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Patterns of hypnotic response, revisited

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ABSTRACT

It has long been speculated that there are discrete patterns of responsiveness to hypnotic suggestions, perhaps paralleling the factor structure of hypnotizability. An earlier study by Brenneman and Kihlstrom (1986), employing cluster analysis, found evidence for 12 such profiles. A new study by Terhune (2015), employing latent profile analysis, found evidence for three such patterns among highly hypnotizable subjects, and a fourth comprising subjects of medium hypnotizability. Some differences between the two studies are described. Convincing identification of discrete "types" of high hypnotizability, such as dissociative and nondissociative, may require a larger dataset than is currently available, but also data pertaining directly to divisions in conscious awareness and experienced involuntariness.

1. Introduction

The existence of wide individual differences in response to hypnosis was recognized even before hypnosis got its name (Laurence, Beaulieu-Prévost, & duChéné, 2008), and every serious laboratory employs standardized scales of hypnotizability (also known as hypnotic susceptibility or hypnotic suggestibility) to identify subjects who have a "talent" for hypnosis. These instruments, the prototype of which is the Stanford Hypnotic Susceptibility Scale, Form A (SHSS:A; Weitzenhoffer & Hilgard, 1959), consist of a hypnotic induction procedure including suggestions for focused attention and relaxation, followed by a series of typical hypnotic suggestions, such as arm lowering, arm catalepsy, and a hallucinated fly. Response to each of these suggestions is scored according to an objective behavioral criterion. To take an example: it is suggested that there is a fly buzzing annoyingly around the subject's head; if he or she makes any visible move to brush the fly away within 10 s, the subject is scored as passing the suggestion. Although many studies rely solely on the group-administered Harvard Group Scale of Hypnotic Susceptibility, Form A (HGSHS:A; Shor & Orne, 1962), which is an adaptation of SHSS:A, the individual Stanford Hypnotic Susceptibility Scale, Form C (SHSS:C; Weitzenhoffer & Hilgard, 1962), administered as a follow-up to SHSS:A or HGSHS:A, is generally considered the "gold standard" for the assessment of hypnotizability (Hilgard, 1965; Laurence et al., 2008). While SHSS:A and HGSHS:A are dominated by "ideomotor" suggestions, the SHSS:C contains a higher proportion of more difficult "cognitive" suggestions, such as hallucinations and age-regression.

2. The search for profiles of hypnotizability

Most current scales measure hypnotizability as a unidimensional trait, by analogy with IQ. For example, HGSHS:A and SHSS:C are both scored on a scale of 0–12, depending on the number of suggestions "passed" according to specific,

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dichotomous, objective, behavioral criteria. The distribution of hypnotizability, so measured, is quasi-normal, with a positive skew and perhaps a hint of bimodality (Balthazard & Woody, 1989). Fewer than 10% of the population qualify as "hypnotic virtuosos", commonly defined as those scoring 10–12 on SHSS:C (Register & Kihlstrom, 1986).

Despite the unidimensional scoring of the hypnotizability scales, it has been generally understood that hypnotic suggestions are not all alike. Judging simply by item content, there are two types of ideomotor suggestions – direct suggestions for the facilitation of some motor activity (e.g., arm levitation), and challenge suggestions for the inhibition of motor activity (e.g., arm catalepsy); perceptual alterations, such as positive and negative hallucinations; and cognitive alterations, such as age-regression, posthypnotic suggestion, and posthypnotic amnesia. Traditional factor analyses have generally converged on a three-factor solution, involving direct suggestions, challenge suggestions, and perceptual-cognitive alterations. A more sophisticated approach, employing item-response theory, yielded a four-factor solution, with posthypnotic amnesia splitting off from the rest of the perceptual-cognitive factor (Woody, Barnier, & McConkey, 2005). Whether there are three or four factors, or more, all the factors are correlated with each other, justifying the use of a single sum score to represent subjects' general hypnotizability. Still, the existence of separable factors suggests that hypnosis taps distinct component abilities – and, more important in the current context, that there might be different "types" of hypnotizable subjects, possessing these component abilities to differing degrees (Woody & Barnier, 2008).

