CONTEMPORARY HYPNOSIS

ISSN 0960-5290

www.interscience.wiley.com/journal/ch

WILEY-BLACKWELL

THE JOURNAL OF THE BRITISH SOCIETY OF CLINICAL AND ACADEMIC HYPNOSIS PUBLISHED BY JOHN WILEY & SONS

Contemporary Hypnosis (2002)
Vol. 19, No. 3, 2002, pp. 101–101

EDITORIAL COMMENTARY

The lead paper by Hasegawa and Jamieson (2002) continues what has become a series of theoretical contributions on the nature of hypnosis begun by my editorial predecessor, David Oakley. This was continued in 2001 with a learning theory account of hypnosis by Barrios, followed by the present article, whilst in the pipeline are contributions by Sarbin, Barabasz and Bongartz. With what began life as an undergraduate essay in my Department, Harutomo Hasegawa, assisted by Graham Jamieson, provides a useful theoretical paper applying to levels of explanation and domains of explanation in hypnosis various conceptual approaches to states of consciousness originating from philosophical echelons. These authors attempt to provide a theoretical framework with which to integrate various approaches ranging from the social, cognitive and information processing to the neurophysiological. One of my aims in encouraging this endeavour is to help integrate the discipline of hypnosis and direct scarce and valuable resources for research away from ivory tower issues about whether hypnosis exists towards research that may demonstrate the unique benefits of hypnosis for pathology and for illness prevention through mind–body connections, for psychopathology, for optimizing healthy function and for advancing research on brain mechanisms in cognitive neuroscience. Hasegawa and Jamieson's contribution has received a warm reception from referees with a diversity of theoretical leanings.

Two single-case studies are presented from clinical and educational settings. Byron successfully applied a brief course of hypnosis and self-hypnosis to an adolescent with a communication disorder similar to Asperger syndrome. Not only school attendance improved but gains were found as long as six months later in well-being and sociability.

Williamson reports a remarkable remission, after only one session of hypnosis, of chronic intractable pain which had existed for more than 30 years and was intuited to be associated with suppressed anger. The treatment consisted of a creative blend of astute clinical history-taking, with an hypnosis session involving an innovative schedule of validation of symptoms, safety anchoring and revivification, silent abreaction of anger and analgesia and re-framing.

Wagstaff and colleagues tested response expectancy hypnosis theory by presenting participants with a visual stimulus having led them to believe that they would see nothing. Hypnotic depth was found to relate to the clarity of the negative hallucination, whereas expectancy did not, a result the authors interpret as compatible with both sociocognitive and state approaches to hypnosis.

Lastly, Frischholz reviews a collection edited by De Pascalis, Gheorghiu, Sheehan and Kirsch entitled 'Suggestion and Suggestibility: Theory and Research'.

John Gruzelier
Editor

Contemporary Hypnosis (2002)
Vol. 19, No. 3, 2002, pp. 103–117

CONCEPTUAL ISSUES IN HYPNOSIS RESEARCH: EXPLANATIONS, DEFINITIONS AND THE STATE/NON-STATE DEBATE

Harutomo Hasegawa[1] and Graham A. Jamieson[2]

[1]University of Glasgow, UK and [2]Imperial College, London, UK

Abstract

The present paper aims to integrate existing streams of hypnosis research and theory into a broader context. A conceptual framework is presented that illustrates the range of explanatory approaches that are available to describe psychological phenomena in general, and this is applied to the discussion of hypnosis. In doing so, various approaches to hypnosis research are categorized and the scope and limitations of the theories derived from them are considered. The definition of hypnosis is also explored within this framework. The state/non-state debate is reconsidered in the context of the systems approach to states of consciousness described by Tart (1983/2000). Research agendas for hypnosis are clarified, and methodologies and directions for future research are suggested.

Key words: definition, hypnosis, hypnosis theory, levels of explanation, neurocognitive, neurophysiology, non-state position, sociocognitive, state position

Introduction

Theories of hypnosis have traditionally been characterized by dichotomies: state or non-state, special process or social-psychological, neurocognitive or sociocognitive. Despite recent calls for integration (Kihlstrom, 1985, 1997; Perry, 1992; Kirsch and Lynn, 1995; Gruzelier, 2000), there has been no theoretical framework in which such integration could be conceptualized. Thus, uncertainties still remain over several longstanding issues, including the debate over the explanatory scope of theories (Spiegel, 1998a, 1998b, 1998c; Kirsch, 1998a, 1999, 2000; Woody and Sadler, 1998; Wagstaff, 2000), the definition of hypnosis (Kirsch, 1994; Wagstaff, 1998a, 1998b; Gruzelier, 2000) and the state/non-state debate (Lynn and Rhue, 1991; Kirsch, 1992, 1998b, 2000; Kirsch and Lynn, 1995; Gruzelier, 1996, 2000; Chaves, 1997). It may be argued that these issues are conceptual rather than empirical, so that their status does not have a bearing on established empirical facts about hypnosis. However, their clarification is important because theories and experiments will be guided by them, in turn influencing future empirical findings. Conceptual uncertainties may foster unproductive research and may prejudice against potentially productive research and hypotheses (Coe, 1992; Gruzelier, 2000).

The aim of the present paper is to contribute by presenting a conceptual framework in which disparate theories of hypnosis may be viewed in a broader perspective. In doing so, terminology is reviewed, the orientation and scope of mainstream theories are clarified, and responses and potential solutions are offered to some of the persisting issues in hypnosis research. What is presented here is not a theory of hypnosis; rather, it is intended to act more as a glue for integrating empirical research across existing theoretical boundaries.

Levels of explanation and domains of explanation

We begin by constructing a broad conceptual map, within which the various theories of hypnosis may be considered.

From a physicalist perspective, nature may be viewed as a complex network of interacting systems, which may be analysed on different *levels of organization*. This may be illustrated by an hierarchy of systems (Figure 1). From this perspective, a structure on one level of organization is a function of processes on a lower level, and a structure does not exist independently of the sum of its components and their interactions. Accordingly, a physical phenomenon may be analysed on multiple levels of organization according to the scale at which it is observed, and these accounts may be used in explanations of the phenomenon at large. For example, in explaining a phenomenon such as the tissue inflammatory response, we may talk about the cellular level of explanation (as vasodilation followed by an increase in capillary permeability and migration of immune cells) or the molecular level of explanation (as a release of histamine, serotonin and prostaglandins), depending on the depth of explanation required. Thus, each level of organization may be associated with a *level of explanation*.

