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Lush, P., Scott, R. B., Seth, A. K., & Dienes, Z. (2021). The Phenomenological Control Scale: Measuring the Capacity for Creating Illusory Nonvolition, Hallucination and Delusion. *Collabra: Psychology*, *7*(1). https://doi.org/10.1525/collabra.29542

Cognitive Psychology

The Phenomenological Control Scale: Measuring the Capacity for Creating Illusory Nonvolition, Hallucination and Delusion

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Keywords: phenomenological control, imaginative suggestion

https://doi.org/10.1525/collabra.29542

Collabra: Psychology

Vol. 7, Issue 1, 2021

Phenomenological control is the ability to generate experiences to meet expectancies. There are stable trait differences in this ability, as shown by responses to imaginative suggestions of, for example, paralysis, amnesia, and auditory, visual, gustatory and tactile hallucinations. Phenomenological control has primarily been studied within the context of hypnosis, in which suggestions are delivered following a hypnotic induction. Reports of substantial relationships between phenomenological control in a hypnotic context (hypnotizability) and experimental measures (e.g., the rubber hand illusion) suggest the need for a broad investigation of the influence of phenomenological control in psychological experiments. However, hypnosis is not required for successful response to imaginative suggestion. Because misconceptions about the hypnotic context may influence hypnotizability scores, a non-hypnotic scale which better matches the contextual expectancies of other experiments and avoids the hypnotic context is potentially better suited for such investigation. We present norms for the Phenomenological Control Scale (PCS), an adaptation of the Sussex Waterloo Scale of Hypnotizability (SWASH) which is free of the hypnotic context. Mean scores for the PCS are higher than for SWASH, and the subjective scales of PCS and SWASH show similar reliability. The PCS subjective scale is a reliable tool for measuring trait response to imaginative suggestion (i.e., phenomenological control) outside the context of hypnosis.

People to varying degrees are capable of altering their subjective experience such that it misrepresents reality in ways consistent with goals, and such that the misrepresentation can be sustained over at least minutes despite clear contrary evidence, a capacity we call phenomenological control (Dienes et al., 2020; in press). For example, people can move their hands together yet have the experience that the hands are moving by themselves (the illusion of nonvolition); or they can imagine a mosquito yet experience the imagination as a perception; or they can pretend to be a child, and yet believe their make-believe so strongly it is virtually a delusion (Bowers, 1993; Jensen et al., 2017; Terhune et al., 2017).

Although it is a new term, phenomenological control is not a new concept. The capacity we describe is most commonly referred to as "hypnotizability", which in turn has its roots in the 18th and 19th century concept of mesmerism (Pintar & Lynn, 2009). The present study is motivated by a belief that, at least in recent years, the dominance of the hypnotic context has had two problematic consequences. Researchers immersed in the hypnotic tradition can overlook that the hypnotic context is not required for response to imaginative suggestion and focus exclusively on this single context and its associated themes. For other researchers, hypnosis remains a mildly disreputable term, a situation which is likely to arise from the many scientifically inaccurate myths associated with the hypnotic context (e.g., trance or being controlled by an authority figure; see Lynn et al., 2020). This may have led to the avoidance of the subject by many researchers, who may have little awareness of the copious evidence for stable trait differences in response to imaginative suggestion. Altogether, focusing on hypnosis may well have acted as a barrier walling off imaginative suggestion research from the rest of psychology, and resulting in a lack of attention to other contexts – beyond the hypnotic context - in which phenomenological control may be operative (which may be many and varied; for example, speaking in tongues, channelling spirits or responding in scientific experiments; Dienes et al., 2020).

In this paper, we present a scale for measuring the capacity of phenomenological control which does not involve

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hypnotic induction or reference the hypnotic context. Our aim is to accelerate research into imaginative suggestion away from just the hypnotic context (and its associated cultural myths) and to raise awareness of imaginative suggestion research outside the field. This is particularly important because imaginative suggestion effects may confound experimental psychology measures (see Corneille & Lush, 2021; Dienes et al., 2020; Lush et al., 2020; Lush, Dienes, Seth, et al., 2021) to degrees which are considerably underappreciated. Trait differences in response to imaginative suggestion (as measured by imaginative suggestion scales) are therefore potentially relevant to any researcher interested in reports of change in experience.

The capacity for phenomenological control can express itself in many contexts. In the hypnotic context, it is called hypnotizability. Hypnotizability is a stable trait (Piccione et al., 1989), measured by response to a series of direct imaginative suggestions (Woody & Barnier, 2008). Within a hypnotic context, the experimenter is designated as a hypnotist, there is a hypnotic induction (typically involving relaxation and suggestions that the participant is entering a state of hypnosis) before suggestions are delivered, and the hypnotic session is ended by bringing people "back out of hypnosis" (see Kihlstrom, 2008). It has long been known that response to imaginative suggestion does not require a special state (Barber & Glass, 1962; Hull, 1933) and the postulation of a special state has not so far been shown necessary to explain response to imaginative suggestions (see Jensen et al., 2017; Lynn et al., 2020). A formal hypnotic induction has been reported to provide a small boost in response over imaginative suggestion without an induction (Braffman & Kirsch, 1999; Martin & Dienes, 2019); other studies report no significant increase in mean response (E. C. Meyer & Lynn, 2011; Milling et al., 2010). Notably, merely the addition of the word "hypnosis" to a screening procedure is sufficient to produce such a boost (Gandhi & Oakley, 2005). Rather than this word having any unique status, a simple explanation is that it drives particular demand characteristics (aspects of an experimental situation which, sometimes contrary to experimenter's intentions, communicate experimental expectations to participants; Orne, 1962; cf. Sharpe & Whelton, 2016) in participants who arrive with a culturally acquired knowledge of the hypnotic context. Again, we emphasise that response to imaginative suggestion predates the introduction of the term "hypnosis" (most famously in mesmerism but also other contexts, Hammond, 2013).

The well-established fact that response to imaginative suggestion does not require hypnosis has not been overlooked in previous scale development. There are existing scales which measure response to non-hypnotic imaginative suggestion, most notably the scales arising from Barber and colleagues work on non-hypnotic imaginative suggestion (Barber & Glass, 1962; Barber & Wilson, 1978). Indeed, any hypnosis scale can be turned into a non-hypnotic scale simply by removing reference to hypnosis and related concepts such as trance, sleep or relaxation (e.g., E. C. Meyer & Lynn, 2011), and a non-hypnotic scale transformed into a hypnosis scale by adding reference to hypnosis and related concepts (e.g., Braffman & Kirsch, 1999). However, existing efforts in this direction have so far failed to displace hypnosis as the dominant context in which imaginative suggestion research is conducted. Because the hypnotic context refers to outdated and inaccurate conceptions of the phenomena in question, this is likely to be a barrier to progress.

