Chapter 6

How Hypnosis Happens: New Cognitive Theories of Hypnotic Responding

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Introduction

In hypnosis, mere words have a dramatic impact (White, 1941; see also McConkey, chapter 3, this volume). Hypnotizable individuals seem compelled to perform the hypnotist's suggestions and are convinced that their hypnotic experiences are real. Although 60 years of experimental research has clarified much of the nature of hypnosis and the limits of its effects, its mechanism remains controversial. Some theorists argue that hypnotic responses reflect relatively mundane psychological processes – such as expectancy – and thus require no special or additional explanation (Braffman & Kirsch, 2001; Sarbin, 1992, 1993; Spanos, 1986; Wagstaff, 1981, 1998; see also Lynn, Kirsch, & Hallquist, chapter 5, this volume). Other theorists argue that hypnotic responses reflect a fundamental transformation in cognitive processing (Hilgard, 1974, 1992; Kihlstrom, 1997, 1998, 2003; Woody & Bowers, 1994; see also Kihlstrom, chapter 2; Woody & Sadler, chapter 4, this volume). They point especially to the exaggerated phenomenology that is the hallmark of hypnosis.

What do we mean by exaggerated phenomenology? In response to relatively straightforward verbal communications from the hypnotist (but see Barnier & McConkey, 1999a; McConkey, 1990), hypnotized individuals typically show disruptions of personal agency and become transiently deluded about the source and reality of their experiences (Lynn, Rhue, & Weekes, 1990; McConkey, 1990; Sutcliffe, 1961; Weitzenhoffer, 1974; Woody & McConkey, 2003). These two qualities, which Kihlstrom (chapter 2, this volume) calls "experienced involuntariness bordering on compulsion" and "conviction bordering on delusion" (p. 2), have remained central to definitions of the domain of hypnosis. But it is not just that hypnotic responses happen easily or seem real. Subjectively, they feel *surprisingly* easy and *surprisingly* real. In other words, hypnotic

responses, even to quite simple suggestions, often feel to the hypnotized individual and appear to an observer to be both unexpectedly and unusually compelling.

To illustrate the quality of compelling subjective involuntariness, consider the phenomenon of posthypnotic suggestion, which involves suggesting to a hypnotized subject that after hypnosis they will respond in a particular way when they receive a specific cue - such as reaching down and scratching their left ankle when they hear a tapping sound, as in the Harvard Group Scale of Hypnotic Susceptibility, Form A (HGSHS:A; Shor & Orne, 1962). Across nine studies, Barnier and McConkey (1995, 1996, 1998a, 1998b, 1998c, 1999a, 1999b, 2001) explored the parameters of posthypnotic responding inside and outside the laboratory (for review, see Barnier, 1999; Barnier & McConkey, 2003; McConkey, chapter 3, this volume). Highly hypnotizable subjects responded successfully to a variety of suggestions – to rub their earlobe, to put their hands behind their head, to cough out loud, to say "Psych 1", to imagine a heavy weight in their hand and to feel their hand moving down, or to mail postcards every day – and for those who responded, they often described their behavior as feeling outside of their own control. For instance, in work by Barnier and McConkey (1998a), one female participant received a posthypnotic suggestion to rub her right earlobe when the experimenter said "Well, what did you think of that?" As soon as the cue was given, her hand moved towards her ear and as her hand and arm moved (or more precisely, as she moved her hand and arm) she watched them move with a look of surprise and puzzlement on her face. At that moment, she experienced her (post)hypnotic response as surprisingly and overwhelmingly involuntary.

To illustrate the quality of compelling subjective reality, consider the phenomenon of hypnotic delusions, which involves suggesting to a hypnotized subject that during hypnosis they will experience themselves in a different way or as a different person. For

instance, in a classic study, Sutcliffe (1961; see also Noble & McConkey, 1995; Burn, Barnier, & McConkey, 2001) gave a suggestion for sex change and instructed male subjects to become female and female subjects to become male (see also McConkey, chapter 3, this volume). In more recent work, Cox (2007; see also Bryant & Cox, chapter 12) gave suggestions for identity change and suggested that subjects become a different identity – real or nonexistent, known or unknown, similar or dissimilar, such as a real or nonexistent same sex sibling or friend. In both sex change and identity change work, very high hypnotizable subjects responded successfully: they changed their names, described themselves in different ways, recalled memories consistent with their new identity, and most importantly, remained convinced that their delusional experiences were real in the face of strong challenges. For instance, in one study by Noble and McConkey (1995) a male participant received a suggestion to become a female. He changed his name to a female name, described his appearance as female, and when asked to open his eyes to look at an image of himself on a video monitor, he said "That's not me, I don't look like that". At that moment, he experienced his hypnotic response as surprisingly, overwhelmingly and, in his words, "disgustingly" real.

At various points in the history of hypnosis research much has been made of the role of expectations in hypnosis; that hypnotic experiences, even those as complex as posthypnotic suggestion and hypnotic delusions, may be almost entirely the product of expectancies (e.g., Barber, 1969; Barber & Calverley, 1963, 1964a, 1964b; for modern analyzes, see Braffman & Kirsch, 2001; Kirsch, 2001). For instance, Kirsch (1991) argued that expectancy may be the sole proximal determinant of hypnotizability and that the residual variance is a result of measurement error (see also Lynn et al., chapter 5, this volume). However, Benham, Woody, Wilson and Nash's (2006) recent analysis of expectancy judgments (collected repeatedly throughout the administration of a

standardized, individually administered hypnotizability scale) and ability factors as simultaneous predictors of hypnotic performance (measured in terms of both response to individual items and an overall score) failed to support Kirsch's view. Benham et al. (2006) reported that "although expectancies had a significant effect on hypnotic responsiveness, there was an abundance of variance in hypnotic performance unexplained by the direct or indirect influence of expectation and compatible with the presence of an underlying cognitive ability" (p. 342).

Although these findings confirm that mere expectations about hypnotic responding cannot be its sole cause (see also Laurence et al., chapter 9; Tasso & Perez, chapter 11; Woody & Sadler, chapter 4, this volume), expectations remain a contentious aspect of hypnosis in need of further analysis. Appropriately then, both of the theoretical accounts that we present in this chapter reconsider the role of expectations in hypnosis. And we argue, at least for one of our accounts, that hypnotic responses *feel* like they do, not because they meet expectations, but because they violate them – or to use Sarbin's (2002) language, because they are *counterexpectational*.

In this chapter, we aim to explain the primary phenomenology of hypnosis with two new accounts of how hypnosis happens. First, we discuss in more detail the phenomena to be explained and the questions we address. Then, we briefly and selectively review previous generations of cognitive theories that have influenced and informed our answers to these questions. Next we introduce our new accounts: Dienes and Perner's (2007) cold control theory of hypnosis and Barnier and Mitchell's (2005) discrepancy-attribution theory of hypnotic illusions. We present these account together because they share a number of features, especially their roots in contemporary cognitive psychology. For each account, we make a core conceptual distinction, summarize its background, and describe its extension to hypnosis. We review the data supporting each account and

highlight the questions and issues for future research. Next, we consider how these accounts can (or cannot) be integrated with each other and with competing theories. Finally, we draw out the implications of these accounts for intrinsic, instrumental and applied hypnosis and we comment on future directions for the field of hypnosis.