The notion of levels of explanation has been used in many contexts and some clarification is necessary. For example, Wagstaff (2000, p. 155) argued:

> In psychology there are many complex explanatory models that are not based on physiology … However, the argument that such models cannot ultimately explain anything because they do not refer to physiology is mistaken: instead, it is more accurate to say that the processes described by such theories represent a different level of explanation.

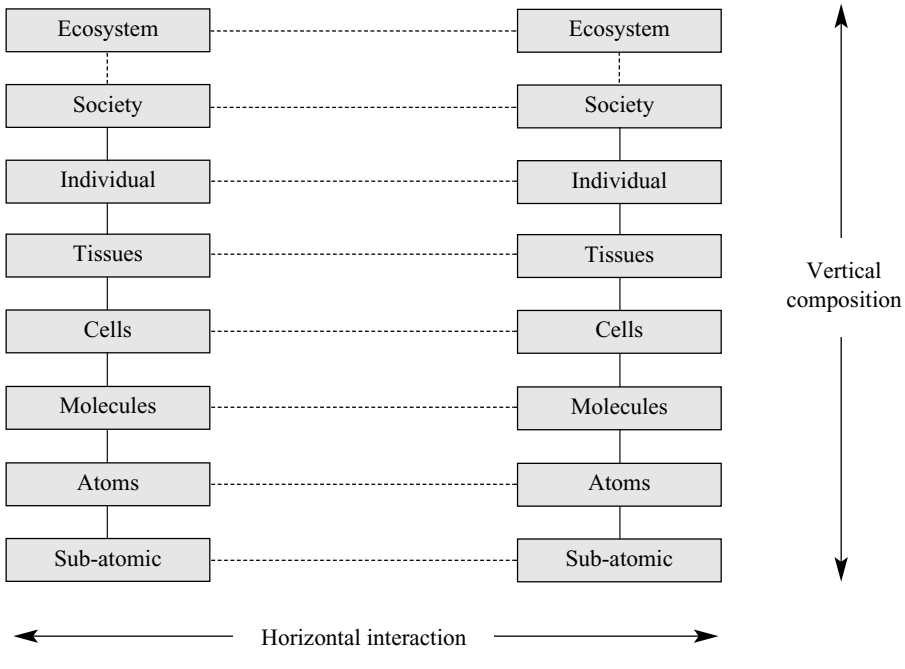

Figure 1. Hierarchy of systems.

In this context, Wagstaff (2000) uses the notion of levels of explanation to distinguish psychological explanations from physiological explanations. This usage is inconsistent with the paradigm above, in which psychological factors do not occupy a distinct level of organization, and consequently, cannot be considered as a level of explanation. In the present paper a level of explanation is only associated with a distinct level of organization within a physicalist paradigm. A few words may be useful here to clarify why psychological factors do not occupy a distinct level of organization. Emergent properties, such as the mind, arise from the integrated action of a multi-layered system and require integrated explanations that span across many levels of organization. For example, current explanations of the mind range across individual behaviour, cells, molecules and even quantum mechanics. There are also some aspects of the mind (for example, language) that need to be analysed above the individual level. The mind is therefore a property of the individual which arises from processes both below and above the individual level. It is for this reason, and for conceptual clarity, that we do not consider psychological factors to constitute a distinct level of explanation.

This does not mean, however, that psychological explanations are redundant. On the contrary, they play a valuable role in explanation. For example, it could be argued that the inflammatory response may be due to 'emotional stress', such as in the case of an aggravation of rheumatoid arthritis. Since it is widely accepted that all psychological states have physiological correlates, we could attempt to substitute the psychological explanation by looking for physiological correlates of emotions and identifying the biochemical pathways by which emotional stress leads to tissue inflammation. However, although we now know that there are reciprocal interactions between the nervous system and the immune system, the precise biochemical pathways are far from understood (Ader, Cohen and Felten, 1995). It may be more useful to frame our explanations in terms of psychological factors that may be considered as metaphors for dynamic physiological states. Therefore, in order that we may conceptualize psychological and physical paradigms alongside each other, we introduce 'domains of explanation'.

Although levels of explanation or organization refer to divisions within an explanatory paradigm (the physical), domains of explanation distinguish different explanatory paradigms. We identify three domains of explanation: the physical, experiential and informational (Figure 2):

- The physical domain of explanation concerns physical processes and structures, which may be considered on multiple levels of organization.
- The experiential domain of explanation concerns psychological factors and subjective experiences.
- The informational domain of explanation applies abstract concepts of information processing for explanatory purposes.

The latter includes conceptual constructs, such as the supervisory attentional system (Shallice, 1982), and theories that are derived from these constructs, such as the dissociated control theory of hypnosis (Woody and Bowers, 1994), which are instantiated in both physical processes and in experience. This is an important point: a phenomenon may have correlates in multiple domains or levels of explanation and thus explanatory accounts of a phenomenon from various domains or levels are not mutually exclusive, but complementary. For example, if we construct informational metaphors for our experiences (such as the supervisory attentional system) these will, in turn, have physical correlates (for example, activity in the dorsolateral prefrontal cortex; Shallice and Burgess, 1998).

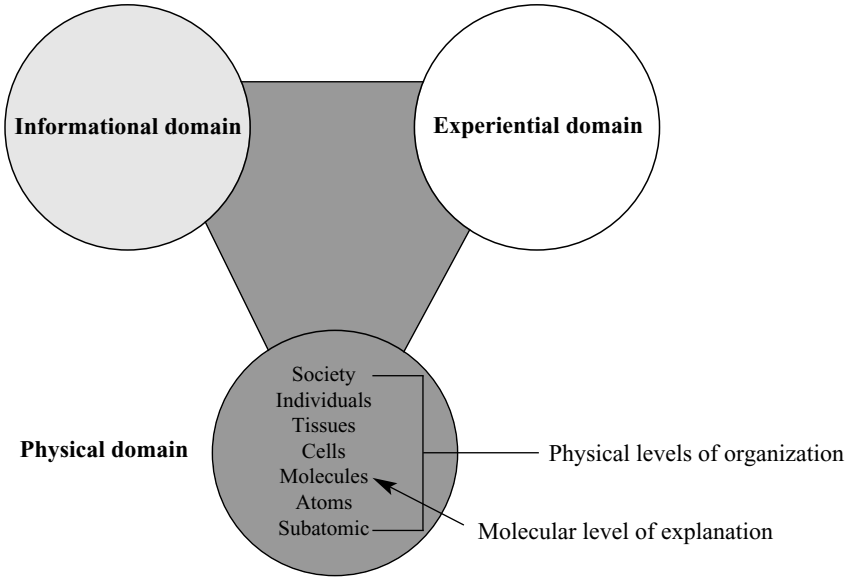

Figure 2. Domains of explanation.