Here we follow Barber & Wilson (1978) in developing a scale to measure response to imaginative suggestion outside the hypnotic context (see also Oakley et al., 2021). The dominant hypnosis scales have been in use for decades, and there is a general need for new scale development to reflect current scientific understanding (Acunzo & Terhune, 2021; Jensen et al., 2017), as well as to address potential confounds arising from peoples' expectations about what hypnosis entails.

As briefly mentioned above, the hypnotic context conveys a wide range of myths and misunderstandings, for example, that there is a "trance" state upon which response to suggestion depends; or that response to hypnotic suggestion is involuntary (rather than just being experienced as involuntary; see Lynn et al., 2020, for a review of persistent myths about hypnosis and imaginative suggestion). For example, in shifting from the mesmeric context in which suggestions were generally indirect (e.g., passing hands across the body to manipulate "mesmeric fluid") to the kind of direct verbal suggestions which accompanied the introduction of the term "hypnosis", response to imaginative suggestion became associated with sleep (Gravitz & Gerton, 1984; see Pintar & Lynn, 2009 for a history of hypnosis). However, it is now known that hypnosis is not related to sleep (e.g. Banyai & Hilgard, 1976).

Similarly, a focus on hypnosis has led to an emphasis on direct verbal suggestion in the study of imaginative suggestion effects, and even to the proposal that direct verbal suggestion and indirect suggestion are unrelated (e.g., see non-significant correlations between direct and indirect suggestion response reported by Polczyk, 2016), an argument which overlooks that mesmerism (and therefore hypnosis) began as a non-verbal indirect suggestion effect (Hammond, 2013). This focus may also have led to a lack of attention to the role that response to imaginative suggestion may play in other contexts. If we accept that people can respond to both direct and indirect suggestions via the same mechanisms, and if we accept that suggestion effects can be generated in contexts other than mesmerism or hypnosis, then it is possible that participant hypothesis awareness arising from demand characteristics may act as indirect suggestion effects and drive experience in experiments (Kirsch & Council, 1989; Lush et al., 2020; Lush, Dienes, Seth, et al., 2021; Michael et al., 2012). This is one important reason why it may be beneficial to conduct imaginative suggestion research away from the hypnotic context.

The term "phenomenological control" does not refer to a new concept. We have introduced it to avoid the unwarranted associations which arise from terminology based on "hypnosis"(see Dienes et al., 2020 for detailed discussion). The term indicates that response is a construction on the part of the subject according to their perception of task requirements rather than a disposition for being controlled by others (such as may be implied by suggestibility). More specifically, it describes trait response to context-general direct and indirect suggestions (including in hypnosis). Therefore, the expectancies which lead to phenomenologi-

cal control can be generated through explicit verbal suggestion (Oakley et al., 2021), or else arise from other sources, for example perceptions of demand characteristics (Corneille & Lush, 2021; Kirsch & Council, 1989; Lush et al., 2020; Michael et al., 2012).

Previous terminology for describing expectancy related experience away from the hypnotic context is problematic. While the term "imaginative suggestion" accurately conveys the nature of scale items, the term "imaginative suggestibility" (Kirsch & Braffman, 2001) may be confused with other forms of suggestibility such as social compliance. Social compliance is a distinct concept to response to imaginative suggestion (e.g. Coe et al., 1973; Moore, 1964; Tasso et al., 2020; but see Polczyk & Pasek, 2006). It cannot, however, be ruled out that any given response on a hypnosis or phenomenological control scale (or indeed any subjective report scale) may reflect response due to social compliance such as faking or imagination rather than phenomenological control. Further, "suggestible" implies subjects are passively manipulated in ways against their intentions, which "phenomenological control" does not entail (see Dell, 2021 for further arguments against the suitability of the term "suggestible" to describe the ability to change experience in hypnosis). Note that our rejection of "suggestibility" does not extend to use of the term "suggestion", which does not have the same connotations as "suggestible"; one can successfully respond to a suggestion (e.g. "Did you think of trying this?") without being suggestible.

Previous terminology has also employed "imagination", which may also have been problematic. For example, "Creative Imagination" (Barber & Wilson, 1978) evokes unrelated ideas such as being good at writing or art (see Dienes et al., 2020). This may have played an important role in the failure of Barber's scales to displace hypnosis scales, as "creative imagination" perhaps fails to convey the range of response to imaginative suggestion, for example, surgical anaesthesia (Esdaile, 1852; Wobst, 2007). Those unfamiliar with the history of imaginative suggestion research may have a misunderstanding of the phenomena which a researcher studying "creative imaginative" is investigating. We emphasise that, while we believe that "creative imagination" is a problematic term for the overall construct, both imagination and suggestion are useful terms for describing the phenomena in question. We define the sort of suggestion that is relevant for phenomenological control as a communication to experience a counter-factual state of affairs as real, for example a voluntary movement as involuntary, or imagination as perceptual. Imagination involves the construction of non-present or counter-factual states of affairs (for a discussion of different ways of imagining, see Currie & Ravenscroft, 2002; the word "imagination", for example, does not necessarily imply the use of visual imagery). For all these reasons, a new term may be beneficial.

The phenomenological control scale will be useful for researchers in two broad ways (cf. Oakley & Halligan, 2009): first, as a way of more rigorously exploring phenomena which phenomenological control may surreptitiously bring about without subject nor experimenter necessarily realizing; and, second, as a way of investigating the nature of conscious perception as revealed by our capacity to transform it. In short, measuring trait phenomenological control outside a hypnotic context can help identify effects of demand characteristics and can provide an opportunity to study how perceptual experiences are constructed by interacting bottom-up and top-down processes.

In terms of the first point, we recently investigated predictions of the theory that phenomenological control confounds reports of experience in psychological studies. We found that measures of changes in experience in psychological phenomena (e.g., the rubber hand illusion and mirror synaesthesia) are predicted by response to direct imaginative suggestion in the hypnotic context (Lush et al., 2020; measured by SWASH). These relationships are substantial. For example, a 1 point increase in hypnotizability score (6 point scale) predicts reports of experience of "ownership" of a fake hand by 0.8 points (7 point scale) (Lush, Dienes, & Seth, 2021). Wherever demand characteristics have not been controlled (e.g., because existing control measures are invalid, Lush, 2020), they may act as indirect imaginative suggestions to meet expectancies by generating experience, just as in direct hypnotic suggestion (see Dienes et al., 2020; Lush et al., 2020). Because this issue may be widespread, it is necessary to test this prediction in a range of phenomena. However, because there are so many myths surrounding the hypnotic context (which participants are likely to bring to the experimental situation) the measurement of hypnotizability is not well matched to other experimental situations. Further, phenomenological control may manifest itself in various contexts in life, including pain control, placebo (Kirsch, 2017), meditation (Dienes et al., in press), spirit possession (Deeley et al., 2014; Dienes & Perner, 2007), out of body experiences (Facco et al., 2019), and more mundanely, any emotions, perceptions, or experiences that being part of any group may render desirable to a person in certain situations.