<div align="center">Core Phenomena and Questions to Address</div>

The Experience of Hypnosis

A theory of hypnosis must account for the behaviors and experiences of hypnosis. We have already pointed to the quality of hypnotic responding as one core feature that needs explanation. As noted by generations of hypnosis researchers, "subjective experience lies at the heart of hypnosis" (Kihlstrom, chapter 2, p. 30, this volume; see also Hammer, 1961; McConkey, chapter 3, this volume; Sutcliffe, 1961; White, 1941). However, most theorists and researchers have focused their attention on the experience of involuntariness. This characteristic feature of hypnotic responding is reflected in Bowers' (1981) distinction between *doings* and *happenings*, where doings appear to be voluntary acts and happenings appear to be outside the individual's control. Weitzenhoffer (1974) called this quality of hypnosis the *classic suggestion effect*, "the transformation of the essential, manifest ideational content of a communication" into behavior that is experienced as involuntary (p. 259; see also, Kihlstrom, chapter 2, this volume; Woody & McConkey, 2003). According to Kihlstrom (chapter 2, this volume), Weitzenhoffer believed that only involuntary responses to suggestion are truly hypnotic.

But the experience of hypnosis is by no means uniform either across people, or within the same person. When a subject responds to a posthypnotic suggestion, as illustrated in the case of the young woman rubbing her ear lobe, the experience is predominantly characterized by subjective *involuntariness*; she felt as if her hand moved to scratch her ear all by itself. In contrast, when a subject responds to a delusion

suggestion, as illustrated in the case of the young man becoming the opposite sex, the experience is predominantly characterized by subjective *reality*; he felt as if he was a girl. This distinction – between involuntariness and reality – is an important one, because although involuntariness has more typically been the focus of theorizing and research, not all hypnotic suggestions lead to this or only to this experience (see also McConkey, chapter 3, this volume).

Woody, Barnier, and McConkey (2005; see also Woody & Barnier, chapter 10, this volume) laid out a 2×2 matrix for hypnotic items, which crosses motor vs. cognitive-perceptual items with direct vs. challenge items. Motor items involve motor actions, such as your arm moving upwards following a hand levitation suggestion. Cognitive-perceptual items involve (positive or negative) distortions in perception, memory, emotion and thought, such as seeing a cat following a visual hallucination suggestion or not being able to remember the events of hypnosis following a posthypnotic amnesia suggestion. Direct suggestions tell you exactly what your response should be, such as "your arm will get heavy and fall down" during a hand lowering suggestion. Challenge suggestions establish a suggested state of affairs ("you can't smell anything") and then challenge you to test this reality ("take a good sniff from this bottle"), such as during an anosmia suggestion.

Arguably, direct motor items, such as hand lowering, are characterized predominantly by involuntariness, and direct cognitive-perceptual items, such as taste hallucination, are characterized predominantly by reality. Challenge items, both motor, such as finger lock, and cognitive-perceptual, such as posthypnotic amnesia, are characterized by both involuntariness and reality in some combination. We'll return to this point when we describe the discrepancy-attribution theory of hypnotic illusions (Barnier & Mitchell, 2005), because this relationship between suggestion and the resulting quality of

hypnotic experience has not generally been addressed (for more on testing the reality of suggestions, see McConkey, chapter 3, this volume).

The Domain of Hypnosis

What other phenomena need to be explained in a useful theory of hypnosis? In this chapter, we conceptualize the domain of hypnosis and the domain of necessary explanation at three levels. Before laying these out, we should acknowledge the work of others in defining this domain (e.g., Hilgard, 1965, 1973, 1975; Kihlstrom, 1985; Killeen & Nash, 1993), and note that, as in other areas of psychology such as personality, intelligence, and development (and indeed of science more generally; Wilson, 1998), theorizing in hypnosis has shifted from grand, general theories to more circumscribed theories of specific phenomena (and perhaps is trending back to general theories again). In general, we can distinguish theories of "hypnosis" from theories of "specific hypnotic phenomena" (see Killeen & nash, 2003; Lynn & Rhue, 1991; Sheehan & Perry, 1976).

Level 1: Classic hypnotic items. Hypnosis first can be described as a set of classic hypnotic phenomena or *items*. For instance, Hilgard (1973; see also Hilgard, 1965, 1975) defined the domain of hypnosis by identifying "the common topics that we study when we engage in hypnotic research" (p. 972). Echoing early researchers in the field (e.g., Hull, 1933) and hypnotizability measures he and others developed at that time, Hilgard considered the following to be typical or specific hypnotic phenomena: (1) ideomotor action and catalepsy, (2) hallucinations (both positive and negative, including analgesia and perceptual distortions), (3) age regression and dreams, (4) amnesia and hypermnesia, and (5) posthypnotic suggestion. A decade later Kihlstrom (1985) focused on analgesia, amnesia and hypermnesia, age regression, perceptual effects (including hallucinations), trance logic, and the hidden observer, and Spanos (1986) illustrated his account with just analgesia, amnesia, and trance logic.

Recent accounts have also tended to focus their explanations on particular phenomena. Woody and Bowers (1994; see also Woody & Sadler, chapter 4, this volume) tested their account with analgesia and amnesia, and differentiated it from explanations of motor behaviours (particularly direct motor action, known as ideomotor suggestions). Kirsch and Lynn (1997) limited their theory of hypnotic involuntariness predominantly to ideomotor action (see also Lynn, Kirsch, & Hallquist, chapter 5, this volume). In our view, any candidate theory of hypnosis must attempt to explain the full range of hypnotic responding or experiencing (for similar comments, see Woody & Sadler, chapter 4, this volume); accounts that target subsets of items may be accounts of these phenomena only, and not of the domain of hypnosis. We aim for flexible theories that can explain a broad range of core hypnotic phenomena. But we keep in mind Woody and Sadler's (chapter 4, this volume) point that "it is possible that any particular explanatory scheme applies well to only certain types of suggestion or content and is difficult to extend to the others" (p. 20).

Level 2: Responding across and within items. We can take a broader view and (like most other researchers) consider sets of these items as representing particular suggestion types. Woody et al. (2005; see also Woody& Barnier, chapter 10, this volume) identified four major types of hypnotic items: direct motor, motor challenge, cognitive-delusory, and posthypnotic amnesia. As noted above, these items differ not only in their focus (motor vs. cognitive-delusory), nature of request (direct vs. challenge), requested response (positive vs. negative) and dominant associated experience (involuntariness vs. reality), but also in their apparent difficulty (Balthazard & Woody, 1985; see also Kihlstrom, chapter 2, this volume). Woody et al. (2005) argued that these item types represent distinct building blocks of hypnotic response, which implies that different suggestions may require slightly

or even significantly different explanations (for a full discussion of their component approach, see Woody & Barnier, chapter 10, this volume).

Within this level of explanation, we can focus not only on responding across different types of items, but responding within items. All hypnotic suggestions contain essentially the same phases and a dynamic time-course that are often overlooked. Although researchers have tended to focus on just the test phase of hypnotic items – when the suggestion's effect is measured – all hypnotic items typically contain three phases: the suggestion (onset), test, and cancellation (offset). Using an innovative "dial method", which measured moment to moment variations in subjects' experience, McConkey and his colleagues mapped theoretically important variations across and within all three phases of representative items of the major suggestion types: direct motor, motor challenge and cognitive-delusory items (e.g., McConkey, Gladstone, & Barnier, 1999; McConkey, Szeps, & Barnier, 2001; McConkey, Wende, & Barnier, 1999; for review, see McConkey, chapter 3, this volume).

For the purposes of our discussion, the most relevant finding from McConkey and Barnier's "dial" research is that participants can be quite strategic and active during the suggestion phase of a hypnotic item, yet still experience their response during the test phase as compellingly involuntary or subjectively real. Barnier and McConkey's (1998a; see also Barnier & McConkey, 1998b, 1999a, 2001) research on posthypnotic suggestion illustrates the same point, but with the added caveat that this process of active construction of a compelling experience can be spread over time and contexts both inside and outside the hypnotic setting. For instance, Barnier and McConkey (1998a) gave high hypnotizable subjects a posthypnotic suggestion to mail one postcard to the hypnotist every single day and tested its success over a period of four months – much like suggestions given by clinicians for long lasting effects outside the therapeutic setting. Interestingly, the

suggestion was more effective when subjects were told explicitly when it would be cancelled (when the hypnotist contacted them again) than when they were not. These and related findings highlight the need to consider all phases of a hypnotic item – suggestion, test and cancellation – both inside and outside the formal hypnotic setting.

