD = 6.49$), $t(111) = 5.17$, $p < .0005$, indicating that participants were more likely to experience their actions as passively occurring without effort when completing the SHSS:C items. The test–retest correlations over 12 weeks showed that *Involuntariness* was highly stable ($r = .703$, $p < .001$), but *Effortlessness* only moderately stable ($r = .366$, $p < .001$). The significant difference between the strength of these correlations ($z = 3.86$, $p < .0005$) most likely reflects the different item sets across the HGSHS:A and the SHSS:C, with a greater concentration of cognitive items in the SHSS:C compared to the HGSHS:A.

4.2.2. Sense of agency and component hypnotic abilities

We next examined relationships between SOARS scores (averaged across the HGSHS:A and the SHSS:C) and the derived hypnotic ability subscales (direct motor, motor challenge, perceptual-cognitive and Posthypnotic Amnesia). These results are shown in [Table 3](#). *Involuntariness* showed a strong correlation with the direct motor factor and moderate correlations with

the motor challenge, Perceptual Cognitive and Posthypnotic Amnesia factors. *Effortlessness* showed moderate correlations with the direct motor, motor challenge and perceptual-cognitive factors; and a weak correlation with the Posthypnotic Amnesia factor. There were no significant differences between correlations for *Involuntariness* and *Effortlessness* with any of the 4 derived factors.

5. Discussion

The present experiments reported on the development and initial validation of the SOARS. We created this scale to address three challenges for understanding agency in hypnosis: no agreement on the cause of agency disruption, no canonical method of measuring agency and no consistent language to describe and conceptualise agency. We constructed items for the scale from a review of terms and phrases that have been used to describe agentive experience in the broader scientific literature.

Factor analysis of responses to the 48-item preliminary agency scale revealed two factors underlying sense of agency: *Involuntariness* and *Effortlessness*. This led to the construction of the SOARS, a 10-item scale that was significantly correlated with HGSHS:A scores and pass rates for ideomotor, challenge and cognitive items in Experiment 1. Confirmatory factor analysis in Experiment 2 validated the scale and confirmed the two factor structure underlying sense of agency. Both *Involuntariness* and *Effortlessness* were significantly correlated with SHSS:C scores and pass rates for ideomotor, challenge and cognitive items in Experiment 2. In an analysis of the combined datasets from Experiments 1 and 2, both SOARS subscales were significantly related to each of the derived factors of Woody et al.'s (2005) four-factor model of hypnotic items.

Empirically, our results suggest that the SOARS is a reliable measure of the subjective experience of self-generated actions. The test–retest correlations over 12 weeks showed particularly high stability for *Involuntariness*. Although significant, the magnitude of the reliability coefficient for *Effortlessness* was moderate. It is important to note however that the two measures of hypnotisability we used to assess participants' experiences of agency were not identical tests. The HGSHS:A consists mainly of easy, motor suggestions, whereas the SHSS:C consists mainly of more difficult hypnotic suggestions focused primarily on alterations to cognitive and perceptual processes. SOARS scores from these two experiments showed that participants' sense of agency differed between these two hypnotisability tests.

Aspects of the experience of being an agent, specifically the degree of passive agency involved (as indexed by the 'Effortlessness' subscale) were quite different during the HGSHS:A hypnosis session, with its focus on physical movements, compared with the SHSS:C hypnosis session, with its focus on internal imaginative experiences. Items in the SHSS:C include suggestions for participants to experience kinaesthetic and visual hallucinations, an imagined waking dream, age regression, altered olfactory sensations and amnesia. Although each of these items was evaluated in terms of (indirect) objective behavioural criteria, the essence of such items is a subjective alteration in cognitive and perceptual experience. The main distinction between the *Involuntariness* and *Effortlessness* subscales across these experiments was that *Effortlessness* scores were significantly higher following the SHSS:C compared to the HGSHS:A. This indicates that whereas *Involuntariness* may be more closely associated with traditional conceptions of the classic suggestion effect (Weitzenhoffer, 1974) and represents changes in feelings of control over low level motor actions (better captured by HGSHS:A items), *Effortlessness* may be more closely associated with higher order self-monitoring alterations (better captured by SHSS:C items). This interpretation is partially supported by the pattern of correlations between pass rates for different types of items and scores on *Involuntariness* and *Effortlessness* subscales.