In terms of the second way the scale may be useful, it may facilitate research into the processes by which people exert phenomenological control itself, that is, how people can strategically (although not knowingly) alter their conscious experience so compellingly that the altered subjective experience presents itself as an objective representation of reality. Understanding this process provides a novel avenue for understanding how conscious perceptual experiences are constructed within the brain (for the constructive nature of conscious perception, see e.g. Frith, 2013; Gazzaniga, 2018; Seth, 2019). Further, by removing the induction and discarding the term "hypnosis", the role of any induction or altered state of consciousness can be approached in a way more aligned with other research examining the influence of expectations or predictions on perception (e.g., De Lange et al., 2018).

We note that there is compelling evidence that response to imaginative suggestion involves genuine change in experience. For example, McGeown et al. (2012) showed V4 activation for suggestions for colour hallucinations; Derbyshire et al. (2009) changes in the pain matrix for pain hallucinations in people with fibromyalgia. We have previously reviewed this evidence as it pertains to phenomenological control (see Dienes et al., in press; for a review of other evidence, see McConkey, 2008). That imaginative suggestion can apparently lead to change in experience does not, of course, imply that any given response on a hypnosis scale

can be considered to reflect genuine experience. Demand characteristic effects are omnipresent wherever expectancies are uncontrolled, and demand characteristics are transparent in imaginative suggestion (Orne, 1969; see Corneille & Lush, 2021 for a simplified model of demand characteristic effects including phenomenological control).

The Phenomenological Control Scale (PCS) is an adaptation of the Sussex Waterloo Scale of Hypnotizability (SWASH; Lush et al., 2018), which is an adaption of the Waterloo Group Scale of Hypnotizability (WSGC; Bowers, 1993) developed to reduce the time cost of screening large numbers of participants and to avoid potentially unpleasant effects of two WSGC suggestions (see Lush et al., 2018 for details). In the PCS, to avoid the hypnotic context, all reference to hypnosis, relaxation, altered states or sleep have been removed from both the script and response questionnaire (for example, the Post-Hypnotic Suggestion item is labelled as a Post-Session Suggestion). The hypnotic induction script has been replaced with a brief introductory script which presents the suggestions which follow as exercises in using imagination to alter subjective experience (cf. Parra & Rey, 2019). In all other respects the two scales are identical. The PCS retains the time-saving modifications of the SWASH and makes further time savings from the omission of hypnotic induction. The SWASH has been adapted for recorded delivery (Lush, Scott, Moga, et al., 2021, including online remote delivery; Palfi et al., 2019), which we employ here.

Here we present norms for a phenomenological control scale which is closely matched to an existing hypnosis scale (SWASH). Secondary analyses contrast scores for the phenomenological control and SWASH scales and investigate the stability of response to imaginative suggestion across the two contexts.

Method

Participants

An opportunity sample of 490 participants completed the first screening session. Six participants were excluded for self-reporting failure to follow instructions (e.g., not closing eyes when instructed). Therefore, data from 484 participants were analysed. 240 participants (197 female, 40 male, 3 other; mean age = 19.5, SD = 3.4) completed the Sussex Waterloo Scale of Hypnotizability (SWASH) screening, and 244 (198 female, 44 male; 2 other/not reported, mean age = 19.4, SD = 2.5) completed the Phenomenological Control Scale (PCS).

123 participants took part in a retest screening (M= 3.9 weeks, SD = 0.7). 61 participants (51 female, 10 male; mean age = 19.8, SD = 3.9) previously screened on the PCS returned for SWASH screening and 62 participants previously screened on the SWASH (49 female, 13 male; mean age = 19.2, SD = 1.7) returned for PCS screening. Retest screenings were advertised until there were no more responses (after 1 month).

The first screening was conducted as part of a practical session run on an undergraduate psychology course with groups of up to 50. Participants were individually randomly assigned to one of the two (SWASH vs. PCS) computer-delivered conditions. Participants at retest were also run in groups of up to 50. Retest participation were compensated with course credits or £6 payment. Ethical approval was received from the University of Sussex Sciences & Technology Cross-Schools Research Ethics Committee (ER/RBS20/11) and informed consent was obtained.

Materials (adapted from Lush, Dienes, Seth, et al., 2021)

Response to two scales (SWASH and PCS) were measured. Both consist of the same 10 items. There are two ideomotor suggestions (suggestions for apparently involuntary movement): Hand Lowering (a suggested experience of a heavy object in the participants outstretched hand) and Moving Hands Together (a suggested experience of a magnetic force pulling the participants outstretched hands together). There are two ideomotor challenges (suggestions that the participant cannot move): Arm Rigidity (the arm is so rigid it cannot be bent) and Arm Immobilisation (the arm cannot be lifted from the participant's lap). There is one Post-Session Suggestion, in which participants are told they will press the space bar six times in a row but will not remember being told to do so. The remainder are cognitive-perceptual suggestions: Mosquito Hallucination (tactile or auditory experience), Music (hearing happy birthday played), Negative Visual Hallucination (seeing only two of three coloured balls), Amnesia (remembering nothing of the session until that point), and Taste Hallucination (experiences of sweet and sour tastes).

The screening program was created in Matlab (2017). Participants reported subjective and objective responses (see Lush, Dienes, Seth, et al., 2021; Lush et al., 2018). We retained both the objective and subjective scale scoring of the SWASH. The objective scale is taken from the WSGC (Bowers, 1993). This consists of questions relating to observable changes (for example, the distance the participants' hands moved for an ideomotor suggestion of a magnetic force drawing the hands together) and employs binary scoring. The subjective scale records experience (for example how much it felt like there was a magnetic force drawing the hands together) on a Likert scale (from 0-5). Responses were recorded by participants pressing number keys on the computer keyboard. See the materials at https://osf.io/4x25a/ for scripts, response texts and scoring procedures.

The SWASH script was taken from Lush, Dienes, Seth, et al. (2021). The PCS script was modified from this script to remove all reference to hypnosis and relaxation. The preamble sets the session up as a test of the use of imagination to create experience, and a counting down procedure presented as an exercise in imagination replaces the SWASH hypnotic induction.