Level 3: State and trait. Finally, at the broadest level we can view responding to hypnotic items as embedded within an overall *hypnotic* context. In response to an hypnotic induction procedure and specific suggestions (mere words), some but not all individuals show altered or exaggerated behaviour and/or experience. We in the field of hypnosis still debate why, or even if, this context leads to altered behaviour and experience; why some, but not other, individuals are so responsive; and how different individuals, within and across hypnotizability levels, achieve their hypnotic experiences. These issues of *state* and *trait* have generated enormous discussion and disagreement in the field (e.g., Kihlstrom, 1997, 1998, 2005; Kirsch & Lynn, 1995, 1998a, 1998b), as well as within the chapters of this book (see Barabasz & Barabasz, chapter 13; Kihlstrom, chapter 2; Lynn et al., chapter 5; McConkey, chapter 3; Oakley, chapter 14; Woody & Sadler, chapter 4), and we cannot ignore them. We suggest, as others have, that there is value in linking to ideas and research outside the domain of hypnosis to help answers the questions of state and trait.

Questions to Address

The overall question we are grappling with asks: what is the source of the hypnotized person's "feelings of hypnosis"? To understand source, we need to address at least five other important questions. First, what is the "switch" for hypnotic responding? By this we mean: What is it about the hypnotic context, the hypnotic induction procedure, or the mere words of hypnotic suggestion that lead to the exaggerated responses of hypnosis? Second, why do some suggestions produce distortions in feelings of control and other suggestions produce distortions in feelings of reality? Third, relatedly, what allows

individuals to be quite strategic during the suggestion phase of an hypnotic item, but still experience it as involuntary or real during the test phase? Fourth, why do individuals differ in hypnotic ability and their hypnotic experiences, not only across the hypnotizability spectrum, but within hypnotizability levels? Finally, why are some suggestions more difficult than others; what drives this difficulty factor and how does it interact with hypnotic ability?

Generations of Cognitive Theories

Past generations of cognitive theories and theorists have influenced the answers we propose to these questions. As McConkey noted in chapter 3, "knowledge, attitudes and skills in a field are transmitted directly and indirectly, not only via its literature, but also via the generations of researchers that come and go" (p. 28). In this section, we briefly and selectively review two sets of influential accounts: the "dissociation" accounts of Hilgard, Kihlstrom, and Bowers, and the "interactionist" accounts of Sutcliffe, Sheehan and McConkey. Since these accounts have been described in detail elsewhere, we point simply to the elements most important to our theorizing.

Dissociation Theories, Hilgard, Kihlstrom, Bowers

Hilgard (1991, see also 1977, 1979, 1992) argued that "most phenomena of hypnosis can be conceived of as dissociative" (p. 84), where dissociation is defined broadly as involving interference with or loss of familiar associative processes. He noted that qualitatively similar dissociations are seen in clinical phenomena of functional paralyses, conversion symptoms, somnambulisms, amnesia, fugues, and multiple personalities, which of course gave rise to dissociation theory in the first place (Hilgard, 1991). Hilgard's "neodissociation" theory (so named to differentiate it from older theorizing about clinical phenomena) was intended as a more general theory than simply that of hypnosis – he aimed for broad links across hypnosis and other areas of psychology

– but it originated from hypnosis research and according to Hilgard (1991), is most clearly demonstrated by hypnotic phenomena and processing.

Hilgard (1991, 1992) outlined a model of cognitive control involving multiple cognitive processing systems or structures arranged in hierarchical order. For our purposes, the essence of Hilgard's theory is that for the most part, the control of behavior during hypnosis is identical to its control outside hypnosis (although hypnotized individuals may be less likely to independently initiate new lines of thought or action; Hilgard, 1992). Basically, everything operates as normal. However, subject's experience of their behavior – their monitoring of it – is impaired: "the control being exercised is not consciously experienced" (Bowers, 1990, p. 164; cited in Woody & Sadler, chapter 4, this volume). According to Hilgard (1991), the control of response production is split off from conscious awareness, that part of the "executive ego" or "central control structure" that monitors responding, by an amnesic barrier.

Bowers (1990, 1992; see also Woody & Bowers, 1994; Woody & Sadler, chapter 4, this volume) labeled Hilgard's theory "dissociated experience" to differentiate it from his own version of neodissociation theory, "dissociated control". Whereas dissociated experience "refers to changes in how subjects experience their behavior" (p. 11), dissociated control "refers to changes in the underlying control of behavior" (p. 12) (Woody & Sadler, chapter 4, this volume). Kihlstrom (1984, 1998, in press; see also chapter 2, this volume) extended Hilgard's analysis to, in Hilgard's (1991) view, link it more closely with modern cognitive psychology. In particular, Kihlstrom analyzed a wide range of hypnotic (as well as clinical, nonhypnotic) phenomena within the neodissociative framework, pointing to the ways in which monitoring, but not control, is influenced by hypnotic suggestion. These phenomena include, but are not limited to: posthypnotic amnesia, source amnesia, hypnotic analgesia, hypnotic deafness, hypnotic blindness,

hypnotic emotional numbing, posthypnotic suggestion (e.g., Kihlstrom, in press; chapter 2, this volume).

Overall, we take two things from Hilgard's and Kihlstrom's (as well as Bowers') theorizing. First, the distinction between *control*, which involves the voluntary initiation and termination of thought and action (Kihlstrom, in press) and *monitoring*, which involves accurately representing objects and events in phenomenal awareness (Kihlstrom, in press). Second, the proposal that whereas hypnotic and nonhypnotic responding may be controlled in essentially the same way, monitoring of hypnotic responding is disrupted (but see Woody & Sadler, chapter 4, this volume).

Interactionist Theories, Sutcliffe, Sheehan, McConkey

The interactionist theories of Sheehan and McConkey focus on the ways in which individuals actively use their cognitive skills and personal traits to create and maintain a subjectively compelling hypnotic experience in a complex social situation. This perspective, with its roots in the interactionism movement within personality theorizing (Bandura, 1978; Mischel, 1979; see also Sheehan & McConkey, 1982) and with its emphasis on the interaction of cognitive, social and experiential processes, is consistent with the desire for a more integrative approach to examining hypnotic phenomena (Kihlstrom, chapter 2, this volume; McConkey, chapter 3, this volume). Sheehan and McConkey's theoretical approach was also influenced strongly by the work of Sutcliffe (1960, 1961), who argued that hypnosis depends upon the qualities that the person brings to the hypnotic setting, and the ability of the hypnotist to establish and maintain conditions favourable to the person creating and believing in the suggested experiences. Importantly, Sutcliffe (1961) argued that "the distinguishing feature of hypnosis appears to be the subjective state; and the main feature of this state is the hypnotized subject's emotional conviction that the world is as suggested by the hypnotist" (p. 200).