However, we should note that although it is assumed that experience always has underlying physical correlates, not all physical processes have manifestations in experience (Kihlstrom, 1987; Velmans, 1991). Domains of explanation can span across many layers of systemic organization. The physical domain spans across submolecular processes to the macro-dynamics of human behaviour and on to the cosmos as a whole. The experiential domain spans across intrapersonal, interpersonal and social phenomena and may even be extended to some non-human species. The informational domain incorporates cognitive information processing systems, but also includes processes from molecular biology to informational systems, such as computers and the internet.

This analysis provides a conceptual framework that brings various types of explanations into a coherent perspective. The physical, experiential and the informational domains constitute different perspectives from which we may investigate a phenomenon such as hypnosis. The distinctions between domains represent conceptual divisions where ontological reduction is not possible (Chalmers, 1995). The finer relationships between domains are not yet specified, and specific linkages must be clarified through actual research rather than assumed. This will require active co-operation to integrate research programmes rather than a retreat into autonomous 'levels of explanation'.

Hypnosis research in perspective

Social-psychological approaches to hypnosis have traditionally been associated with identifying behaviour (interactions on individual level in the physical domain) and subjective, personal factors (experiential domain) that are important in mediating response to hypnosis. Variables such as suggestion, compliance, motivation, absorption, imagination and expectancy have been emphasized (Sarbin and Coe, 1972; Spanos,

1986; Wagstaff, 1991; Kirsch and Lynn, 1997; see also Spiegel, 1998a; 1998b; Kirsch, 1998a; 1999). On the other hand, neurophysiological research interprets hypnosis by referring to changes in brain function at tissue (neural network) and cellular levels within the physical domain (Crawford and Gruzelier, 1992; Crawford, Gur, Skolnick, Gur and Benson, 1993; Graffin, Ray and Lundy, 1995; Gruzelier, 1998; Szechtman, Woody, Bowers and Nahmias, 1998; De Pascalis, 1999; Rainville, Duncan, Price, Carrier and Bushnell, 1999; Kosslyn, Thompson, Costantini-Ferrando, Alpert and Spiegel, 2001). Hypnosis has also been interpreted in terms of informational accounts, such as the erection of an amnesic barrier (Hilgard, 1992) or a reduced influence of the supervisory attentional system (Woody and Bowers, 1994; Woody and Farvolden, 1998). Thus, different approaches embody different perspectives, and they are not necessarily mutually exclusive explanations. For example, a reduced influence of the supervisory attentional system will have particular manifestations in neurophysiology and in experience. Therefore, the important questions are first, '*Which behaviours, experiences, neurophysiology and cognitive/information processing functions are important in hypnosis?'*, and second, *'In what way do these observations relate to each other*?'

Findings that correlate with hypnosis require interpretation in terms of other explanatory domains. For example, by itself the finding that highly susceptible subjects in hypnosis are characterized by enhanced left frontal theta (Sabourin, Cutcomb, Crawford and Pribram, 1990) is of limited value, unless one finds out what this finding means in terms of experience and cognitive function. As Wagstaff (2000, p. 160) states, 'No matter how impressive neurophysiological data and the range of accompanying technical anatomical jargon may seem to be, they mean nothing without an adequate psychological theory to interpret them and guide the construction of experimental paradigms in this area.' The relationships between different theories also require consideration. For example, the observation that highly susceptible subjects in hypnosis are impaired on tests of frontal function (Gruzelier and Warren, 1993; Kallio, Revonsuo, Hamaleinen, Markela and Gruzelier, 2000) may be consistent with a speculated reduced influence of the supervisory attentional system (Woody and Bowers, 1994), since the latter involves the frontal areas of the brain (Jack and Shallice, 2001). Similarly, experiences may be reconciled with neurophysiology; for example, in searching for the neural correlates of response expectancy (Kirsch, 2000, 2001). It is important to design experiments that actually test these cross-relationships rather than to continue to isolate existing streams of enquiry.

Figure 3 is a summary of the discussion so far. It shows how the phenomenon of hypnosis may be studied from different perspectives, which may be related to each other. The arrows indicate research areas and the arrowheads their direction of development. It directly suggests specific research agendas, as shown in Table 1. It may be seen that although only A, B and C are directly related to hypnosis research, we require D, E and F, which represent wider research in the behavioural and cognitive sciences, to fully interpret the findings from hypnosis research.

Description, explanation and definition

The differences between a description, an explanation and a definition of a phenomenon may be considered in the context of the conceptual framework (c.f. Fellows, 1994). From this perspective, a *description* of a phenomenon is an assortment of reports from different levels or domains of explanation that are associated with that phenomenon (in

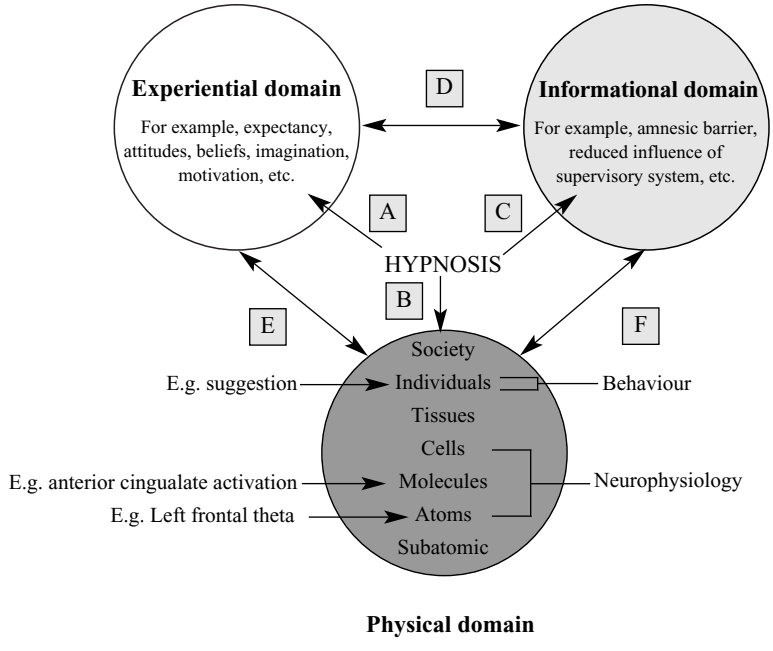

Figure 3. Hypnosis research in perspective.