The SWASH induction (adapted from the WSGC; see https://osf.io/g72ae/ for the full script) is 862 words in length and establishes a hypnotic context through multiple references to entering a state of hypnosis and the presentation of a counting down relaxation procedure as hypnotic. For example, "I am about to help you to relax, and meanwhile I will give you some instructions that will help you to gradually enter a state of hypnosis. You can become hypnotized if you are willing to do what I tell you to, and if you concentrate on what I say." And "Soon you will be deeply

hypnotized, but you will have no trouble hearing me. You will remain deeply hypnotized until I tell you to awaken later on. Soon I shall begin to count from one to twenty. As I count, you will feel yourself going down further and further into a deeply relaxed, a deeply hypnotized state. At the end of the induction participants are told they are "now hypnotized".

The PCS preamble (rather than induction; see https://osf.io/pzmbw/ for the full script) removes all reference to relaxation, sleep, hypnosis or an altered state. The study is presented as an exercise in imagination: "You will shortly be given some exercises in the use of your imagination to create certain experiences. The aim is to see how much you can control the way you experience some simple events, such as moving your hand. For example, first you will be asked to lower your hand, and imagine it is being pulled down by itself. Engage yourself in that imagination, until it really feels like it is being pulled down by itself. Focus on the sensations and on the imaginary situation so you can immerse yourself in that reality, as if, for example, you were getting carried away by the narrative of a film, as if it were real." and "We will warm up with a simple exercise in imagination. Soon I shall begin to count from one to twenty. As I count, imagine yourself going down some steps…feel yourself stepping and see the steps .. experience them in every way you can".

Reference to hypnosis was removed from the introduction of the report section: "the specific happenings which were suggested to you during the hypnotic procedure" in the SWASH was changed to "the experiences which were proposed to you during the procedure" in the PCS. The wording in the rest of this section was revised to avoid reference to suggestion: "the specific happenings which were suggested to you during the hypnotic procedure" in the SWASH was replaced in the PCS with "each of the experiences which were proposed to you during the procedure" and "how strongly you experienced the effects of the suggestion." was replaced with "how strongly you experienced each phenomenon.". At the end of the preamble participants are told "Now we will start with our exercises."

Subjective scale anchors are taken from the SWASH and differ for each item. For example, the anchors for Taste Hallucination are "No taste" and "Strong taste" and for Moving Hands Together, in which participants are told they will experience a magnetic force, the labels are "No force" and "Strong force". See the response booklet at https://osf.io/hqdnt/.

The suggestions are identical for the two scales except for the removal of references to relaxation or hypnosis in the PCS script. E.g., "just relax.." removed from Hand Lowering; "and relax…." removed from Moving Hands Together; "Now relax, relax completely" removed from Mosquito Hallucination; "and you just continue to relax… more and more relaxed." removed from Taste Hallucination; "and relax" removed from "Arm Rigidity"; "because of the relaxed state you are in", "relax" and "Just relax, relax all over" removed from Arm Immobilization. "Now … just sit back and enjoy being hypnotized." removed from Music Hallucination; "Just relax and become even more deeply hypnotized as you continue to breathe comfortably and effortlessly." And "relax completely" removed from Negative Visual Hallucination.

The SWASH script ends with a de-induction procedure during which the hypnotist counts down from twenty and participants are told that they will be fully awake when the count reaches one. During the de-induction, the amnesia and post-hypnotic suggestions are given (e.g., "you will have difficulty in remembering all the things I have told you and all the things you did or felt, since you closed your eyes"). There is no counting down de-induction for the PCS and the amnesia suggestion and post-session suggestion are presented as a further exercise: "For the next exercise, feel you will have difficulty in remembering all the things I have told you and all the things you did or felt, since you closed your eyes".

The final section of audio provides information about the reporting procedure (see materials at https://osf.io/pzmbw/). Participants were instructed to rate either the degree to which they entered a hypnotic state or how absorbed they felt in their imagination for the hypnosis and phenomenological control conditions respectively, with response on a 0 – 5 "depth scale". However, due to a programming error, these data were not recorded (see explanatory note at OSF). The Penn State Worry Questionnaire (T. J. Meyer et al., 1990) was presented following the screening. These data were for classroom use and were not analysed as part of this study.

Procedure

Participants were screened in a computer lab. Each participant was seated in front of a PC, which provided all subsequent instruction. Before the procedure began, participants were prompted to provide informed consent and were able to choose to provide contact details for inclusion in a participant recruitment database. They next provided demographic information and were then instructed to sit back from the PC to allow sufficient space to freely raise their arms in front of their body. Participants wore headphones and were instructed to adjust the volume to a comfortable level by listening to a reference tone prior to the induction. They then listened to a pre-recorded introductory statement (hypnotic induction or imagination exercise) and a series of 10 imaginative suggestions. Following delivery of the script, in both groups, participants reported their experience by entering ratings on the computer keyboard.

Analyses

Mean objective and subjective scores were calculated. A preregistration document is available at https://osf.io/qh9mx. Because data for the first screening had been collected before the preregistration document was uploaded, only retest analyses are preregistered. All other analyses are exploratory but are based on analyses conducted in our previous scale norms papers (Lush, Dienes, Seth, et al., 2021; Lush et al., 2018). Data are available at https://osf.io/4x25a/.

Exploratory analyses

Scoring for the PCS was calculated as in the SWASH (Lush et al., 2018; Lush, Scott, Moga, et al., 2021; Palfi et al.,

Table 1a. Mean subjective scores for each suggestion for live and recorded SWASH delivery.

	SWASH		PCS	
Suggestion	*M*	*SD*	*M*	*SD*
1. Hand lowering	3.2	1.5	3.6	1.2
2. Moving hands together	2.6	1.5	3.1	1.3
3. Mosquito hallucination	1.0	1.3	1.7	1.5
4. Taste hallucination	1.1	1.2	1.8	1.3
5. Arm rigidity	2.5	1.5	3.2	1.4
6. Arm immobilisation	2.0	1.4	2.7	1.4
7. Music hallucination	0.1	0.5	0.3	0.8
8. Negative visual hallucination	0.2	0.9	0.4	1.2
9. Amnesia	1.6	1.4	1.6	1.4
10. Post-session suggestion	1.0	1.4	0.9	1.5

2019). Objective scale items were scored as pass or fail according to the criteria for each item. Subjective scale measures for most items were simply the score provided on a 0-5 scale. However, two of the items (Taste Hallucination and Post-Session Experience) involve two experiences, and therefore include two responses (see Lush et al., 2018). Taste Hallucination consists of responses to two suggestions for sweet and for sour tastes. The final subjective response score is the mean of the sweet and sour responses. The Post-Session (traditionally called post-hypnotic) Suggestion suggests both that the participant will perform an action and also forget that this was suggested. The score for this item is the geometric mean of response to urge and amnesia statements, so that a subjective response for this item would be zero if either of the components of the suggestion did not generate a subjective response.