More recently, Sheehan (1991) emphasized the aptitude factors and contextual influences that interact to shape the outcome of hypnotic suggestion. In particular, he argued that hypnotic subjects actively attempt to construct the experiences suggested by the hypnotist. Central to Sheehan's (1991, 1992) theory is the concept of "motivated cognitive commitment", which reflects the hypnotic subject's positive motivation to co-operate with the hypnotist: "not simply to conform, but rather to process the hypnotist's communications in a cognitively active way in order to solve the problem of responding appropriately to suggestion" (Sheehan, 1991, p. 527). The notion of motivated cognitive commitment acknowledges that hypnotic subjects vary in their motivation to become involved in hypnotic suggestions, and in the ways that they achieve their suggested experiences. In collaboration with Sheehan and independently, McConkey (1991) emphasized the cognitive strategies that hypnotized individuals employ to resolve the multiple problems posed by the hypnotic setting. In particular, he underscored their ability to manage conflicting information and influences in a way that allows them to "both experience the effects suggested by the hypnotist and to develop a belief in the genuineness of those experiences" (p. 561; see also McConkey, chapter 3, this volume).

In their work, Sheehan and McConkey focused in particular on the individual pathways to and profiles of hypnotic responding, especially of highly hypnotizable individuals (e.g., McConkey, 1991; McConkey & Barnier, 2004; Sheehan, 1991, 1992; Sheehan & McConkey, 1982). To do this, they developed two distinct methodologies: the Experiential Analysis Technique, an inquiry that involves the subject and an independent experimenter watching a videorecording of the hypnosis session to cue subjects about their subjective experiences associated with particular suggestions (for more, see McConkey, chapter 3, this volume; Sheehan, 1992), and the "dial method", a moment to moment measure of subjective experience such as the strength or reality of a suggested

effect across the phases of the items (as noted above; for full review, see McConkey, chapter 3, this volume). Using these methods, Sheehan, McConkey and their colleagues have identified a range of cognitive styles. Whereas some subjects tend to concentrate on the literal message of the hypnotist, other more independent subjects are willing to change the suggestion to suit their preferences; for example, hallucinating blue rather than the suggested orange. Subjects can also be more or less constructive in how much they embellish strategies to experience the suggested effect. For example, in a detailed analysis of the responses of two excellent (virtuoso) subjects across a range of hypnotic suggestions, McConkey, Glisky, and Kihlstrom (1989) described one subject as having a concentrative style, whereby she listened to suggestions and waited for the effects to happen, and the other as having a constructive style, whereby she actively worked on the suggestion she received, deciding how she could go about experiencing them (see also McConkey, chapter 3, this volume; McConkey & Barnier, 2004; Sheehan & McConkey, 1982).

We take two things from Sutcliffe's, Sheehan's and McConkey's theorizing. First, hypnotic subjects are sentient agents in the hypnotic context; they are motivated and cognitively prepared to co-operate, to become actively involved in hypnotic suggestions, and to develop a strong commitment to the communications of the hypnotist. Second, although hypnotic subjects may be very active and involved in constructing their response to hypnotic suggestions, they still experience their response as compelling: as outside their control and/or as subjectively real.

Cold Control and Discrepancy-Attribution:

Two New Perspectives on Theory and Research

In this section we introduce two new accounts of hypnotic behavior and experience: Dienes and Perner's (2007) cold control theory of hypnosis, and Barnier and

Mitchell's (2005) discrepancy-attribution theory of hypnotic illusions. Like our theoretical predecessors, we identify alterations in subjective experience as the fundamental phenomena of hypnosis. Whereas Hilgard, Kihlstrom and Bowers focused more on the division in awareness that leads to controlled action and constructed experiences feeling either involuntary or real, and Sutcliffe, Sheehan and McConkey focused more on the nature of the hypnotized subject's constructive processing, the precise mechanism by which active construction yields to compelling experience remains unclear. We aim to explain why mere words produce such compelling – surprisingly easy, surprisingly real – effects.

Our two distinct accounts share a number of features, and that is why we present them together in this chapter. Both accounts draw heavily from areas outside the domain of hypnosis, particularly from cognitive psychology – cold control draws from recent theorizing about conscious awareness and, specifically, higher-order states (Rosenthal, 1986, 2002, 2005), while discrepancy-attribution draws from recent theorizing and research on memory illusions such as false recall and false recognition (Goldinger & Hansen, 2005; Leboe & Whittlesea, 2002; Whittlesea, 1997; Whittlesea & Leboe, 2000; Whittlesea, Masson, & Hughes, 2005; Whittlesea & Williams, 1998, 2001). Both accounts make a distinction inspired by Hilgard's influential one between *control* and *monitoring* – cold control distinguishes between *first-order states* and *second-order states*, while discrepancy-attribution distinguishes between *production* and *evaluation*.

Using these distinctions, our accounts agree that hypnotized individuals actively construct (control) their hypnotic behaviors and experiences more-or-less as they do in a nonhypnotic context. And our accounts agree that hypnotized individuals develop inaccurate attributions (monitoring) about their hypnotic responses. Thus, our two accounts challenge theories that claim that the hypnotic subject is genuinely passive, such

as in Woody and Bowers (1994) theory of dissociated control (see also Woody & Sadler, chapter 4, this volume), or that subjects' behavior is automatically produced by a generalized implementation intention, such as in Kirsch and Lynn's (1999) response set theory (see also Lynn et al., chapter 5, this volume). Cold control and discrepancy-attribution theories agree that hypnotized individuals can be very active in creating their hypnotic responses, but fail to recognize their own hand in their experiences.

In providing these two theories: first, we spell out the distinction it makes between control and monitoring; second, we describe the theory's background in cognitive psychology; third, we set out the account; fourth, we summarize empirical data that supports the account; and finally, we point to remaining issues and directions for future research. In a separate section we consider the relationship between our two theories and with other current theories. Although our theories share a number of features, they are distinct, and that is why we present them separately first before considering their integration.

Before we turn to our first theory, we should note that our aim is to develop flexible theories that can explain a broad range of core hypnotic phenomena. And we believe that a good theory should be evaluated on a number of dimensions including: (1) testability, (2) empirical validity, (3) parsimony, (4) internal consistency, (5) extensiveness, (6) usefulness in practical applications, and (7) acceptability among those who test it through research and practice.

Cold Control Theory of Hypnosis

Control vs. monitoring. Cold control theory begins by drawing a distinction between *being in a certain mental state* and *being aware of being in that state*, which is related to Hilgard's distinction between *control* and *monitoring*. A first-order state is a state about the world. A higher-order state makes one aware of being in another state.

Thus, a second-order state makes one aware of being in a first-order state (and a third-order state makes one aware of being in a second-order state). For example, a visual representation of a cat caused by looking at a cat is a first-order state. Thinking "I see a cat" is a higher-order state, specifically a second-order state. Similarly, forming an executive intention "make the arm rigid" is a first-order state. Thinking "I intend to make my arm rigid" is a second-order state.[1] English language does not often clearly distinguish first-order and higher-order states. If I say "Bill is seeing a cat", typically I mean both Bill formed a visual representation of the cat (first-order state) and Bill is aware of seeing a cat (second-order state). If I say "Bill is intending to go to the cinema", typically I mean both he formed an intention (first-order state) and is aware of having that intention (second-order state). To be clear about possible mechanisms of hypnosis, we need to be clear on this distinction. Theories of hypnosis may postulate that during hypnosis the process of forming first-order states (e.g., imagining a cat or intending to lift an arm) is compromised. Alternatively, control may be intact, but the process of forming higher-order states (awareness of intending or awareness of imagining) is compromised (c.f., Woody & Sadler, chapter 4, this volume). When applied to awareness of intentions, compromising second-order states generates theories of the sense of involuntariness; when applied to perception, it generates theories of the sense of reality.

To see how ambiguous language can be, consider Woody and Szechtman's (2007) exploration of 'feelings of knowing'. At first sight, a 'feeling of knowing' is a higher-order state, if the phrase means a feeling with the content that one knows (as implied, e.g., by their citation of the metamemory literature). On the other hand, a feeling of knowing might be a 'strength of belief' – not a phrase describing a higher-order state at all, but rather the degree of intensity with which a first-order state is held (or perhaps whether a first-order state is one of believing rather than supposing – still a first-order property). We

will sharply distinguish first- and higher-order properties in order to explain hypnotic phenomena.