Table 1. Research agendas for hypnosis

Figure 3	Research question
A	Which experiences are associated with hypnosis?
B	Which behaviours and neurophysiology are associated with hypnosis?
C	Which information processing functions are associated with hypnosis?
D	How does experience relate to information processing functions?
E	How does experience relate to observed behaviour and neurophysiology?
F	How does information processing relate to observed behaviour and neurophysiology?

this sense the APA definition is a description; Kirsch, 1994). In contrast, an *explanation* involves specific relationships between sets of reports in a temporal (if one precedes the other in time) or correlational (if one level or domain of explanation is substituted for another level or domain of explanation) context. What is an adequate explanation? Suppose we were successful in mapping the physiological processes that occur during the entire course of an hypnotic induction. Would such an analysis constitute an adequate explanation of hypnosis? Physiological processes require interpretation in terms of experience and informational accounts to be meaningful. In this sense, neurophysiology alone does not constitute a sufficient explanation of hypnosis. Similarly, if future research is successful in uncovering psychological variables that accurately predict hypnotic responding, this will require a neurophysiological logic to support it. As Gruzelier (2000, p. 53) states:

> What is missing, not only from a sociocognitive analysis but also from the neurological diagnosis of conversion hysteria, is any explanation of how psychological factors, whether they be hysteria, mistaken attribution or anything else, could lead to the physiological outcome — in other words, the *process* is missing.

A complete explanation of hypnosis therefore would require a synthesis of perspectives and an analysis of the variance in explanatory power provided by findings from each of them (Kihlstrom, 1985, 1997; Spiegel, 1998c). Although emphasis has been placed here on correlational explanation, it is also important to bear in mind the temporal sequence of processes. Thus, correlational explanations need to be embedded in a temporal context. For example, see Gruzelier's (1988, 1990) analysis of the temporal dynamics of the hypnotic induction process.

If explanations are complex rather than simple, what constitutes a *definition* of hypnosis? A common strategy has been to construe a definition based on a single defining feature, that is, some characteristic (such as a neurophysiological marker) that accompanies the phenomenon in every case. A fundamental problem with this approach is that the defining feature may also manifest itself in other phenomena. Indeed, all leaves are green but not everything that is green is a leaf. Thus, it would be insufficient to find physiological markers that characterize highly susceptible subjects in hypnosis, and to equate this with a definition of hypnosis. Similarly, we cannot define hypnosis simply as suggestion, because there are forms of suggestion that lie outside the domain of hypnosis, such as conformity and the placebo response (Hilgard, 1973; Kirsch, 1997). The same reasoning applies to any attempt to define hypnosis in terms of a cognitive function, such as a *shift in attention* (Spiegel, 1998b), because a shift in attention occurs in other contexts, such as daydreaming or reading a book, or every time one looks somewhere else. Although sophisticated methods may allow us to detect defining features more precisely, the fundamental approach is the same and is subject to the same constraints.

After all, what is a leaf? Would it be satisfactorily defined as 'a flat green thing'? One might argue to the contrary — it is possible to have a flat green piece of apple peel. Such a definition also ignores the vital role of the leaf in sustaining the environment through photosynthesis. Bateson (1979, p. 17) writes on Goethe:

> He was a considerable botanist who had great ability in recognizing the nontrivial (i.e. the pattern that connects). He straightened out the vocabulary of the gross comparative anatomy of flowering plants. He discovered that a 'leaf' is not satisfactorily defined as 'a flat green thing' or a stem as 'a cylindrical thing'. The way to go about the definition — and undoubtedly somewhere deep in the growth process of the plant, this is how the matter is handled — is to note that buds (i.e. baby stems) form in the angles of leaves. From that, the botanist constructs the definitions on the basis of the relations between stem, leaf, bud, angle, and so on.
>
> A stem is that which bears leaves.
> A leaf is that which has a bud in its angle.
> A stem is what was once a bud in that position.

In other words, the way to define something is not by what it supposedly is in itself, but by its relation to other things. Accordingly, a definition of hypnosis should indicate the wider set of interactions that occur in the hypnotic context, as illustrated in Figure 3 above. It is the appreciation of the connections within a global perspective that is the essence. On this basis, a definition of hypnosis, developed from Gruzelier (2000), is offered:

> Hypnosis is a context in which suggestions may induce an altered state of brain functional organization through interpersonal and cultural cues, which may produce atypical alterations in subjective experience, volition and physiology.

It is acknowledged that this definition is overinclusive. For example, according to this definition, a person responding to task-motivational instructions or 'waking suggestions' would be hypnotized, even without the use of the word *hypnosis.* This is consistent with Kirsch's (1997) alternative of changing the definition of hypnosis. From a practical point of view, a distinction will continue to be required between the procedural aspect of hypnosis (which may well be characterized by labelling the situation as hypnosis; c.f. Wagstaff, 1998a) and the phenomenology the procedure induces, depending on the context in which the word finds its use. For example, when the use of 'hypnosis' is queried in a legal case, it may be pertinent to use a phenomenological, rather than a semantic or procedural definition.

The state/non-state debate

The state/non-state debate has been an important, yet elusive issue throughout the history of hypnosis research (Kirsch and Lynn, 1995; Chaves, 1997). Part of the difficulty may be attributed to an inconsistent use of terminology (Kirsch, 1998b). The issue has also been complicated by the historical association between state and neurocognitive theories, and between non-state and sociocognitive theories, because the state/non-state and neurocognitive/sociocognitive issues are conceptually separable. The remainder of the present paper attempts to tackle this longstanding issue by considering a range of current interpretations and their implications.

Traditionally, the state/non-state debate has been about whether or not hypnosis involves an altered state of consciousness. Kihlstrom (1997, p. 326) argued:

> There *is* a state of altered consciousness in hypnosis: amnesic subjects cannot remember things they should be able to remember; analgesic subjects do not feel pain that they should feel; subjects asked to be 'blind' and 'deaf' do not see and hear things that they should be able to see and hear … These are alterations in conscious experience observed in hypnosis, and it does not matter if they can also occur in the absence of a hypnotic induction, and it does not matter if there are no physiological markers of hypnosis. These alterations in consciousness are what make hypnosis interesting, and they remain to be described and explained.