It was to explore this possibility that Weitzenhoffer and Hilgard developed the Stanford Profile Scales of Hypnotic Susceptibility, Forms I and II (SPSHS:I & II; Hilgard, Lauer, & Morgan, 1963; Weitzenhoffer & Hilgard, 1963). These are intended to be administered only to subjects who prove to be at least moderately hypnotizable on SHSS:A or HGSHS:A, and consist of a number of suggestions for various kinds of perceptual-cognitive alterations arranged into six subscales:

1. Agnosia and other anomalies affecting semantic and procedural knowledge (AG).
2. Positive hallucinations (HP), or sensory-perceptual experiences occurring in the absence of appropriate environmental stimuli.
3. Negative hallucinations (HN), the lack of awareness of normally perceptible stimulation.
4. Dreams and regressions (DR), including hypermnesia.
5. Amnesia and posthypnotic suggestion (AM).
6. Loss of motor control (MC), derived from prior testing).

The SPSHS items are relatively difficult, in terms of pass percents, and so can be used to make further discriminations among subjects who have already been identified as highly hypnotizable by procedures such as SHSS:C. More to the point, the composition of SPSHS allows researchers to plot a profile of differential response to hypnotic suggestions, much like Thurstone's (1938) primary mental abilities, the subscale scores of the WAIS (Wechsler, 1939), or the profiles generated by the MMPI (Hathaway & McKinley, 1940) and CPI (Gough, 1956), which were the inspiration for the Profile Scales in the first place.

Based on the standardization sample, Hilgard (1965) identified some 62% of subjects who had profiles with substantial deviations from their own mean scores on one or more subscales. But given the data-analytic techniques available at the time, he was unable to determine the extent to which these patterns were shared within the group. The Profile Scales never came into wide use, even in the Stanford laboratory, and there the matter sat for some time.

The obvious solution to this problem – once the technology became available – was to conduct a cluster analysis (Aldenderfer & Blashfield, 1984; Allen & Goldstein, 2013). To that end, Brenneman and Kihlstrom (1986) submitted the SPSHS standardization data (Lauer, 1965), plus some additional data collected in the Stanford laboratory (both courtesy of E.R. Hilgard), to a non-metric hierarchical cluster analysis (maximum method), employing AGCLUS, a free-standing computer program developed at Harvard University by Donald C. Olivier. Beginning with 155 subjects (including the 112 subjects in the standardization sample), we eliminated 28 subjects (18% of the total) with obviously flat profiles (i.e., scatter values less than 1 *SD* below the mean scatter for the entire sample). Analysis of the remaining 127 profiles yielded 17 clusters, five of which, totaling 11 cases (9%), contained fewer than five subjects each. Eliminating these small, residual profiles left 12 profile clusters containing 5–15 subjects each. Eight of the profiles constituted mirror–image pairs, depicted in Fig. 1; the remaining four profiles, depicted in Fig. 2, including another 13 "flat" profiles, had no obvious complements.

Finding 12 profiles (including the "flat" profiles excluded *a priori* from the cluster analysis, combined with the additional "flat" profiles yielded by the cluster analysis itself) in 155 subjects, eight of which formed complementary pairs, seemed a reasonable solution to the problem of identifying patterns of hypnotizability: the clusters seemed to maximize homogeneity while representing widely shared patterns of hypnotic response. However, as Terhune (2015) correctly notes, cluster analysis is vexed by the problem of determining exactly how many clusters there are in any given data set. In principle, the solution is simple enough: partition the dendrogram at whatever level shows the greatest amalgamation distance from adjacent levels. This is not all that different from using the scree test to determine the number of factors in principal components analysis, or simply looking for eigenvalues greater than 1. Of course, amalgamation distances, like eigenvalues, are not perfectly reliable, which is what injects some uncertainty into the process. This problem seemed insurmountable in 1979 (Everitt, 1979), though more recent model-based approaches to cluster analysis may offer a solution (Fraley & Raftery, 1998).