Background to the cold control theory. The theoretical background for cold control comes from three sources: (1) cognitive theories of control, like Hilgard (1977, 1991) and Norman and Shallice (1986), already familiar to readers of the hypnosis literature; (2) hypnosis research showing that hypnotic subjects can be very active (in dissociation and interactionist theories, as discussed above, as well as in sociocognitive approaches; e.g., Comey & Kirsch, 1999; Spanos, 1986); and (3) the higher-order thought (HOT) theory of consciousness, which we now discuss.

In the 1980s, Rosenthal and Carruthers independently took up an idea that can be traced to Aristotle; namely that a mental state's being conscious arises because of actual (e.g., Rosenthal, 2005) or potential (e.g., Carruthers, 2000) higher-order states. A mental state (e.g., of seeing) makes us conscious of some state of affairs, in the minimal sense of "conscious of"; for example, the seeing that occurs in a blindsight patient's blind field. What the blindsight patient lacks is an awareness of being in the mental state of seeing. Indeed, Rosenthal (2002) argued that a mental state, like seeing, is a conscious mental state only when we are conscious of being in that mental state. In other words, it sounds bizarre to say the blindsight patients can consciously see but are not conscious of seeing. When we are conscious of seeing, we see consciously.

On Rosenthal's (2002) account, we are conscious of mental states by having thoughts about those states. A thought about being in a mental state is a second-order thought, because it is a mental state asserting one is in a (first-order) mental state. For example, the first-order state could be seeing that "the object in front of me is black". Because of this first-order state, I am conscious of the object in front of me being black. Because of the second-order thought that "I see that the object in front of me is black", I

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am conscious of the first-order state of seeing. The seeing is then a conscious mental state: we consciously see that the object in front is black. In sum, according to HOT theory, a mental state is a conscious mental state when the person has a HOT to the effect that they are in that (first-order) mental state (for elaboration see Rosenthal, 2002; for review, criticism and discussion of HOT theories of consciousness, see chapters in Gennaro, 2004).

The distinction between first-and higher-order states urged by HOT theory has proven useful in understanding the difference between conscious and unconscious perception, memory and learning (e.g., Dienes & Perner, 1999). For example, the distinction between having knowledge and being aware of having that knowledge appears to mark a real division in different types of learning, implicit and explicit (e.g., Dienes, Altmann, Kwan, & Goode, 1995; Dienes & Scott, 2005; Fu, Fu, & Dienes, in press). Similarly, the distinction between seeing and being aware of seeing marks two qualitatively different types of perception, subliminal and conscious perception, as determined subjectively (Merikle, Smilek, & Eastwood, 2001).

As applied to control, the intention "Lift the left arm!" is not a conscious intention unless there is the HOT that "I am intending to lift my left arm". Due to this HOT, one is conscious of the intention. In principle, HOT theory allows intentions (including those used in executive control) without HOTs of intending. The theory allows unconscious intentions; thus, on the theory, unconscious intentions should sometimes happen. This prediction is counter-intuitive and contradicts the theories of Norman and Shallice (1986) and Jacoby (1991).

Cold control theory of hypnosis. The cold control theory of hypnosis (Dienes & Perner, 2007) states that successful response to hypnotic suggestions can be achieved by forming an intention (a command in the executive system) to perform the action or

cognitive activity required, without forming the HOTs about intending that action that would normally accompany the reflective performance of the action. That is, cold control is executive control without appropriate HOTs. According to cold control theory, hypnotic responding does not involve changes to first-order representations (intentions can function as normal) but a change in a specific type of second-order representation -- the awareness of intending. The change involves avoiding accurate HOTs as well as entertaining inaccurate HOTs (e.g. "I did not intend this action").

Because the executive system at the level of first-order intentions is postulated to function normally[2], according to cold control theory, anything that can be done outside of hypnosis can be performed as a hypnotic suggestion. This contrasts with theories that claim executive function is compromised in hypnosis (Jamieson & Woody, 2007; Woody & Bowers, 1994; see also Woody & Sadler, chapter 4, this volume); on these accounts responses demanding executive resources should be especially difficult to carry out as hypnotic suggestions. For example, tasks that require the subject to overcome a habitual response or that involve distractions should be difficult on these accounts. According to cold control, such actions are just as easy whether they are hypnotic suggestions or performed normally. Conversely, according to cold control, one should not be able to do anything as a hypnotic suggestion that one cannot do otherwise. For example, memory, strength, or ability to remove pain should be no better than normal following a hypnotic suggestion. The difference between hypnotic and nonhypnotic suggestions is only in how the response is subjectively felt; for a hypnotic suggestion, at least some of the intentions that support the (motor or cognitive) action are unconscious, so the action will seem to happen in part by itself. This difference can make a big difference; in a non-hypnotic context, without the interesting subjective experiences, a subject may not put in the first-order effort to, for example, lift their arm in an arm levitation suggestion.

The theory begs the question of how HOTs of intending could be systematically avoided in a hypnotic context when they arise spontaneously otherwise. The sustained performance of an intentional act, particularly an unusual act or an act unusual in context, typically leads to HOTs of intending. So how are they avoided in hypnotic responding? One answer is to point out that HOTs of intending, like most thoughts, will be influenced by beliefs and expectations. Thoughts tend to trigger other consistent thoughts. So the expectation that 'this act will happen by itself' will tend to trigger the thought that "I am not making it happen". Note this is a specific theory of how expectations produce hypnotic experiences. It is not that expectations directly cause the suggested outcomes, like hallucinations, analgesia and so on. On cold control theory, these outcomes must be produced by intentions (for example, the intention to imagine an object to be hallucinated; the intention to engage in strategies that modulate pain); all the expectation does is obstruct an accurate HOT of intending. Thus, expectations need not produce hallucinations in inappropriate contexts; expectations will only apparently produce hallucinations when the person already has intended to imagine the suggested object. The expectation can remove the awareness of intending and thus leave the person believing the imagined object is real. But without the intention there would be no hallucination, even with the expectation of hallucinating. Accounts that postulate a direct effect of expectation on first-order states rather than second-order states (e.g., Kirsch, 1991) have difficulty explaining why a 100% expectation to see an object rarely leads to seeing that object in normal clear viewing conditions, but a less than 100% expectation in a hypnotic context may produce an hallucination.

Research supports Dienes and Perner's (2007) proposal that expectations affect second-order states. In signal detection terms, it has long been known that expectations typically affect the bias parameter rather than sensitivity. Whereas sensitivity reflects the

underlying first-order representation (people can have high sensitivities while claiming not to see at all; c.f., blindsight, Weiskrantz, 1997), bias reflects second-order representations (when the shift in bias reflect people's changing beliefs about what they have seen; for discussion, see Dienes, 2004; Lau & Passingham, 2006). In line with this, Naish (1985) reported that high hypnotizable subjects changed their bias in a signal detection task to a greater extent than lows when given expectancy information that the signal was more likely; highs' subjective experiences were also influenced by their expectations, as evidenced in their verbal reports. Dienes and Perner (2007) suggest that expectations can affect second-order states of intending as well as of perceiving.

Cold control and the hypnotic state. Cold control theory is neutral as to whether there is a special state of hypnosis that (causally) enhances hypnotic responding. Perhaps there are special states in which HOTs are especially easily decoupled from first-order states like intentions. Perhaps alcoholic intoxication is one such state, for example. But cold control does not require such states. Braffman and Kirsch (1999) argued that hypnotic inductions lead to only small increments in hypnotic behavioral responding and such increments as they do cause may be accounted for by the increase in expectation accompanying them. Further, Baker and Kirsch (1993) argued that anything can be an induction, even the giving of a sugar pill or gas said to induce hypnosis, so long as it heightens expectations.