Scale scores for SWASH and PCS are reported for comparison. Scale reliability was assessed using Cronbach's alpha, with item-dropped and corrected same scale item-total correlations. 95% Confidence Intervals are reported throughout, which can be interpreted as 95% Credibility Intervals with uniform priors.

Bayes factors for Welch t-tests of differences in mean scores between the scales and within scales at retest were calculated with H1 modelled using normal distributions with SD of 1.7/2 (0.85) for the subjective scale scores and 3.7/2 (1.85) for objective scale scores (the "room-to-move heuristic", see Dienes, 2019). These were based on the difference between the scale scores reported in Lush et al. (2018) and minimum scale scores (subjective scale, mean of 1.7 and minimum score 0; objective scale, mean 3.7 and minimum score 0). Bayes factors were calculated using the calculator at: https://harry-tattan-birch.shinyapps.io/bayes-factor-calculator/. Robustness Regions, RR, were determined as the set of scale factors that led to the same qualitative conclusion, i.e. either $B > 3$, or $B < 1/3$; or $1/3 < B < 3$ (Dienes, 2019). Bayes factors are provided for inferential analyses (rather than when estimation alone suffices).

Cut-off points for low response (0.60) and high response (2.65) were based on the 10% cut-offs for highest and lowest subjective scale scores in a previous screening of the SWASH (delivered by computer; n = 353; data available at https://osf.io/huwxd/).

Preregistered analyses

Retest analyses were conducted in accordance with a preregistration document available at https://osf.io/qh9mx. We aimed to estimate effect size rather than test hypotheses. We therefore report estimates and 95% CIs (interpreted as Bayesian credibility intervals with a uniform prior). Pearson's correlation coefficient and raw regression slopes were calculated between first and second session screening scores to estimate the stability of phenomenological control capacities across the two screening procedures which are presented in different contexts. Correlations for the whole sample and for two groups (with the sample divided according to which test was taken first) were estimated.

Results

Exploratory results

Scores

Table 1 shows mean subjective scores for each suggestion in the two conditions. Mean PCS subjective score (1.9, SD = 0.7) was greater in the sample than SWASH subjective score (1.5, SD = 0.8), $t(465.8) = 6.08$, $p < .001$, 95% CI [0.3, 0.5], $d = .55$ 95% CI, [.37, .73], $B_{N(0,0.85)} = 3449315.63$, $RR_{B>3}$ [.02, > 10]. Mean PCS objective score (4.1, SD =1.6) was also greater than SWASH objective score (3.4, SD = 1.8) $t(471.7) = 4.05$, $p < .001$, 95% CI [0.3, 0.9], $d = 0.37$ 95% CI [.19, .55], $B_{N(0,1.85)} = 254.98$, $RR_{B>3}$ [.07, >10].

Relation between subjective and objective scales

Table 2 shows mean subjective score and point biserial correlations for objective and subjective responses for each item. Total subjective scale score and total objective scale score had an estimated correlation for the SWASH of $r(238) = .74$, 95% CI [.68, .79] and for the PCS, $r(242) = .59$, 95% CI [.50, .67]. For each item, objective and subjective responses were correlated in the SWASH condition with a mean coef-

Table 1b. Percentage passing each item on the objective criterion for SWASH and PCS.

Suggestion	SWASH	PCS
1. Hand lowering	57.5	63.9
2. Moving hands together	67.5	75.4
3. Mosquito hallucination	28.8	44.7
4. Taste hallucination	50.0	66.0
5. Arm rigidity	46.3	55.7
6. Arm immobilisation	31.3	45.1
7. Music hallucination	3.7	8.2
8. Negative visual hallucination	2.1	3.7
9. Amnesia	15.4	14.8
10. Post-session suggestion	41.7	29.1

Table 2. Mean subjective score and point biserial correlations between behavioural and experiential scoring of suggestions for SWASH and PCS.

Suggestion	SWASH *rpb*	PCS *rpb*
1. Hand lowering	.56 [.46, .64]	.49 [.39, .58]
2. Moving hands together	.53 [.43. .62]	.48 [.38, .57]
3. Mosquito hallucination	.62 [.53, .69]	.60 [.51, .67]
4. Taste hallucination	.43 [.32, .53]	.46 [.36, .56]
5. Arm rigidity	.50 [.40, .59]	.49 [.39, .58]
6. Arm immobilisation	.47 [.36, .56]	.32 [.20, .42]
7. Music hallucination	.48 [.37, .57]	.79 [.74, .83]
8. Negative visual hallucination	.47 [.36, .56]	.35 [.23, .45]
9. Amnesia	.28 [.16, .39]	.13 [.01, .25]
10. Post-session suggestion	-.03 [-.16, .09]	.01 [-.12, .13]

ficient of .50, and in the PCS condition with a mean coefficient of .53.

Reliability

For the SWASH, subjective scale alpha was .81, 95% CI [.77, .84], indicating good internal consistency. The upper limit of the 95% CI for the PCS subjective scale alpha was lower than the lower limit for the SWASH, .68, 95% CI [.62, .74], but also showed acceptable consistency.

Table 3a shows Cronbach's alpha if the item is dropped for each SWASH suggestion on the subjective scale. Point estimates of the coefficient were equal or similar to overall alpha in each condition, indicating that subjective scales for both PCS and SWASH are reliable.

Alpha did not show good reliability for the objective SWASH scale .49, 95% CI [.39, .57] nor for the objective PCS .30, 95% CI [.13, .44], Item dropped objective scale alpha was similar or lower for all items for both scales except for post-hypnotic suggestion.

Table 4 shows item-total correlations for each scale item. Subjective scale mean item-total correlations for PCS was r =.34, and for SWASH, r =.48. Objective scale mean item-total correlation for PCS was r = .20, and for SWASH was r = .34.

Retest

Table 5 shows mean first test and retest scores for participants who completed the SWASH at first-test and the PCS at second test, and vice versa. There was a main effect of retest on subjective scores, with scores lower at second test for both groups, $F(1, 121) = 29.86$, $p < .001$, 95% CI [0.2, 0.5], d = .50 95% CI [.31, .68], $B_{N(0,0.85)}$ = 1585098.55 $RR_{B>3}$[.02,> 10]. There was evidence for no interaction, $F(1,121) = .041$, p = .839, 95% CI [0.0, 0.1], d = .04, 95% CI [-.32 .39], $B_{N(0,0.85)}$ = .18, $RR_{B<1/3}$[0.48,> 10].