In a new approach to this problem, Terhune (2015) has employed latent profile analysis, which apparently obviates the clustering problem. Employing the 112-subject standardization sample of the Profile Scales, he obtained the best fit with a four-class model. One of these classes (Pattern 3) consisted almost exclusively of subjects of moderate (rather than high)

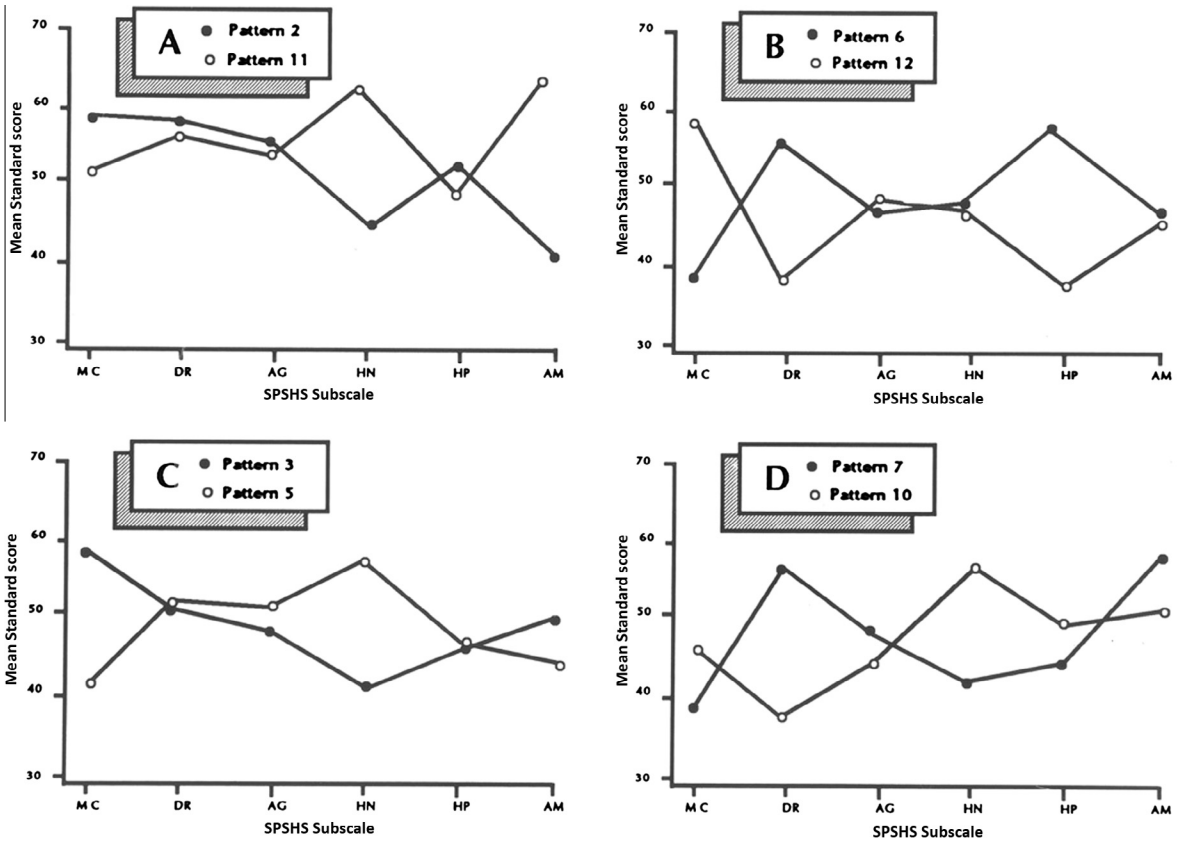

Fig. 1. Four mirror–image pairs of SPSHS profiles obtained in the study by Brenneman and Kihlstrom (1986). MC = Loss of Motor Control; DR = Dreams and Regressions; AG = Agnosias; HN = Negative Hallucinations; HP = Positive Hallucinations; AM = Amnesia and Posthypnotic Compulsion.

hypnotizability, and was excluded from further consideration on those grounds alone. Of the three remaining classes: Patterns 1 and 2 were very similar, except for one subscale, AG (and smaller differences on another, AM); Pattern 4 was relatively flat.