Cold control occurs in contexts other than those defined as hypnosis. For example, in certain religious and spiritual contexts, people produce behaviour they believe they are not intending, like talking in tongues or speaking with the voice of a spirit. For example, the State Oracle of Tibet is a monk consulted about difficult decisions of state. He is taken over by the deity Pehar Gyalpo. From the monk's point of view, it is Pehar Gyalpo who gives advice not the monk himself. In esoteric traditions of martial arts, a master may

control a student's 'ki' at a distance, causing the student to stop breathing, jump in the air, fall unconscious or become immobile. These different contexts produce cold control with different subjective states: in some contexts the subject is relaxed (typically, hypnosis) and in others not (students of the martial arts master may be attacking him very vigorously); in some contexts the subject is passive with reduced spontaneous thoughts (one type of report from hypnotic subjects) and others not (the State Oracle of Tibet will actively deliberate on important matters); in some contexts attention is focused inwards (typically, hypnosis) and others not (martial arts). It is unclear whether any special subjective state is uniquely associated with cold control (Dienes & Perner, 2007). The "switch" to engage in cold control may merely be the recognition of an appropriate context; and subjective feelings associated with this context may be produced because they are believed appropriate (c.f., Henry, 1985, cited in Lynn & Kirsch, 2006, who found people's experiences of hypnotic trance matched their expectations).

Cold control and the experience and domain of hypnosis. Cold control theory uses appropriate unconscious intentions, and the subsequent feelings of involuntariness, to explain all aspects of hypnotic experience. For example, according to Dienes and Perner (2007), the feeling of reality of a hallucination is produced by the fact that the (merely imagined) image is nonetheless felt to appear of its own accord (c.f., Bentall, 1990). The step from the image seeming to arise of its own accord to thinking one is seeing rather than imagining is an extra step, but perhaps one readily made. Similarly, if one lifts an arm intentionally, but does not believe one is intentionally lifting the arm, the conclusion that the arm is very light follows naturally. Thus, subjective feelings of reality of hypnotic suggested stimuli may occur as a direct consequence of cold control.

One advantage of cold control is it is relatively easy to see how it could produce both motor and cognitive responses in both direct and challenge suggestions. Both motor

and cognitive actions can be produced normally by first-order intentions, either those actions directly suggested, or those actions necessary to pass challenge suggestions (c.f., Woody & Sadler, chapter 4, this volume). The active nature of all responses is consistent with findings mentioned above that subjects can be very active during the suggestion phase of a hypnotic item, but experience their responses as involuntary during the test phase. However, this does not mean that all hypnotic responses should be equally easy or that there must be one factor underlying hypnotizability. Dienes and Perner (2007) illustrate how HOT theory can help to explain the relative difficulty of different hypnotic items by, for example, distinguishing those suggestions that require control of second-order thoughts or just third-order thoughts (for more, see Dienes & Perner, 2007, whose analysis in this case illustrates the distinctive contributions of HOT theory to understanding hypnosis). Also, the difficulty in carrying out the first-order intention is plausibly related to the difficulty in avoiding accurate HOTs of intending. This simple idea has yet to be tested.

Cold control and hypnotizability. A person may be highly hypnotizable because their expectations can shift their HOTs more than average. Evidence for this possibility comes from studies showing expectations are particularly likely to change biases in highs rather than lows, as in the Naish (1985) study cited above. Both Polczyk and Pasek (2006) and Woody, Drugovic, and Oakman (1997) found that hypnotizability was correlated with expectancy-induced changes in particular sensations (including, in Woody et al.'s study, feelings of alcoholic intoxication), albeit in different directions. Whereas Polczyk and Pasek (2006) reported that expectancy-induced changes were associated with difficult hypnotic items, Woody et al (1997) reported that they were associated with easy items (note that Woody et al. argued that responsiveness to expectancies is a poor explanation for most hypnotic responses). One interpretation is that cold control is particularly

important for difficult or easy items, respectively. However, in these studies, participants will have varied in the extent to which their expectations were manipulated as well as in the extent to which a given change in expectancies produced changes in subjective states. For the purposes of assessing cold control, we are interested only in the latter variability. Future research could first calculate the relationship between expectation and sensation change within each subject, and then relate this index with success on different item types. This may indicate whether particular hypnotic items rely on expectation-induced cold control more than others. Although suggestive, this and other possibilities for a cold control view of hypnotizability (and related constructs) have yet to be elaborated within the theory and tested.

Research that supports cold control theory. Cold control could be falsified by several types of findings. If hypnotised subjects were impaired in executive function tasks or unable to carry out suggestions involving executive activity, cold control theory would be wrong. Conversely, if subjects had greater executive or other abilities when carried out as hypnotic suggestions than when performed non-hypnotically, cold control theory would be wrong. Further, if suggestions involving an altered sense of reality could be passed without any sense of involuntariness, cold control theory would be mute in explaining successful response in those cases. We divide the relevant existing research into evidence that supports Dienes and Perner's (2007) proposals that hypnotic suggestions involve successful executive control; and that hypnotic responses do not involve any extraordinary abilities. We then consider other new research avenues.

Hypnotic suggestions can involve the subject engaging in executive function tasks. For example, a standard suggestion used in stage hypnosis, and that can be reproduced in the laboratory (Evans, 1980), is the suggestion to forget a number, such as the number "four." The subject will count, for example, "1, 2, 3, 5, 6" fingers on a hand. In

overcoming a strong pre-existing habit (counting the sequence of digits must be one of the strongest habits we have) successful response involves executive control. Sackheim, Nordlie, and Gur (1979) found that with strong motivation instructions for blindness, a highly hypnotizable subject performed significantly *below* chance in reporting the emotion shown in photographed faces (but see Bryant & McConkey, 1999). Similarly, Spanos, Radtke, and Dubreuil (1982) reported that highs who were given a suggestion to forget certain words in any task they were given during the session, produced those words at a level below baseline on a word association task. This requires executive control (as well as awareness of the purpose of the task), because the existing associations that would be produced automatically must be suppressed.

Bertrand and Spanos (1985) gave subjects a list of three words in three different categories and highly hypnotizable subjects, when suggested, could selectively forget one word from each category. Subjects recalled on a category-by-category basis, and must have inhibited the to-be-forgotten word when recalling each category. Such inhibition requires executive functioning. In a striking example, Raz and colleagues (e.g. Raz, Shapiro, Fan, & Posner, 2002) found that highs who were given a suggestion that they could not read words (the words would appear as a foreign language) eliminated or modulated the Stroop effect. These results suggest that the habit of reading was suppressed (though the effect has been hard to replicate in a number of other laboratories[3]).

Executive control is required for novel actions and in overcoming strong distractions. And virtually any arbitrary behavior can be hypnotically suggested despite the fact that such behaviour might be novel to the person, at least novel in context, and many hypnotic suggestions require the person to ignore some salient aspect of the situation (e.g. analgesia or amnesia suggestions). In sum, the evidence supports the claim

that many hypnotic responses are under executive control, a central assumption of cold control theory.

Similarly, decades of research has shown that hypnotic suggestions do not endow the subject with abilities the subject could not express equally well otherwise. It is now well accepted that suggestions for greater strength or endurance have only motivational effects readily equalled by motivational instructions (e.g. Barber, 1966). Similarly, McConkey and Sheehan (1995; see also McConkey, Barnier, & Sheehan, 1998) reviewed evidence that hypnotic rather than non-hypnotic suggestions for enhanced memory do not actually produce better overall memory. Consistently, cold control theory asserts that whatever intentions are useful for remembering can be employed in non-hypnotic as well hypnotic contexts (e.g., see Barnier, 2002a). More controversially, cold control theory also predicts that highs should be able to produce analgesia just as effectively in or out of the hypnotic context. In both contexts the same pain control strategies can be used; the only difference being that in the hypnotic context the pain reduction would feel more like a "happening" than a "doing". This prediction was supported by Milling, Kirsch, Meunier, and Levine (2002; but see Miller & Bowers, 1993; see Spanos, 1986, and commentaries for debate on whether hypnotic analgesia is as or more effective than the use of intentional cognitive strategies).