These words have been interpreted by Kirsch (1998b) as a position in which the term 'altered state of consciousness' simply implies changes in subjective experiences. This interpretation is, however, too simplistic, because it would imply that one would be in an altered *state* whenever one looked somewhere else, and to identify hypnosis with such a state would be meaningless.

In order to enquire whether or not hypnosis involves an altered state of consciousness, it is important to have a satisfactory definition of the term 'altered state of consciousness'. We must first define a 'state of consciousness' in a manner that is consistent with established psychological theory. According to Tart's (1983/2000) systems approach to states of consciousness, a state of consciousness may be conceptualized as a particular pattern of dynamically interacting psychological structures. In his words (Tart, 1993/2000, p. 5):

> The terms state of consciousness and altered state of consciousness have come to be used too loosely, to mean whatever is on one's mind at the moment. The new term discrete state of consciousness (d-SoC) is proposed for greater precision. A d-SoC is a unique, dynamic pattern or configuration of psychological structures, an active system of psychological subsystems. Although the component structures/subsystems show some variation within a d-SoC, the overall pattern, the overall system properties remain recognisably the same. If, as you sit reading, you think, 'I am dreaming' instead of 'I am awake', you have changed a small cognitive element in your consciousness but not affected at all the basic pattern we call your waking state. In spite of subsystem variation and environmental variation, a d-SoC is stabilized by a number of processes so that it retains its identity and function … A discrete *altered* state of consciousness (d-ASC) refers to a d-SoC that is different from some baseline state of consciousness (b-SoC). Usually the ordinary state is taken as the baseline state. A d-ASC is a new system with unique properties of its own, a restructuring of consciousness. Altered is intended as a purely descriptive term, carrying no values.

In terms of our conceptual framework, a state of consciousness may be considered to belong in the informational domain of explanation. In effect, it describes the pattern of relationships between various psychological structures, and thus subsystems in the brain. Subsystems are functional units that perform relatively discrete functions, and contemporary neuroscience shows that they rely on interactions between distributed cortical regions and subcortical structures (Brown and Kosslyn, 1993). An *altered* state of consciousness is a condition in which the normal relationships between these subsystems have changed.

There are significant individual differences in the structuring of states of consciousness. As Tart (1983/2000, p. 6) states:

> If we map the experiential space in which two people function, one person may show two discrete, separated clusters of experiential functioning (two d-SoCs), while the other may show continuous functioning throughout both regions and the connecting regions of experiential space. The first person must make a special effort to travel from one region of experiential space (one d-SoC) to the other; the second makes no special effort and does not experience the contrast of pattern and structure differences associated with the two regions (the two d-SoCs). *Thus what is a special state of consciousness for one person may be an everyday experience for another.* (Emphasis added.)

This means that transitions between discrete states of consciousness may be accompanied by a meta-cognitive awareness of the transition in some individuals, but in others the transition is smooth and no contrast of pattern is experienced. This view is consistent with the finding that most highly susceptible subjects do not experience themselves as being in an altered state of consciousness in hypnosis (McConkey, 1986).

Adopting this approach shifts the axis around which the state/non-state debate revolves. Instead of simply asking whether hypnosis involves an alteration in consciousness, we now ask whether there is a *discrete state of hypnosis*, a distinctive pattern by which psychological structures operate during hypnosis. It is postulated that in such a state, the processes that regulate the contents of consciousness have changed, and in this sense, the presence of such a state may be postulated on the basis of atypical subjective experiences (Kihlstrom, 1997). Empirical research can in principle reveal whether there is one, none or several such discrete states of hypnosis.

If a state of hypnosis can be inferred on the basis of atypical subjective experiences, what is all the fuss about? The relevance of subjective reports are widely accepted. Indeed, according to Kirsch (2000), almost everybody agrees that hypnosis produces

atypical changes in subjective experience, but he argues this is not the issue dividing the state and non-state positions. As Kirsch (2000, p. 277) states:

> The questions dividing state from non-state theorists are: (1) is there a uniquely hypnotic background state (trance) produced by hypnotic inductions (2) if so, are the experiences produced by suggestion in any way dependent on this trance state.

In this case, the issue is not whether changes in the brain or altered states of consciousness take place *per se*, but whether these changes involve a background state that is *unique* to hypnosis, that is, a state that does not occur in other non-hypnotic conditions. However, it is impossible to prove that any state is unique to hypnosis, because this would involve excluding every other possibility, which is impossible. It is also beside the point because proving such a state only exists in hypnosis does not tell us much about hypnosis; rather, we should be studying the nature of the state, and to the contrary, whether it occurs in any other situation!

The outcome of this debate is that although hypnosis may involve an altered state of consciousness, this state may not be unique to hypnosis. This corresponds to an important *variant of the state position* acknowledged by Kirsch (Kirsch and Lynn, 1995; Kirsch, 1998b, 2000). As Kirsch (2000, p. 277) states:

> There is yet another variant of the trance (state) position that must be considered. Some writers see trance (the experienced state in hypnosis) as an altered state, but not as one that occurs only in hypnosis. Trance may be identified as a state that often occurs in non-hypnotic contexts such as daydreaming, absorption, focused attention or concentration.

According to Kirsch, this position is not viable because it reduces hypnosis to something mundane such as 'just a shift in attention', and so the journals of hypnosis should be renamed 'journals of focused attention' (Kirsch, 1998b, 2000). However, this is an overly restrictive interpretation of such theorizing (presently advocated by Spiegel, 1998b). There is no intrinsic reason to limit Spiegel's approach to a unidimensional account simply because it has been initially developed with a focus on attentional phenomena. In addition, the fact that not all highly susceptible subjects in hypnosis respond to every given suggestion indicates that even if such a state is necessary, it is not a sufficient condition to produce hypnotic phenomena.