The composition of the hypnotisability measures in Experiments 1 and 2 may have influenced the specific ways in which agency was altered. This is consistent with the work of Woody et al. (2005), who found that the way in which a particular hypnotic suggestion was experienced subjectively depended not only on the content of the specific suggestion but also on the type of suggestions preceding it. It is worth noting that in this study participants always completed the HGSHS:A before completing the SHSS:C, and that the SOARS was always administered after the completion of the relevant hypnotisability screening. This means that responses made by participants were retrospective evaluations of their experience throughout an entire hypnosis session. But since participants' experiences of agency may vary (perhaps considerably) throughout a hypnosis session, it may also be useful to ask participants to complete the scale with regards to their experience of a single suggestion and to obtain these ratings immediately after the suggestion has been administered. The scale is sufficiently short (10 items) to allow for repeated administration for several hypnotic suggestions of interest. Application of the SOARS to investigate experiences related to specific hypnotic tasks would likely highlight further dissociations between *Involuntariness* and *Effortlessness*.

Although we did not measure agency alteration related to specific items, our findings showed that all types of hypnotic suggestion (i.e. ideomotor, challenge and cognitive) were related significantly to both SOARS scores. This suggests that sense of agency in hypnosis is not only altered for straightforward, physical motor actions (i.e., ideomotor items) but also for more complex motor actions (such as challenge items that require the participant to make movements that contradict a suggested state of affairs) and for cognitive items, which may not involve any physical movements at all. This indicates that during hypnosis participants have a sense of agency not only for their body movements but also for perceptual and cognitive experiences.

Sense of agency over such internal representations is a controversial area. Woody and Sadler (2008) argued for a fundamental mechanism that distinguishes between the internal and external origin of events (both motor actions and internal

representations). They claimed that hypnosis transiently disrupts this mechanism and this disruption is what leads participants to experience altered sense of agency. Researchers outside of hypnosis, however, have noted that theoretical accounts of agency cannot easily explain the processes that might generate a sense of agency for internal representations, such as thoughts (Synofzik et al., 2008; Vosgerau & Newen, 2007). Feedforward theories of agency stipulate that sense of agency depends on a predictive representation within the motor system (Frith, Blakemore, & Wolpert, 2000; Wolpert, Ghahramani, & Jordan, 1995), but it is unlikely that hypnotic cognitive alterations could have a motor system referent. An alternate perspective holds that sense of agency results from high level inferential judgements about the likely causes of perceived actions (Wegner & Wheatley, 1999; Wegner, 2004). These inferential theories also struggle to explain sense of agency for internal representations as, according to this perspective, actions are experienced as self-generated if they are preceded by an appropriate thought. To propose that a mental representation, such as a thought, would also be experienced as self-generated when preceded by a supervening, higher order, appropriate thought leads to an infinite regress. The association between SOARS scores and pass rates for cognitive items is therefore difficult to reconcile with existing theories. As noted above, participants in this study were asked to rate their sense of agency for the entire hypnosis session. A clearer understanding of sense of agency for thoughts in hypnosis would be provided by specifically investigating agentic experiences related to cognitive items and tracking the triggers and influences on agency alteration for these tasks.