To review the bidding, Brenneman and Kihlstrom (1986) got evidence for 12 patterns; Terhune's findings suggest that there are only three (counting only highly hypnotizable subjects) or four (including subjects of moderate hypnotizability). However, there are enough differences between Terhune's (2015) study and ours that not too much should be made of the differences in findings. To begin with, the two studies addressed somewhat different questions. Terhune (2015) sought to identify different patterns of responses within the range of medium-to-high hypnotizability – which could include patterns of uniform responding across the different SPSHS subscales (such as his Classes 3 and 4). Brenneman and Kihlstrom (1986), following Hilgard (1965), were interested primarily in *differential* patterns of response – that is, patterns of peaks and valleys that are obscured by the sum scores usually employed in assessing hypnotizability. As noted earlier, three of Terhune's four classes differed in hypnotizability; while his Classes 1 and 2 showed the differential peaks and valleys that were the target of our analysis.

Other than our choice of analytic method (traditional cluster analysis versus latent profile analysis, which had not yet been invented when we did our study), our methods also diverged somewhat.

1. Brenneman and Kihlstrom employed a somewhat larger sample, in that the standardization sample ($N = 112$) was augmented by data from 43 additional subjects tested in Hilgard's laboratory, yielding a total of 155 subjects. Following Hilgard (1965), we included subjects of moderate as well as high hypnotizability, as measured by SHSS:A. Terhune's four-class solution included one class consisting of moderately hypnotizable subjects, while his three-class solution included only highly hypnotizable subjects.
2. We also employed a somewhat expanded item pool, drawing on SHSS:C as well as SHSS:A. Specifically, we included the motor items from SHSS:C in the MC "motor pool", and posthypnotic amnesia from SHSS:C in the AM scale. As a result, each subscale was composed of four items, each scored on a four-point (0–3) scale.