Cold control, although one process, does not require that all subjects respond by the same means. Indeed, as noted above in our description of interactionist theorizing and research, there is more than one way to successfully respond to hypnotic suggestions (McConkey, 1991; McConkey, chapter 3, this volume; Sheehan, 1991, 1992; see also McConkey & Barnier, 2004). These different cognitive styles can be implemented with cold control; subjects can vary in the exact intentions they formulate to achieve a suggested effect, and which and how many of these intentions they can act on while

preventing appropriate HOTs of intending. The better subjects are at cold control, the greater the variety of intentions they should be able to implement without relevant HOTs. Indeed, Sheehan &McConkey (1982) found highs more likely lows to respond constructively to suggestion.

Issues to resolve and future research. Research that shows subjects have greater first-order abilities with hypnotic rather than non-hypnotic suggestions is prima facie evidence against cold control. For example, Derbyshire, Whalley, Stenger, and Oakley (2004) found that subjects told they will feel pain in a hypnotic condition experienced more pain than when told to imagine pain in a nonhypnotic condition. In this and other similar studies showing differences between hypnotic and non-hypnotic conditions (see Oakley, chapter 14, this volume), the challenge to cold control needs to be strengthened by dealing with two methodological issues (as pointed out by Lynn, Kirsch, Knox, Fassler, & Lilienfeld, 2007). First, the hypnotic and nonhypnotic suggestions need to be identical otherwise there is a confound between what subjects are being asked to do and whether hypnosis is involved. Second, the problem of subjects "holding back" in the nonhypnotic conditions because of demand characteristics needs to be avoided (and can be with appropriate experimental design; see Sheehan & Perry, 1976). There is already research in progress in various labs on this matter that could support or contradict cold control theory.

Cold control theory in principle also makes specific predictions concerning the effect of disruption to frontal areas of the brain. According to the theory, executive intentions are formed and implemented normally under hypnosis but higher-order awareness of these intentions is avoided. Thus, selectively disrupting areas of frontal cortex involved in the implementation of executive intentions (e.g., Brodmann's area 32 in the lateral frontal cortex; Egner, Jamieson, & Gruzelier, 2005) should impair responsiveness to hypnotic suggestion. Conversely, selectively disrupting areas involved

in maintaining accurate higher-order states of awareness should increase responsiveness to suggestion. Lau and Passingham (2006) compared two conditions involving a visual detection task where visual sensitivity was identical but people differed in the proportion of times they believed they saw the stimulus. That is, the conditions of presentation involved equivalent first-order visual states but different degrees of accuracy in second-order states (thoughts that one saw). fMRI indicated it was activation in the mid-dorsolateral prefrontal cortex that distinguished conditions. Lau and Passingham argued that this area was responsible for producing accurate higher-order states. It is possible the same area is responsible for the accuracy of HOTs of intending as well as of perception, as the dorsolateral prefrontal cortex is not in general modality-specific. We are in the process of functionally disrupting the dorsolateral prefrontal cortex by rTMS to begin exploring how the induced impairment of frontal areas is related to subjective and objective degrees of response to hypnotic suggestion.

Szechtman, Woody, Bowers, and Nahmias (1998) also provided interesting evidence concerning brain regions involved in the formation of higher-order states. They found that Brodmann area 32 in the right anterior cingulate was activated both when highs heard an auditory stimulus and when they hallucinated hearing it, but not when they merely imagined hearing it. Szchetman et al. suggested that Brodmann area 32 is involved in experiencing something as external. That is, the region may be involved in forming HOTs that one perceived rather than just imagined. On cold control theory, such thoughts occur inaccurately in hypnosis because first the image is felt to be involuntary, which facilitates the thought that the image is real (c.f., Woody & Sadler, chapter 4, this volume). By contrast, if inaccurate thoughts of perceiving can occur in hypnosis together with accurate HOTs of intending, then cold control cannot explain such hallucinations. Hypnotic subjects often report control. However, some control is consistent with feelings

of involuntariness in other respects. One may unconsciously intend to lift the arm, but consciously intend to modulate the speed. One may unconsciously imagine an object, but consciously change some of its characteristics. There is some control, but there may also be enough involuntariness to trigger thoughts of external reality (perception) rather than of imagining. Future research could take a fine-grained look at the relationship between involuntariness and other changes in experience. It remains to be determined whether cold control theory really has a handle on hypnotic changes in feelings of reality.

A final area for research is the precise mechanism/s for avoiding accurate HOTs and producing inaccurate HOTs. The difficult task for highs is to maintain a first-order state together with a higher-order state that denies the first-order state. While Dienes and Perner (2007) suggest that expectation plays a key role in this process, cold control theory does not yet completely spell out how an individual might avoid accurate HOTs while producing inaccurate HOTs. HOT theory makes salient the distinction not only between first-order and second-order states (responsible for conscious awareness) but also between second-order and third-order states (responsible for introspective awareness). Dienes and Perner (2007) used these distinctions to analyse the requirements of different hypnotic tasks and different hypnotic experiences. Cold control theory motivates a continuing fine-grained analysis of the contents of different orders of thoughts in order to understand hypnotic response.

In summary. Dienes and Perner's (2007) cold control theory extends Rosenthal's (2002, 2005) HOT theory of consciousness to hypnosis. It draws a distinction between *being in a certain mental state* and *being aware of being in that state*, which in some ways parallels Hilgard's distinction between *control* and *monitoring*. According to cold control, hypnosis "happens" because subjects lack awareness (the HOTs) of controlling their responses. HOTs are disrupted by expectancies of involuntariness. As we discuss in our

integration section below, cold control theory utilizes a common theme from some previous theories: the active agent who misattributes the causes of his actions. The fact that cold control theory captures a central theme from other contemporary theories without being identical to any of them is perhaps something to recommend it. It isolates an old yet core idea, weds it to HOT theory, and examines the utility of this new combination in explaining hypnosis. In turn, HOT theory provides new theoretical apparatus to analyse hypnotic responses (cold control vs. cold perception vs. empty heat; first vs. second vs. third order states: Dienes & Perner, 2007). We turn now to introduce our second theory of hypnosis.

Discrepancy-Attribution Theory of Hypnotic Illusions

    Control vs. monitoring. Discrepancy-attribution theory begins by drawing a distinction between *production* and *evaluation*, which is inspired in part by Hilgard's distinction between *control* and *monitoring*. Suppose that during hypnosis, we give you a hypnotic suggestion that you will see a cat in the room; that is, a positive visual hallucination. If you are a talented hypnotic subject (with the component ability for such a difficult cognitive-delusory item; Woody & Barnier, chapter 10, this volume) you may well "see" what you believe at that moment to be a real cat in the room. Many commentators agree that the mental event corresponding to "seeing" a cat during hypnosis is very similar to the mental event corresponding to imagining a cat outside of hypnosis (e.g., Haggard, Cartledge, Dafydd, & Oakley, 2004; Hilgard, 1977, 1991; Kihlstrom, in press; Kihlstrom, chapter 2, this volume; McConkey, chapter 3, this volume; Oakley, 1999; Oakley, chapter 14, this volume; but see Woody & Sadler, chapter 4, this volume). According to discrepancy-attribution theory, what distinguishes hypnotic from nonhypnotic events is an attributional process. The hypnotic image of the cat is attributed

to the external world and reality, whereas the imagined image of the cat is attributed to just that, imagination.