There was also a main effect of retest on objective scores, $F(1, 121) = 13.42$, p < .001, 95% CI [0.26, 0.85], d = .33 95% CI [.15, .51], $B_{N(0, 1.85)}$ = 64.25, $RR_{B<1/3}$[.07,>10]. There was again evidence for no interaction, $F(1, 121) = 1.10$, p = .296, 95% CI [-.91, .28], d = -.19 95% CI [-.54, .17], $B_{N(0, 1.85)}$ = .28., $RR_{B<1/3}$[1.7,>10].

Table 3a. Subjective scale alpha (if item dropped) (95% CI)

	SWASH	PCS
1. Hand lowering	.78 [.73, .81]	.65 [.56, .71]
2. Moving hands together	.79 [.74, .82]	.67 [.58, .73]
3. Mosquito hallucination	.79 [.74, .82]	.65 [.57, .72]
4. Taste hallucination	.79 [.75, .82]	.66 [.58, .72]
5. Arm rigidity	.77 [.72, .80]	.62 [.51, .70]
6. Arm immobilisation	.77 [.72, .81]	.62 [.52, .69]
7. Music hallucination	.81 [.77, .84]	.67 [.59, .72]
8. Negative visual hallucination	.82 [.78, .85]	.69 [.62, .75]
9. Amnesia	.79 [.74, .82]	.67 [.58, .74]
10. Post-session suggestion	.81 [.77, .84]	.67 [.59, .73]

Table 3b. Objective scale alpha (if item dropped) (95% CI in brackets)

	SWASH	PCS
1. Hand lowering	.44 [.32, .52]	.28 [.11, .41]
2. Moving hands together	.45 [.34, .53]	.29 [.10, .43]
3. Mosquito hallucination	.44 [.34, .53]	.25 [.06, .39]
4. Taste hallucination	.43 [.33, .52]	.23 [.04, .37]
5. Arm rigidity	.41 [.30, .50]	.23 [.02, .38]
6. Arm immobilisation	.49 [.38, .57]	.25 [.07, .37]
7. Music hallucination	.43 [.32, .53]	.28 [.10, .40]
8. Negative visual hallucination	.49 [.38, .57]	.27 [.10, .40]
9. Amnesia	.49 [.38, .57]	.31 [.13, .44]
10. Post-session suggestion	.54[.44, .61]	.35 [.22, .46]

Table 4a. Subjective scale corrected same-scale item-total correlations (95% CI)

	SWASH	PCS
1. Hand lowering	.58 [.49, .66]	.39 [.28, .49]
2. Moving hands together	.52 [.42, .61]	.29 [.17, .40]
3. Mosquito hallucination	.52 [.42, .61]	.36 [.25, .46]
4. Taste hallucination	.52 [.42, .61]	.35 [.23, .46]
5. Arm rigidity	.69 [.62, .75]	.50 [.40, .59]
6. Arm immobilisation	.67 [.59, .73]	.54 [.44, .62]
7. Music hallucination	.23 [.11, .35]	.30 [.18, .41]
8. Negative visual hallucination	.18 [.05, .30]	.13 [.00, .25]
9. Amnesia	.52 [.42, .61]	.29 [.17, .40]
10. Post-session suggestion	.35 [.23, .46]	.28 [.16, .39]

Pre-registered analyses

In the whole sample, test and retest scores for subjective scales were correlated $r(121) = .57$ [.43, .68]. The regression slope, b = .60 [.44, .76], showed each subjective scale point at first test predicted a change in scale score at second test of 0.6 of a scale point. The whole sample test-retest correlation for objective scales was $r(121) = .60$ [.48, .71], b = .62, [.47, .77], so each objective scale point at first test predicted a change in objective scale score at retest of 0.6 of a scale

Table 4b. Objective scale corrected same-scale item-total correlations (95% CI)

	SWASH	PCS
1. Hand lowering	.27 [.15, .38]	.10 [-.03, .22]
2. Moving hands together	.25 [.13, .37]	.07 [-.06, .19]
3. Mosquito hallucination	.27 [.15, .38]	.15 [.02, .27]
4. Taste hallucination	.33 [.21, .44]	.18 [.06, .30]
5. Arm rigidity	.26 [.14, .37]	.16 [.04, .28]
6. Arm immobilisation	.09 [.04, .21]	.11 [-.02, .23]
7. Music hallucination	.28 [.16, .39]	.19 [.07, .31]
8. Negative visual hallucination	.12 [.01, .24]	.02 [-.11, .15]
9. Amnesia	.16 [.03, .28]	.20 [.08, .32]
10. Post-session suggestion	.002 [-.12, .13]	-.05 [-.17, .08]

Table 5. Objective scale and subjective scale total mean score for first test and retest (SD)

	First test SWASH	Retest (PCS)	First test (PCS)	Retest (SWASH)
Subjective score	1.7 (0.8)	1.4 (0.8)	2.1 (0.6)	1.8 (0.8)
Objective score	3.8 (2.0)	3.1 (1.8)	4.4 (1.7)	4.0 (1.9)

point.

The objective scale test/retest correlation for the group who were tested on SWASH first and the PCS on retest was $r(60) = .64$, [.47, .77], b = .57 [.40, .75]. Subjective scale test/retest correlation for this group was (60) = .56, [.36, .71], b = .51 [.32, .71].

For participants who completed the PCS first, subjective SWASH score on retest correlated with first test, $r(59) = .52$ [.31, .68], b = .69 [.40, .98]. Objective scale correlated with PCS from first test with an estimated $r(59) = .55$ [.34, .70], b = 0.63, [.38, .88].

Score distributions

Figure 1 shows distributions of scores on the subjective scale for the two scales.

Table 6 shows the percentage of low and high responders for each scale. The odds ratio of the classification as low vs not low for the SWASH vs the PCS was OR = 3.9, 95% CI [1.9, 8.0]. On the other hand, the odds ratio for the classification as a high vs not high for the SWASH vs the PCS was OR = 0.8, 95% CI [0.4, 1.4]. The ratio of these ORs was 4.9, 95% CI[1.8, 13.7]. That is, the hypnotic scale, SWASH, disproportionately produced more lows than highs compared to the PCS by a ratio plausibly between about 2 and 14.

Exploratory PCA results were similar for the two scales (see supplementary results at https://osf.io/7x3fy/), showing a primary component of overall response to suggestion and a secondary small component that contrasts perceptual-cognitive suggestions with motor suggestions, consistent with the motor vs perceptual-cognitive by challenge vs direct classification of Woody and Barnier (2008).