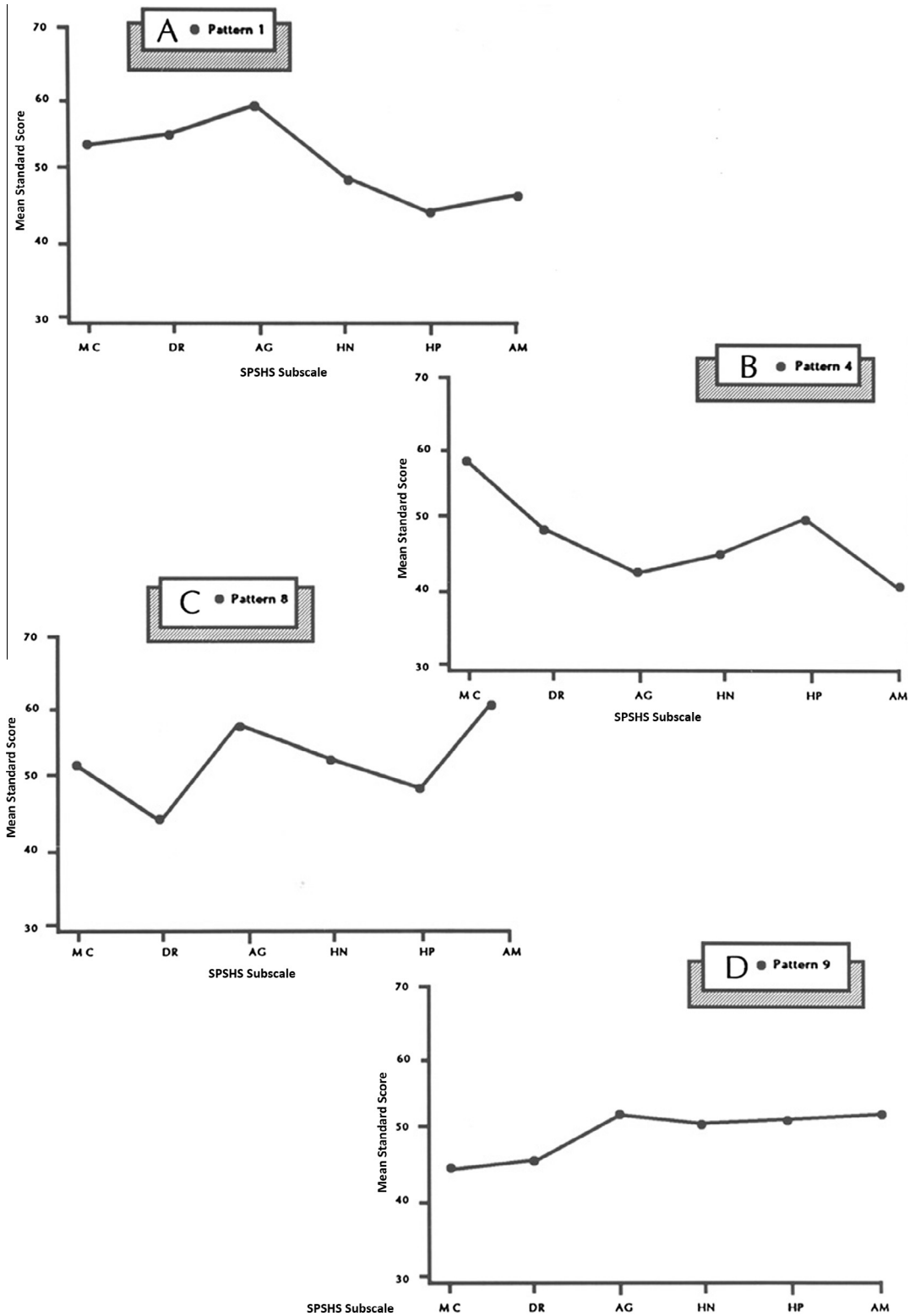

Fig. 2. Four non-reflecting SPSHS profiles, including a group of "flat" profiles (D), obtained in the study by Brenneman and Kihlstrom (1986). MC = Loss of Motor Control; DR = Dreams and Regressions; AG = Agnosias; HN = Negative Hallucinations; HP = Positive Hallucinations; AM = Amnesia and Posthypnotic Compulsion.

3. Following Hilgard (1965), we excluded from our analysis 28 subjects who had obviously flat profiles. Although such subjects are interesting (when highly hypnotizable, they qualify as true virtuosos), the primary purpose of our study was to identify different patterns of response across the SPSHS. Even so, our cluster analysis identified 13 additional subjects with relatively flat profiles, for a total of 41 such subjects. Apparently, the criteria applied by AGCLUS differed somewhat from those that we had applied at the outset. Still, our view was that the goal of identifying differential patterns of hypnotic response would be more easily achieved by eliminating at the outset subjects who did not display any such pattern.
4. Again following Hilgard (1965), we standardized each subscale score to a mean of 50 and a standard deviation of 10. In its standard version, the SPSHS subscales differ in terms of how many items they contain, and how the items are scored, as well as in terms of difficulty level. The result is that the range of possible subscale scores varies among the subscales. Standardization insured that each subscale had an equal weight in the calculation of profile similarity.
5. Perhaps most important, we ipsitized each subject's profile score, calculating each subscale score as the deviation of that score from the subject's own mean subscale score. Our interest was in the shape of subjects' profiles, irrespective of their overall performance (within the medium-to-high range). We did not want our profiles to be contaminated by overall level of hypnotizability (Cronbach & Gleser, 1953).