The emerging role of cognitive neuroscience

In order to find neurophysiological evidence for such a state, we would have to look for markers that characterize relationships between brain subsystems in non-hypnotic conditions and then demonstrate that a change occurs in such markers in responsive highly susceptible subjects in hypnosis. This is a difficult task, because the markers indicating relations between brain subsystems are not well established. It is also uncertain if we will be able to detect such changes by methods traditionally used in hypnosis research (for example, EEG spectral power analysis, ERP-based methods and functional imaging). This is because they are essentially local measures that detect changes that are imposed on a background state; for example, the neurophysiological processes recruited to instigate responses to particular suggestions. To detect the state itself will require measures of functional connectivity that allow the characterization of the pattern of information flow within the cortex and between cortical and subcortical regions (Ray,

1997; Ray, Blai, Aikins, Coyle and Bjick, 1998). Recent advances in the quantitative description of dynamic changes in complex systems now permit the direct experimental study of such phenomena. See Tononi, Edelman and Sporns (1998) for an accessible introduction to these techniques. Local measures, however, may still provide valuable information in terms of which systems are involved. There is now considerable evidence that the anterior cingulate plays an important role in conscious processing (Posner, 1994; Posner and Rothbart, 1998) and that modulation of activity in this area is associated with alterations in conscious experience in hypnosis (Rainville, Duncan, Price, Carrier and Bushnell, 1997; Kropotov, Crawford and Polyakov, 1997; Szechtman et al., 1998; Faymonville, Laureys, Degueldre, DelFiore, Luxen, Franck, Lamy and Maquet, 2000). These results provide insights into mechanisms that mediate responses in hypnosis. However, they in themselves do not indicate a discrete state of hypnosis.

Many neurophysiological studies have attempted to verify a 'state' of hypnosis on the basis of differences in local physiological measures between highly and low susceptible subjects. Traditionally, the method has been to compare differences between highly and low susceptible subjects in hypnosis, and moreover, to demonstrate that the hypnotic induction has a differential effect on highly and low susceptible subjects. Gruzelier (1996), after citing such evidence, concluded, 'We can now acknowledge that hypnosis is indeed a state and redirect energies earlier spent on the state/non-state debate'. Indeed, it is established that highly and low susceptible subjects in hypnosis may exhibit differences in certain neurophysiological markers, although the results between studies have been inconsistent (Sarbin and Slagle, 1979; Perlini and Spanos, 1991; Crawford and Gruzelier, 1992; Ray, 1997; Gruzelier, 1998; De Pascalis, 1999; Williams and Gruzelier, 2001). These findings indicate that highly and low susceptible subjects in hypnosis may be characterized by different 'brain states' (that is, differences in neurophysiology) and are valuable indicators of underlying cognitive processes. However, it is uncertain whether they reflect a state of hypnosis, because the functional significance of the results are not clearly established, and also because the measurements only provide a limited window on brain functional organization. It is also uncertain to what extent the local markers identified contribute to hypnotic experience. For example, Kosslyn et al. (2001) point out that adopting the hypnotic role could alter evoked potentials.

According to our view, a state of consciousness describes a pattern of functional relationships among psychological structures. An altered state of consciousness is a condition in which this pattern has changed from a baseline state, normally taken to be the ordinary, waking state. Such a transition may or may not involve a perceived transition in experiential state. Whether a discrete state of hypnosis can be identified is an empirical question. If such a state is to be demonstrated, researchers must be able to identify changes in the processes that regulate the contents of consciousness. Posing the problem in this way suggests new and directly testable empirical propositions. However, it should be noted that, although we have sought to propose new methodologies for addressing the state non-state debate, this only represents a subset of hypnosis research; indeed, other methodologies continue to provide valuable information about the nature of hypnosis.

Asking the right questions

It is important to maintain the conceptual map and the multiplicity of explanatory perspectives to encourage integration and to prevent premature dismissal of existing hypotheses. Once this is established, researchers can focus on testing the relevant

properties of the processes proposed by various theorists and how the operation of these processes changes (or does not change) across different hypnotic and non-hypnotic contexts. Although it is important to study the neurophysiological nature of the changes involved, one also must appreciate the importance of contextual cues, communication and expectancies, which are major sources for structuring those very processes.

Our empirical findings are limited by our experimental methods, which are in turn constrained by our conceptual constructs. When experiments are conducted to answer specific questions, the resulting answer is a cogent one, regardless of one's approach to investigation (Kihlstrom, 1998; Lynn and Sherman, 2000). It is also important to appreciate the scope and limitations of our tools of scientific investigation, so that unreasonable expectations (such as the quest to find a defining neurophysiological marker of a unique hypnotic state) are avoided. A pressing question is the nature of hypnotic susceptibility and its implications in research design. Measured susceptibility (Weitzenhoffer and Hilgard, 1962) predicts hypnotic responsiveness, but does not explain it (Woody, Bowers, and Oakman, 1992). It should be noted that the present trend in neurophysiological investigations of hypnosis, that of drawing implications from differences between groups of highly and low susceptible subjects, relies entirely on the assumption that measured susceptibility is an antecedent of hypnotic response, a concept that has been thoughtfully questioned (Woody et al., 1992; Nadon, 1997). This approach neglects the potential multidimensionality of hypnotic responsiveness (Woody et al., 1992; Barber, 2000), which is crucial if we are to elucidate the mechanisms that underlie hypnosis.

Hypnosis research is not just about understanding hypnosis. As Ernest Hilgard (1986, p. 138) stated nearly two decades ago, 'If hypnotic investigators are successful in what they are doing, they should be able to tell us not only about hypnosis but about human functioning more generally and so contribute to the understanding of normal consciousness and the controls systems affecting it'. The study of hypnosis may provide clues to several issues that are central to human enquiry, including the function of our body, the nature of our conscious experiences, and the conceptualization of volition. Indeed, we are gifted with a remarkable art and a formidable teacher of mind, body and nature.

References

Ader, R., Cohen, N., Felten, D. (1995) Psychoneuroimmunology: interactions between the nervous system and the immune system. Lancet 345: 99–103.

Barber, T.X. (2000) A deeper understanding of hypnosis: its secrets, its nature, its essence. American Journal of Clinical Hypnosis 42: 208–72.

Bateson, G. (1979) Mind and Nature: A Necessary Unity. New York, NY: Bantam.

Brown, H.D., Kosslyn, S.M. (1993) Cerebral lateralization. Current Opinion in Neurobiology 3: 183–6.

Chalmers, D. (1995) Facing up to the problem of consciousness. Journal of Consciousness Studies 2: 200–19.