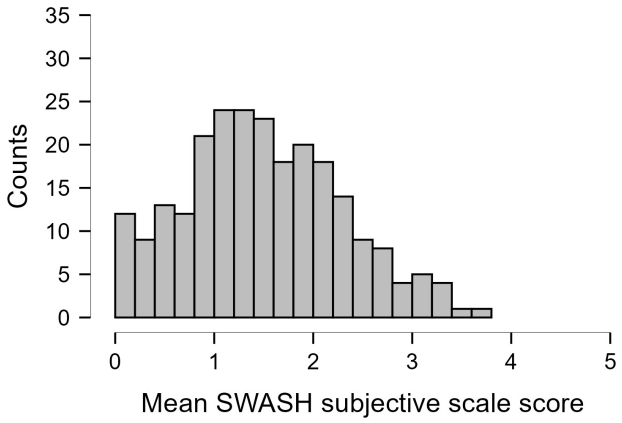

Figure 1a. Histogram of subjective scale scores for SWASH scale

Discussion

While it is well established that response to imaginative suggestion does not require hypnosis, previous scales of imaginative suggestion outside the hypnotic context (e.g., Barber & Wilson, 1978) have failed to displace hypnosis as the primary context in which imaginative suggestion effects are studied. Because many of the cultural beliefs about hypnosis are scientifically inaccurate, there is a need to develop scales for measuring trait response to imaginative suggestion outside the hypnotic context. The Phenomenological Control Scale is a version of the SWASH hypnotizability scale from which reference to hypnosis has been removed. We compared scale norms between the SWASH and

PCS. Subjective scale Cronbach's alpha was acceptable for both PCS and SWASH. Subjective scale scores on SWASH substantially predicted PCS scores at retest, as did scores on PCS predict SWASH. Mean item-total correlations were moderate for subjective scale SWASH and PCS. Neither the SWASH nor PCS showed good reliability for the objective scale.

Scores were higher for the non-hypnotic context (PCS) than for the hypnotic context (SWASH). This finding is at odds with prior research in which the hypnotic context provides a boost in response (e.g., Braffman & Kirsch, 1999; Gandhi & Oakley, 2005) and consistent with existing evidence that mean group response is greater when imaginative suggestions are presented as imagination rather than hypnosis (Lynn et al., 2002; Scacchia & De Pascalis, 2020).

Lower mean scores in the hypnotic than non-hypnotic context are driven by differences at the lower end of the scale. Just 4.1% of PCS participants were classified as lows using the 10% cut-off from previous SWASH data, while 14.2% of participants in the SWASH condition met this criterion for classification. This may indicate reactance in the hypnosis condition. That is, preconceptions about hypnosis may have encouraged some people to resist engaging with the study. Supporting this interpretation, negative misconceptions are widespread. For example, Green et al report that around 50% of survey respondents are apprehensive or wary about giving up their "free will" to the hypnotist (Green et al., 2006; see Lynn et al., 2020). In the absence of negative aspects of the hypnotic context, participants may have comparatively little incentive to demonstrate they are not able to respond successfully. Further research could test this hypothesis.

There was a reduction in score from first test to retest for both orders of scale presentation. This is consistent with Fassler et al. (2008), who argued boredom is the mediating factor. Test retest correlations across the two scales were comparable to the test-retest correlation (.50) for experiential scales across hypnotic and non-hypnotic presentations of the WSGC (in which the hypnotic context was presented second; E. C. Meyer & Lynn, 2011).

The PCS offers advantages over the SWASH for testing correlations between hypnotizability and the use of phenomenological control in other contexts. For example, a reactant participant who scores low on the SWASH scale because of their attitude toward hypnosis may score higher when this context is not present. While no experimental situation is ever free of context, the context of phenomenological control is relatively simple compared to that of hypnosis. We suggest that the presentation of imaginative suggestions in a scientific context (the context of a scientific experiment rather than the context of hypnosis, though we note that hypnosis can, of course, be performed within the context of a scientific experiment) makes it likely to be a closer match for unintended implicit suggestion effects (resulting from demand characteristics) in other scientific experiments. This speculation remains to be tested. On a practical note, in terms of the usefulness of imaginative suggestions tested out of versus within the hypnotic context, we have investigated relationships between response to imaginative suggestion and other experimental reports using both the SWASH (e.g., rubber hand illusion and mirror

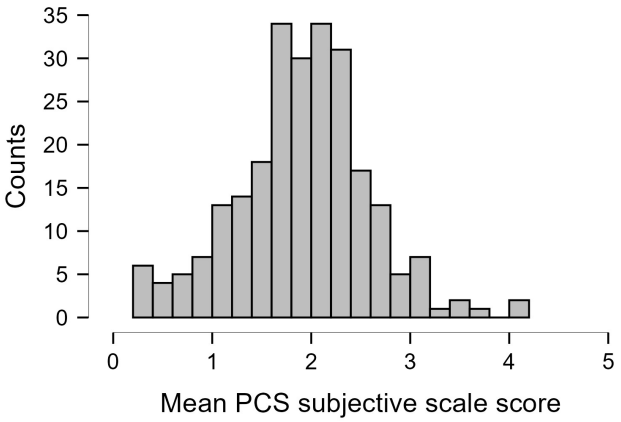

Figure 1b. Histogram of subjective scale scores for PCS scales

Table 6. Percentage of participants classified as low and high on each scale.

	SWASH	PCS
Low 10%	14.2%	4.1%
High 10%	9.6%	11.9%

synaesthesia; Lush et al., 2020) and PCS (e.g., visually evoked auditory response; Lush, Dienes, Seth, et al., 2021). As for the SWASH, relationships between the PCS and other measures are substantial; reports of visually evoked auditory response are predicted to increase half a point for each 1 point increase in PCS, (both on 6 point scales), r_s = .37. At least for the purposes of predicting reports of experiential change from trait response to imaginative suggestion (i.e., phenomenological control as a potential confound in psychological experiments), the PCS appears to be no less effective than the SWASH.

As with the objective scale of the SWASH, the objective scale for PCS was not very reliable. This scale is taken directly from the WSGC. While we no longer use and do not recommend the use of scores generated by the objective scales (which are really no more objective than the subjective scales; see Lush, Dienes, & Seth, 2021 for a related discussion on the interpretation of measures which are labelled as "objective"), the inclusion of an objective scale may still be useful, for example, simply as an extra measure (e.g., selecting only participants who passed objective and subjective scale items).

According to participant report, phenomenological control scale items can create: illusions of non-volition, illustrated by the scale items of hand lowering, hands moving together, arm rigidity and arm immobilisation; alterations in perception, illustrated by the scale items of experiencing a mosquito, taste experience, music hallucination and negative visual hallucination; and delusion, illustrated by repeatedly pressing a keyboard, believing one is acting for reasons unrelated to direct instruction; and also amnesia, believing one cannot remember when in fact one can (Coe,

1996; construing response to an amnesia suggestion as delusional depends on the claim that the subject can breach it if motivated). Another way of cross-classifying types of responses suggested by Woody and Barnier (2008) is motor vs cognitive/perceptual crossed by direct vs challenge. A challenge suggestion is when the subject is urged to try to do something but the suggestion is that they will fail. An example of each of these four types is: hand lowering for motor direct; mosquito for perceptual/cognitive direct; arm immobilisation for motor challenge; and negative visual hallucination for perceptual/cognitive challenge. The scale thus has a mix of the suggestions requiring possibly different subskills (Kallio, 2021; Woody & McConkey, 2003).