Unfortunately, acknowledging these differences in method does not provide any rationale for choosing between them. Latent profile analysis is arguably superior to traditional cluster analysis, as a means of identifying groups of subjects with similar response profiles, but the other differences remain matters of choice and emphasis. The groups revealed by the cluster analysis were not differentiated by hypnotizability: use of ipsitized scores ruled out that possibility by fiat. Aside from the differential peaks and valleys visible in Classes 1 and 2, the outstanding feature of Terhune's classes is that they differ in hypnotizability: the subjects in Class 4 were more hypnotizable (*M* SPSHS score = 58.00) than those in Classes 1 and 2 (*M*s = 33.31 and 39.44, respectively), who in turn were more hypnotizable than those in Class 3 (*M* = 17.79). Class 4 showed high levels of responding on all subscales, like true virtuosos; Class 3 shows relatively low levels of response, except on the MC subscale, as might be expected of less-hypnotizable subjects; Classes 1 and 2 actually look quite similar, diverging significantly only on AG and (among the subset of highly hypnotizable subjects) AG.

One is tempted to conclude from Terhune's results that hypnotizable subjects are more alike than they are different – except, to paraphrase George Orwell, that some are more hypnotizable than others. There is something of a paradox here. We know that hypnosis is multidimensional – that there are different "types" of hypnotic suggestions, positive and negative, involving motor activities, perception, and memory. It stands to reason, then, that there might be different "types" of hypnotic subjects, with different patterns of abilities tuned to the different types of suggestions – some good at motor suggestions, but not perceptual alterations, some good at positive suggestions, but not at negative ones, etc. There is clear evidence of such groupings in the Brenneman and Kihlstrom (1986) study. Something similar occurs in Terhune's Classes 1 and 2 – which, as noted, differ on AG and (among the subset of highs) AM. Then again, multivariate analysis also shows clearly that the different dimensions of hypnosis are highly intercorrelated: they can be teased apart, but they also hang strongly together. In the same way, the component skills that might differentiate among the various "types" of hypnotic subject might be highly intercorrelated as well.

3. Identifying "Dissociative and "Non-Dissociative subtypes

If so, it will take much more data than is currently available to tease apart any discrete patterns of hypnotic response that might exist. If distinctly different patterns of hypnotic response are visible only at subordinate levels of analysis, amounting to a dozen or so clusters, as appeared to be the case in the 1986 study, then we will need a larger set of SPSHS data to identify them with confidence and confirm them through double cross-validation. This is true whether we rely on traditional cluster analysis, a model-based variant, or latent profile analysis.

In addition, it will require more *highly hypnotizable* subjects. The SPSHS was intended to be administered to subjects of at least moderate hypnotizability, defined as scores of 4 or more on the 12-point SHSS:A. But it must be admitted that SHSS:A scores of 4, or even 5–7, are a pretty low standard for hypnotizability. In the entire dataset available for the 1986 study, only 79 of 155 subjects (51%) were highly hypnotizable, with SHSS:A scores of 8–12 (the comparable figure is 54% for the standardization sample of 112 employed by Terhune). Things get even worse when we turn to the SHSS:C scores, which – as mentioned earlier – generally are considered the gold standard for assessing hypnotizability. In the full sample of 155, only 45% of subjects scored in the high range (8–12) on SHSS:C, while 14% actually scored in the *low* range (0–4). In the standardization sample of 112 employed by Terhune, the comparable figures are 48% highs, and 11% lows. So, any future effort along these lines should make sure that the sample excludes insusceptible subjects, and includes a greater density of highly hypnotizable subjects. However, there is a Catch-22: the subjects cannot be *too* hypnotizable: after all, virtuoso subjects experience virtually everything that is suggested to them, and thus are unlikely to show differential patterns of hypnotic response. They will look more like Terhune's Class 4 (and many of our subjects with "flat" profiles).

This is not a call for laboratories to collect more SPSHS data, in search of a more definitive answer to the question of profiles. It is difficult enough to assess hypnotizability based on HGSHS:A and SHSS:C. Nobody uses the individually administered SHSS:A anymore, and economic considerations have forced some laboratories to rely on a group-administered version of SHSS:C as well (Bowers, 1993). The effort involved in adding both forms of SPSHS is simply too daunting: in

my view, the costs far outweigh the benefits. Researchers who want to insure that their subjects are capable of experiencing a particular hypnotic suggestion (e.g., posthypnotic suggestion) can simply add a screening item to a "tailored" version of SHSS:C, as proposed by Hilgard himself (Hilgard, Crawford, Bowers, & Kihlstrom, 1979).