Administering the SOARS to participants completing the HGSHS:A and SHSS:C has provided a new perspective on sense of agency in hypnosis. Subjective involuntariness is an important and often discussed aspect of hypnotic responding (K. Bowers, 1981; P. Bowers, 1982; Bowers et al., 1988; Kirsch et al., 1990; McConkey, Wende, & Barnier, 1999; Spanos et al., 1983; Wilson & Barber, 1978), but usually it has been understood as a single unitive construct. This may be because different hypnosis theorists have attempted to explain different aspects of agentic action. Our scale with two factors (*Involuntariness* and *Effortlessness*) offers an empirical means to assess subjective alterations to agency across multiple dimensions and is consistent with theoretical views of sense of agency from outside the domain of hypnosis, which have also proposed two distinct components of sense of agency (Gallagher, 2000, 2012; Synofzik et al., 2008). Gallagher's (2000) notion of "explicit agency" refers to evaluative attributions about the experience of action. This is similar to Synofzik et al.'s (2008) 'judgement of agency', which they describe as conceptual, interpretative judgments of action. The *Involuntariness* factor identified in our experiments comprises items that involve deliberative evaluation of one's experience, for example, 'my experiences and actions were under my control' and 'I chose how to respond', and seems compatible with these ideas. Gallagher (2012)'s "implicit agency" refers to an awareness of oneself as the immediate subject of experience. This fits nicely with Synofzik et al.'s (2008) non-conceptual 'feeling of agency'. Such a conceptualisation does not exactly map onto the *Effortlessness* dimension identified in our experiments but there are some important parallels. For these theorists, 'implicit agency' or 'feeling of agency' represents a low-level, first-order awareness of acting that may occur in the absence of higher-order attributions about the cause or nature of the action in question. This idea of a primary, automatic and immediate sense of being an agent resonates with the *Effortlessness* factor identified here. The qualitative descriptions of participants scoring high in *Effortlessness* were characterised by claims that their bodies had made movements that they experienced as occurring automatically, without planning or intention. In other words, these participants described situations in which they had awareness of their actions but no higher order beliefs or intentions about those actions. Taken together, these findings suggest that our investigation of the various terms used to refer to sense of agency converges on a two factor model that fits approximately within the framework of recent theoretical accounts.

Our findings also showed a positive linear relationship between hypnotisability (for both screening measures) and factors of the SOARS. The more hypnotisable a participant was, the more likely they were to experience both involuntariness and effortlessness during the hypnosis session. This is consistent with our understanding of hypnotisability and, in particular, with the notion that high hypnotisable individuals are prone to experiencing actions in hypnosis as occurring spontaneously and without conscious volition. These findings, showing variation in the degree to which individuals experience alterations to their sense of agency, further support the view that hypnosis is a multidimensional rather than a unidimensional or categorical construct.

One potential application of the SOARS could be to rule out malingering in hypnosis (or in other contexts). Whereas the majority of researchers accept that hypnosis alters executive functioning (Hilgard, 1979; Lynn et al., 2008; Woody & Sadler, 2008), some maintain that the effects of hypnosis can largely be explained by compliance and expectation (Wagstaff, 1981, 1991). Assessing agency change using the SOARS could help identify such strategies or artefacts (Orne, 1979). For example, participants employing a compliant strategy might be expected to respond to suggestions without experiencing the involuntariness and effortlessness that would characterise the experience of individuals with altered executive monitoring or control. For instance, researchers could use the SOARS in a "real-simulating" hypnosis design where the performance of high hypnotisable participants is compared with the performance of motivated low hypnotisable participants who have been instructed to fake hypnosis (Orne, 1979). An analysis of differences in SOARS scores between genuinely hypnotised highs and simulators might show those aspects of agentic experience that can be influenced by demand characteristics and those that are influenced by genuine hypnotic alterations.

Finally, although it was developed within the context of hypnosis (and several of the items in the *Effortlessness* factor explicitly refer to suggestions), this scale could be easily modified for use in other contexts (e.g., by substituting the word 'instructions' for 'suggestions'). As a clinical tool, the SOARS offers a means to assess and track agency alterations over time. As a research tool, the SOARS could be used to index specific ways that sense of agency is altered in under different circumstances. For example, behavioural illusion studies typically induce alterations in sense of agency but provide misleading

feedback to participants about the effects of their own self-generated actions (e.g., Blakemore et al., 1998; Wegner, Fuller, & Sparrow, 2003). Using the SOARS in this kind of research could highlight the effects of different manipulations across the domain of agentive experience. Most importantly, the two SOARS subscales provide an operational conceptualisation of sense of agency. By using this replicable, empirical measure, investigators could avoid the definitional and conceptual confusion that has traditionally been associated with sense of agency research.

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