For some researchers, the terms "induction" and "hypnosis" presume there is a special procedure for inducing an altered state (Coe, 1992). People "enter" or "leave" hypnosis. As mentioned, it has long been known that response to imaginative suggestion does not require a special state (Barber & Glass, 1962; Hull, 1933) and the postulation of a state has not yet led to confirmed predictions that could not be made otherwise (see Jensen et al., 2017; Lynn et al., 2020). However, the phrase "the capacity for phenomenological control" does not presume anything on this matter, one way or the other. The question of an altered state may be investigated by those who wish, while others may investigate the nature of how people alter their sense of volition, or create hallucinations or delusions independent of issues to do with special states. Further the term "phenomenological control" indicates that the phenomenon measured is central to understanding consciousness, and not tied to any particular context, such as the hypnotic one. The term "phenomenological control" is consistent with any theory of response to imaginative suggestion which posits that response is under control (as opposed to reflex), and any theory which accepts there is experiential change in response to imaginative suggestion. While we favour the theory that phenomenological control involves voluntary acts which are experienced as involuntary (Dienes, 2012; Dienes et al., 2020; in press), the term is in no way limited to this "cold control" theory alone.

It is possible that the preamble to the PCS, inviting subjects to actively engage with the exercises, promotes a different way of responding than a hypnotic context. However, the results of this study do not easily support this interpretation. The scale items in both the PCS and SWASH scales are worded as suggestions for changes in experiences rather than instructions or requests. The response scales ask about the experiences in terms of distortion in volition and perception; thus, prima facie, subjects have similar experiences on both scales. Responding in the hypnotic context has also long been recognized as an active striving (White, 1941), a process with which subjects actively engage (McConkey & Sheehan, 1982), with the subjective distortions building up over time within each suggestion (McConkey et al., 1999).

Regardless of the degree to which one believes imaginative suggestion scales (within or outside the hypnotic context) reflect genuine experience (for a review of evidence for this see Dienes et al., in press; for a review of other evidence see McConkey, 2008), other demand characteristics effects such as faking, wilful imagination (see Corneille & Lush, 2021) or (as is most likely) some mixture of these possibilities, it is important to take stable trait differences in a tendency to report anomalous experiences in experimental situations seriously. With reference to effects for which relationships between phenomenological control have been shown (thus far the rubber hand illusion, mirror touch synaesthesia, vicarious pain and visually evoked auditory response), there is a measurable trait which predicts reports of experience. When this is taken into account, these effects require re-interpretation. For example, without higher phenomenological control participants there is not agreement on average for an illusion of ownership of a fake hand at typical sample sizes (see Roseboom & Lush, 2020); this puts pressure on theories of the rubber hand illusion not based on phenomenological control.

Although we believe that imaginative suggestion research has been hampered by the outdated label of "hypnosis", we are aware that this claim may not be welcomed by researchers who have much invested in the hypnotic context. It is for this reason that we have changed only as much as was necessary to remove the hypnotic context in adapting the SWASH scale (e.g., references to relaxation, sleep, trance states; Lynn et al., 2020). We hope that fears that the scale measures something different to hypnosis scales may be allayed somewhat by this conservative approach. We do not discount hypnosis research; the hypnotic context has proven fruitful in the study of imaginative suggestion effects. We also do not discount the use of the hypnotic context in clinical treatment, whenever it proves useful (see Lynn et al., 2019). However, continued adherence to a term rooted in 19th century understanding and which is so laden with misleading mythology may be of more harm than good to progress in scientific research on the phenomena in question.

The SWASH is an adaptation of the long established WSGC, itself a group adaptation of the Stanford. The PCS is a close adaptation of the SWASH. While this strategy is advantageous with regard to relating results to earlier studies, a disadvantage is that weaknesses of these historical scales have not been removed. There is, however, a need for development of imaginative suggestion scales, which have undergone relatively little development since their initial development many decades ago (see Acunzo & Terhune, 2021). Future development of phenomenological control scales can afford to be less conservative, for example, by revising the post-session/post-hypnotic suggestion and by introducing new items. Furthermore, as for most measures of hypnotizability, the experience of involuntariness is assumed for the PCS. Future scales would also benefit from the addition of an involuntariness measure for each item.

Note that we do not argue that expectancies are the sole determinant of response (see e.g. Dienes & Perner, 2007, for counter-arguments to expectancies being the sole psychological determinant to response). Rather, we point out that suggestions inform people of what they should experience (or what they should expect to experience). This is true whether the suggestion is indirect and non-verbal (e.g., repetitive passes of a mesmerist's hands or iron rod) or direct and verbal (e.g., the suggestion that one will have a particular experience as delivered by a "hypnotist").

In sum, the capacity for phenomenological control has

been largely ignored outside of the hypnotic context, yet the application of the capacity may be widespread in many contexts, inside and outside the lab (Bell et al., 2011; Bryant et al., 2003; Hilgard, 1970). The subjective scale of the PCS is a reliable tool for measuring trait response to imaginative suggestion outside the context of hypnosis. We hope this scale will help us see what may have been in front of our noses all along; phenomenological control may be widespread in psychological experiments without people noticing. People may not have noticed because phenomenological control has been called hypnosis, a word and context that suggests something both magical, yet also mildly disreputable. Our aim is to encourage others to look and see.

Author contributions

PL, Z.D. and R.B.S designed the study. R.B.S wrote the MATLAB program and collected first session data. P.L. collected retest data, performed analyses and drafted the manuscript. All authors provided critical revisions.

Acknowledgements

Bence Palfi and Gyorgy Moga assisted with collection of retest data.

Funding information

PL and AKS are grateful to the Dr. Mortimer and Theresa Sackler Foundation and to the Canadian Institute for Advanced Research (CIFAR) Program on Brain, Mind, and Consciousness.

Competing interests

No competing interests.

Supplemental material

Study materials (scripts and audio recordings) and supplemental results (principle components analysis) available at https://osf.io/4x25a/

Data accessibility statement

All stimuli, presentation materials, participant data, and JASP analysis files and output can be found on this paper's project page on the OSF: https://osf.io/4x25a/

Submitted: April 26, 2021 PST, Accepted: October 18, 2021 PST

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