Chaves, J.F. (1997) The state of the 'state' debate in hypnosis: a view from the cognitive–behavioural perspective. International Journal of Clinical and Experimental Hypnosis 45: 251–63.

Coe, W.C. (1992) Hypnosis: where art thou? International Journal of Clinical and Experimental Hypnosis 40: 219–37.

Crawford, H.J., Gur, R.C., Skolnick, B., Gur, R.E., Benson, D. (1993) Effects of hypnosis on regional cerebral blood flow during ischemic pain with and without suggested hypnotic analgesia. International Journal of Psychophysiology 15: 181–95.

Crawford, H.J., Gruzelier, J.H. (1992) A midstream view of the neuropsychophysiology of

hypnosis: recent research and future directions. In: Fromm, W., Nash, M. (eds). Hypnosis: Research Developments and Perspectives (third edition). New York, NY: Guilford Press; 227–66.

De Pascalis, V. (1999). Psychophysiological correlates of hypnosis and hypnotic susceptibility. International Journal of Clinical and Experimental Hypnosis 47: 117–43.

Faymonville, M.E., Laureys, S., Degueldre, C., DelFiore, G., Luxen, A., Franck, G., Lamy, M., Maquet, P. (2000) Neural mechanisms of antinociceptive effects of hypnosis. Anesthesiology 92: 1257–67.

Fellows, B.J. (1994) Defining hypnosis: a survey of British opinions on the APA definition. Contemporary Hypnosis 11: 155–9.

Graffin, N.F., Ray, W.J., Lundy, R. (1995) EEG concomitants of hypnosis and hypnotic susceptibility. Journal of Abnormal Psychology 104: 123–31.

Gruzelier, J.H. (1988) The neuropsychology of hypnosis. In: Heap, M. (Ed.). Hypnosis: Current Clinical, Experimental and Forensic Practices. London: Croom Helm; 68–76.

Gruzelier, J.H. (1990) Neuropsychological investigations of hypnosis: cerebral laterality and beyond. In: Van Dyck, R., Spinhoven, P.H., Van der Does, A.J.W. (eds) Hypnosis: Theory, Research and Clinical Practice. Amsterdam: Free University Press; 38–51.

Gruzelier, J. (1996) The state of hypnosis: evidence and applications. Quarterly Journal of Medicine 89: 313–17.

Gruzelier, J. (1998) A working model of the neurophysiology of hypnosis: a review of evidence. Contemporary Hypnosis 15: 3–21.

Gruzelier, J. (2000) Redefining hypnosis: theory, methods and integration. Contemporary Hypnosis 17: 51–70.

Gruzelier, J., Warren, K. (1993) Neuropsychological evidence of reductions on left frontal tests with hypnosis. Psychological Medicine 23: 93–101.

Hilgard, E.R. (1973) The domain of hypnosis, with some comments on alternative paradigms. American Psychologist 28: 972–82.

Hilgard, E.R. (1986) Neodissociation theory of multiple cognitive control systems. In: Shapiro, G.E., Schwartz, D. (eds). Consciousness and Self-regulation. New York, NY: Plenum Press; 137–71.

Hilgard, E.R. (1992) Divided consciousness and dissociation. Consciousness and Cognition 1: 16–31.

Jack, A.I., Shallice, T. (2001) Introspective physicalism as an approach to the science of consciousness. Cognition 79: 161–96.

Kallio, A., Revonsuo, A., Hamaleinen, H., Markela, J., Gruzelier, J. (2001) Anterior functions and hypnosis: a test of the frontal hypothesis. International Journal of Clinical and Experimental Hypnosis 49: 95–108.

Kihlstrom, J.F. (1985) Hypnosis. Annual Review of Psychology 36: 385–418.

Kihlstrom, J.F. (1987) The cognitive unconscious. Science 237: 1445–52.

Kihlstrom, J.F. (1997) Convergence in understanding hypnosis? Perhaps, but perhaps not quite so fast. International Journal of Clinical and Experimental Hypnosis 35: 324–32.

Kihlstrom, J.F. (1998) Hypnosis, awareness and dissociation: in memoriam Kenneth S. Bowers, 1937–1996. American Journal of Clinical Hypnosis 40: 194–204.

Kirsch, I. (1992) The state of the altered state debate. Contemporary Hypnosis 9: 1–6.

Kirsch, I. (1994) Defining hypnosis for the public. Contemporary Hypnosis 11: 142–3.

Kirsch, I. (1997) Suggestibility or hypnosis: what do our scales really measure? International Journal of Clinical and Experimental Hypnosis 35: 212–25.

Kirsch, I. (1998a) Social psychological theories are not based on compliance: setting the record straight. American Journal of Clinical Hypnosis 41: 155–8.

Kirsch, I. (1998b) Deconstructing and reconstructing hypnosis. Contemporary Hypnosis 15: 166–70.

Kirsch, I. (1999) Setting the record straight (again). American Journal of Clinical Hypnosis 41: 226–30.

Kirsch, I. (2000) The response set theory of hypnosis. American Journal of Clinical Hypnosis 42: 274–88.