When it comes to identifying "types" of hypnotizable subjects, perhaps SPSHS is the wrong place to look after all. Elsewhere, Terhune and others have made the quite reasonable suggestion that there are two types of highly hypnotizable individuals: a "dissociative" type who experiences alterations in perception, memory, and action as occurring involuntarily; and a "nondissociative" type who actively constructs hypnotic experiences in a more effortful, attention-demanding way (e.g., King & Council, 1998; Terhune & Cardeña, 2010a; Terhune, Cardeña, & Lindgren, 2011a, 2011b). Of course, it might be said that genuine hypnosis involves both subjectively compelling alterations in awareness, bordering on delusion, and an experience of involuntariness bordering on compulsion (Kihlstrom, 2008b). Experienced involuntariness lies so close to the heart of hypnosis that it has been labelled the "classic suggestion effect" (Bowers, 1981, 1982; Weitzenhoffer, 1974, 1980). If so, subjects who achieve high scores on hypnotizability scales in the absence of both subjective conviction and experienced involuntariness may not be hypnotized at all, but rather are engaged in some other activity (e.g., Bowers & Gilmore, 1969; Ruch, Morgan, & Hilgard, 1974).

A word of caution, then, is perhaps in order about the procedures for identifying "dissociative" and "non-dissociative subtypes of hypnotizable subjects. One way to do this is to divide highly hypnotizable subjects on a measure of dissociative tendencies, such as the Dissociative Experiences Scale (DES; Bernstein & Putnam, 1986; Waller, Putnam, & Carlson, 1996). This strategy has been employed in a number of studies (e.g., King & Council, 1998; Terhune et al., 2011a, 2011b). However, it does not necessarily follow that subjects who score high on both hypnotizability and dissociation will have dissociative experiences during hypnosis – or, if they do, that these dissociative experiences will have anything to do with being hypnotized. Furthermore, because the correlation between DES scores and hypnotizability is relatively modest (e.g., Nadon, Kihlstrom, Hoyt, & Register, 1991) there will also be a "dissociative" subtype of subjects who are *not* hypnotizable. These subjects are unlikely to have dissociative experiences during hypnosis, for the simple reason that they are not hypnotizable in the first place.

A better strategy would be to assess dissociative experiences which occur while the subject is hypnotized (Cleveland, Korman, & Gold, 2015). Along these lines, Terhune and Cardeña (2010a, 2010b) assessed subjects' experiences of hypnosis through the Inventory Scale of Hypnotic Depth (ISHD; Field & Palmer, 1969) and the Phenomenology of Consciousness Inventory (PCI; Kumar, Pekala, & Cummings, 1996). They identified two groups of hypnotizable subjects, which they described as "dissociated control" and "inward attention" subtypes. Interestingly, the same two subtypes were found among subjects of low and moderate hypnotizability. Similarly, Terhune et al. found that their high-dissociative hypnotizable subjects had higher levels of experienced involuntariness than their low-dissociative counterparts (although they were also somewhat more hypnotizable to begin with).

Terhune (2015) suggests that his Classes 1 and 4 may be variants of the dissociative subtype. However, these two classes also differ in hypnotizability. If, as Terhune suggests (2015, p. 339), agnosia, hallucinations, and posthypnotic amnesia are the hallmarks of dissociation, the subjects in Class 1 actually perform relatively poorly on many of these suggestions; and those in Class 4 perform well on all the items, including those that do not, superficially at least, appear to have a dissociative flavor to them.

Still, the hypothesis that some hypnotic subjects experience a dissociative loss of conscious awareness and control, while others do not, is an entirely reasonable hypothesis. Unfortunately, it probably cannot be tested using the SPSHS, no matter how large the data set, because the standard version of SPSHS does not provide the relevant information. On the surface, high scores on suggestions for agnosia, negative hallucinations, posthypnotic suggestion, and posthypnotic amnesia, might be taken as evidence of a "dissociative" subtype of hypnotizability. On the other hand, these effects might be achieved by deliberate self-distraction, or voluntary compliance – as might be expected in a non-dissociative subtype. Moreover, relatively high performance on other SPSHS subscales is not necessarily a marker of the non-dissociative, perhaps "imaginative" subtype. Positive hallucinations, dreams, and regressions can all be experienced dissociatively – if, for example, the subject does not realize that he is actively generating the mental imagery involved (Kihlstrom, 1992). This is true even of ideomotor suggestions. So there is no pattern of performance on SPSHS itself that would reliably indicate a dissociative or non-dissociative subtype of hypnotizability.

In order to make this kind of distinction convincingly, we will need other information. For example, we might want to specifically test for divisions in conscious awareness (Hilgard, 1977), as manifested in the hidden observer (Hilgard, Morgan, & Macdonald, 1975; Knox, Morgan, & Hilgard, 1974), trance logic (McConkey, Bryant, Bibb, & Kihlstrom, 1991; Orne, 1959), dissociations between explicit and implicit memory in posthypnotic amnesia (Barnier, Bryant, & Briscoe, 2001; David, Brown, Pojoga, & David, 2000; Kihlstrom, 1980), or dissociations between explicit and implicit perception in hypnotic deafness or blindness (Bryant & McConkey, 1989, 1994). Such dissociations indicate that the percepts or memories in question have been processed, at least to some degree, outside of conscious awareness (Kihlstrom, 2007). On the other hand, the same sorts of dissociations are observed in brain-damaged patients, and even in normal perception and memory. So explicit–implicit dissociations may not be diagnostic of "dissociation" in the sense intended here.

Alternatively, we might want to assess divided consciousness in terms of the experience of involuntariness in response to hypnotic suggestions. And, indeed, Terhune et al. did find that a "high dissociative" subtype of hypnotizable subjects (identified by high DES scores) experienced more involuntariness than their "low dissociative" counterparts (Terhune et al., 2011b). It should be understood, however, that the subjective *experience* of involuntariness in response is distinct from actual

automaticity, as it has been traditionally defined (Kihlstrom, 2008a; Moors & DeHouwer, 2006). For example, posthypnotic suggestions may be experienced as unconscious and involuntary, but they do not display the canonical features of automatic behavior. For example, they are not inevitably evoked by the prearranged cue (Barnier & McConkey, 1998; Damaser, Whitehouse, Orne, Orne, & Dinges, 2010; Spanos, Menary, Brett, Cross, & Ahmed, 1987); and the behavior itself consumes attentional resources, interfering with other, ongoing, attention-demanding activities (Tobis & Kihlstrom, 2010; Wyzenbeek & Bryant, 2012). Because the *experience* of involuntariness is distinct from true automaticity of response (Kihlstrom, 2007), the dissociative subtype of hypnotizability will not necessarily be characterized by high levels of performance on traditional indicators of automaticity, such as the Stroop test. This is, of course, an empirical question.

What may distinguish the "dissociative" from the "non-dissociative" type of hypnotizability is not any pattern of objective behavior on the standardized scales, but rather a pattern of subjective experience – in particular, the distinction between *doing* and *happening* (Baudouin, 1921; Sarbin, 1984; Sarbin & Coe, 1972). In the classic (dissociative?) instance, hypnotized subjects experience their response to suggestion as something that is happening to them, not as something they are actively doing. As Wittgenstein put it, "voluntary movement is marked by an absence of surprise" (Wittgenstein, 1953/1958, p. 628; see also (Wittgenstein, 1914–1916/1961, entry for November 16, 1916). This is not merely a matter of strategic self-presentation (Spanos, Cobb, & Gorassini, 1985), but rather part and parcel of the division of consciousness that is central to the experience of hypnosis.

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