Kirsch, I. (2001) The response set theory of hypnosis: expectancy and physiology. American Journal of Clinical Hypnosis 44: 69–73.
Kirsch, I., Lynn, S.J. (1995) The altered state of hypnosis: changes in the theoretical landscape. American Psychologist 50: 859–77.
Kirsch, I., Lynn, S.J. (1997) Hypnotic involuntariness and the automaticity of everyday life. American Journal of Clinical Hypnosis 40: 329–48.
Kosslyn, S., Thompson, W.L., Costantini-Ferrando, M.F., Alpert, N.M., Spiegel, D. (2001). Hypnotic visual illusion alters color processing in the brain. American Journal of Psychiatry 157: 1279–84.
Kropotov, J.D., Crawford, H.J., Polyakov, Y.I. (1997) Somatosensory event-related potential changes to painful stimuli during hypnotic analgesia: anterior cingulate cortex and anterior temporal cortex intracranial recordings. International Journal of Psychophysiology 27: 1–8.
Lynn, S.J., Rhue, J.W. (1991) Hypnosis theories: themes, variations, and research directions. In: Lynn, S.J., Rhue, J.W. (eds). Theories of Hypnosis: Current Models and Perspectives. New York, NY: Guilford Press; 601–26
Lynn, S.J., Sherman, S.J. (2000) The clinical importance of sociocognitive models of hypnosis: response set theory and Milton Erickson's strategic interventions. American Journal of Clinical Hypnosis 42: 294–395.
McConkey, K.M. (1986) Opinions about hypnosis and self hypnosis before and after hypnotic testing. International Journal of Clinical and Experimental Hypnosis 34: 311–19.
Nadon, R. (1997) What this field needs is a good nomological network. International Journal of Clinical and Experimental Hypnosis 45: 314–23.
Perlini, A., Spanos, N. (1991) EEG alpha methodologies and hypnotizability: a critical review. Psychophysiology 28: 511–30.
Perry, C. (1992) Theorizing about hypnosis in either/or terms. International Journal of Clinical and Experimental Hypnosis 40: 238–52.
Posner, M.I. (1994) Attention: the mechanism of consciousness. Proceedings of the National Academy of Sciences 91: 7398–7403.
Posner, M.I., Rothbart, M.K. (1998) Attention, self-regulation and consciousness. Philosophical Transactions of the Royal Society of London B 353: 1915–27.
Rainville, P., Duncan, G.H., Price, D.D., Carrier, B., Bushnell, M.C. (1997) Pain affect encoded in human anterior cingulate but not somatosensory cortex. Science 277: 968–71.
Rainville, P., Hofbauer, R.K., Paus, T., Duncan, G.H., Bushnell, M.C., Price, D.D. (1999) Cerebral mechanisms of hypnotic induction and suggestion. Journal of Cognitive Neuroscience 11: 110–25.
Ray, W.J. (1997) EEG concomitants of hypnotic susceptibility. International Journal of Clinical and Experimental Hypnosis 45: 301–13.
Ray, W., Blai, A., Aikins, D., Coyle, J., Bjick, E. (1998) Understanding hypnosis and hypnotic susceptibility from a psychophysiological perspective. Presented at INABIS '98 — 5th Internet World Congress on Biomedical Sciences at McMaster University, Canada, 7–16 Dec. Invited symposium.
Sabourin, M.E., Cutcomb, S.D., Crawford, H.J., Pribram, K. (1990) EEG correlates of hypnotic susceptibility and hypnotic trance: spectral analysis and coherence. International Journal of Psychophysiology 10: 125–42.
Sarbin, T.R., Coe, W.C. (1972) Hypnosis: A Social Psychological Analysis of Influence Communication. New York, NY: Holt, Rinehart & Winston.
Sarbin, T.R., Slagle, R.W. (1979) Hypnosis and psychophysiological outcomes. In: Fromm, E., Shor, R.E. (eds). Hypnosis: Developments in Research and New Perspectives (second edition). New York, NY: Aldine; 273–303.
Shallice, T. (1982) Specific impairments in planning. Philosophical Transactions of the Royal Society of London B 298: 199–209.
Shallice, T. Burgess, P. (1998) The domain of supervisory processes and the temporal organization of behaviour. In: Roberts, A.C., Robbins, T.W., Weiskrantz, L. (eds). The Prefrontal Cortex — Executive and Cognitive Functions. London: Oxford University Press; 22–35.

Spanos, N.P. (1986) Hypnotic behaviour: a social-psychological interpretation of amnesia, analgesia, and 'trance logic'. Behavioural and Brain Sciences 9: 449–502.
Spiegel, D. (1998a) Hypnosis and implicit memory: automatic processing of explicit content. American Journal of Clinical Hypnosis 40: 231–40.
Spiegel, D. (1998b) Social psychological theories cannot fully account for hypnosis: the record was never crooked. American Journal of Clinical Hypnosis 41: 158–61.
Spiegel, D. (1998c) Using our heads: effects of mental state and social influence on hypnosis. Contemporary Hypnosis 15: 175–77.
Szechtman, H., Woody, E., Bowers, K.S., Nahmias, C. (1998) Where the imaginal appears real: a positron emission tomography study of auditory hallucinations. Proceedings of the National Academy of Sciences 95: 1956–60.
Tart, C. (1983/2000). States of Consciousness. iUniverse.com: Lincoln. (Originally published by Dutton.)
Tononi, G., Edelman, G.M., Sporns, O. (1998) Complexity and coherency: integrating information in the brain. Trends in Cognitive Sciences 2: 474–84.
Velmans, M. (1991) Is human information processing conscious? Behavioural and Brain Sciences 14: 651–69.
Wagstaff, G. (1991) Compliance belief and semantics in hypnosis: a nonstate sociocognitive perspective. In: Lynn, S.J., Rhue, J.W., (eds). Theories of Hypnosis: Current Models and Perspectives. New York, NY: Guilford Press; 362–96.
Wagstaff, G. (1998a) The semantics and physiology of hypnosis as an altered state: towards a definition of hypnosis. Contemporary Hypnosis 15: 149–65.
Wagstaff, G. (1998b) The hypnotic state: semantics and pragmatics. Contemporary Hypnosis 15: 178–81.
Wagstaff, G.F. (2000) On the physiological redefinition of hypnosis: a reply to Gruzelier. Contemporary Hypnosis 17: 154–62.
Weitzenhoffer, A.M., Hilgard, E.R. (1962) Stanford Hypnotic Susceptibility Scale, Form C. Palo Alto, CA: Consulting Psychologists Press.
Williams, J.D., Gruzelier, J.H. (2001) Differentiation of hypnosis and relaxation by analysis of narrow band theta and alpha frequencies. International Journal of Clinical and Experimental Hypnosis 45: 185–206.
Woody, E.Z., Bowers, K.S. (1994) A frontal assault on dissociated control. In: Lynn, S.J., Rhue, J.W. (eds). Dissociation: Clinical, Theoretical and Research Perspectives. New York, NY: Guilford Press; 52–79.
Woody, E., Farvolden, P. (1998) Dissociation in hypnosis and frontal executive function. American Journal of Clinical Hypnosis 40: 206–16.
Woody, E., Sadler, P. (1998) The rhetoric and science of 'nothing but'. Contemporary Hypnosis 15: 178–81.
Woody, E.Z., Bowers, K.S., Oakman, J.M. (1992) A conceptual analysis of hypnotic responsiveness: experience, individual differences, and context. In: Fromm ,W., Nash, M. (eds). Hypnosis: Research Developments and Perspectives (third edition). New York, NY: Guilford Press; 3–33.

Address for Correspondence,
Harutomo Hasegawa,
9 Kingfield Road,
Sheffield S11 9AS
UK.
(E-mail: haruchobin@hotmail.com)