The process of creating the image of the cat is production, making sense of it is evaluation. According to Barnier and Mitchell (2005), the production of responses is slightly easier in hypnosis. This slight change in production leads to substantially altered evaluation. Of course, this view of hypnosis – that it may alter the production vs. evaluation of hypnotic responding to different degrees – is not new (Hilgard, 1977, 1991; Kihlstrom, chapter 2, this volume; Spanos, 1986; Woody & Sadler, chapter 4, this volume). Discrepancy-attribution theory makes a similar conceptual distinction, but draws on an entirely different literature to justify and apply this distinction to hypnosis. More importantly, it conceptualizes production and evaluation as two aspects of the same system and uses the distinction between them to explain hypnosis in an entirely new way.

Background to the discrepancy-attribution theory. Apart from theory and research by (among others) Hilgard, Kihlstrom, McConkey and Sheehan, the theoretical background for discrepancy-attribution comes from the domain of cognitive psychology and memory theorizing and research.[4] Specifically, Barnier and Mitchell's (2005) theory draws heavily on and extends Whittlesea and colleagues' recent theory of memory attributions and illusions. According to Whittlesea's (2002) *"Selective Construction and Preservation of Experience"* (SCAPE) theory, accessing memory (whether via recall or recognition) involves two stages. Stage 1 is production, whereby images or ideas are accessed and brought to consciousness. Stage 2 is evaluation, whereby the products of cognition and the production process are automatically and continuously evaluated. According to Whittlesea (2002; see also Whittlesea & Williams, 1998, 2001), memory performance and memory attributions can be explained by a *discrepancy-attribution hypothesis*. As practised users of our memory systems, we have specific, often context-

dependent, implicit expectations of the ease of memory processing – processing fluency – that may be violated in certain circumstances. Individuals are motivated to seek the most natural or salient explanation for unexpectedly more (or less) fluent production. When surprising ease is unconsciously attributed to a source in the past, for instance, the person experiences a conscious feeling of familiarity (Whittlesea, et al., 2005).

To illustrate, in one experiment on false recognition, Whittlesea and Williams (2001) presented participants with a list of words to study. At test, both studied (old) and unstudied (new) words were presented, but each word was preceded by a sentence that provided a semantic context for that word. In the critical condition, new words were presented in either a *predictive* or a *nonpredictive context*. For example, in the predictive context, participants read the sentence "the stormy seas tossed the….", and after a pause made a recognition judgment of the new word "boat". The sentence provided a context consistent with the target word "boat", where "boat" was an appropriate ending. In the nonpredictive context, participants read the sentence "she read in a newspaper about a.…", and then made their recognition judgement for "boat". The context of the sentence was not especially consistent with boat, and boat was an appropriate but not highly predicted ending. When new words were presented in a predictive context they were likely judged as old words and characterised by a sense of familiarity.

Whittlesea and Williams (2001) argued that the phrase "the stormy seas tossed the…." sets up an *indefinite expectation* of what is to come. That is, the participants do not know for sure that the sentence will end with the word "boat", but can guess that it will be one of "boat, "ship", raft" etc. The critical feature of this indefinite expectation is that when the word "boat" appears, the word is processed surprisingly fluently. In other words, there is a discrepancy between expectancies for production and actual production. Since the surprising ease of processing must be attributed to some source, participants

unconsciously (mis)attribute processing ease to having seen the word "boat" in the study list.

Participants in these studies misattribute increased processing ease to the past (false recognition), and not (correctly) to the predictive context because, according to Whittlesea and Williams (2001), unconscious attribution (or evaluation) is made to whatever source is most natural or salient. A predictive context is an unusual and not especially salient way to increase processing ease. Also, the pause between the predictive context and the presentation of the target item makes the real source of increased ease less obvious. The recognition question is much more salient. This question suggests that the increased ease of processing may be because this item appeared in the recent past; that it is familiar. So the illusion of familiarity is produced by an inaccurate evaluation of the production of a mental event; increased processing ease is attributed to familiarity and not to the predictive context.

Discrepancy-attribution theory of hypnotic illusions. Barnier and Mitchell's (2005) discrepancy-attribution theory of hypnosis states that hypnotic illusions can be understood within the same theoretical framework as illusions of memory (note, when we refer to illusions here we mean all hypnotic responding, rather than just specific cognitive-delusory phenomena such as hallucinations). As Whittlesea and Williams' (2001; see also Whittlesea et al., 2005) work demonstrates, in false recognition a very slight increase in the ease with which a novel event can be brought to mind – produced – can profoundly increase the degree to which that event is mistakenly judged – evaluated – as having occurred in the past. Similarly, Barnier and Mitchell (2005) argue that in hypnosis the ease with which hypnotic responses (behavioural acts or mental events) can be produced may have a profound effect on the way in which the response is evaluated.

Let's return to our hallucinated cat to capture the essence: If outside of hypnosis we ask you to see a cat in the room, constructing that mental event takes a certain degree of effort. Barnier and Mitchell (2005) believe that within hypnosis seeing the cat is slightly easier, it requires marginally less effort. So, you can produce the image of the cat just a little bit easier. This generates a discrepancy between the expected effort and ease of producing the mental image of the cat (based on your experiences outside of hypnosis) and the actual effort and ease of producing the mental image of the cat inside of hypnosis. This slight discrepancy – between your expectations of effort and ease and its actual effort and ease - makes the production of the image of the cat feel surprisingly easy. So quite a small quantitative change in ease may yield a large – surprising – qualitative effect. The sense of surprising ease influences the way in which you interpret the image of the cat. Outside of hypnosis, you would attribute (or evaluate) the cat to your imagination. But inside hypnosis, the sense of surprising ease causes you to attribute (or evaluate) the cat to reality. Interestingly, even partial or incomplete responses– whether an incomplete hallucination of a cat or partial experience of amnesia – still are evaluated as involuntary or real. We consider why in a moment.

Barnier and Mitchell (2005) argue that the hypnotic setting has the same influence on hypnotic responses as, for instance, a predictive context has on the processing of a target word in a recognition task. They believe that the hypnotic setting makes the production of a motor act or of a mental event surprisingly easy. The response is then attributed to the most salient or natural source, such as lack of control (an illusion of involuntariness) or reality of the imagined stimulus (an illusion of reality). The first important question to answer then is: what is it about the hypnotic context, the hypnotic induction procedure, or the mere words of hypnotic suggestion that lead to the

exaggerated experiences of hypnosis? Why does the hypnotic context increase processing ease, even if only slightly?

What is the hypnotic state? On Barnier and Mitchell's (2005) view, the hypnotic induction does not generate any major qualitative changes in information processing; all aspects of normal cognitive functioning take place within hypnosis much as they do outside of it (for a similar conclusion based on neuroimaging evidence, see Oakley, chapter 14, this volume). However, Barnier and Mitchell believe that certain (perhaps minor) quantitative changes in cognitive processing do take place in the hypnotic setting. In particular, suggested responses are easier to execute and goals are more easily achieved within hypnosis than outside of it. Why?

It is useful to consider first why responding under normal circumstances may be difficult (where "normal" circumstances are characterized by specific expectancies about the qualities of performance; see below). Under certain circumstances, executing any response can be difficult and experienced as effortful. For example, teenagers find concentrating on their homework difficult and effortful. They have a huge range of more interesting things they could be doing: playing video games, watching television, calling a friend, or going shopping. The target activity is of low interest and the competing activities are of high interest. It is the activation of the target goal and inhibition of competing goals, both of which are cognitively demanding, that leads to the experience that homework is effortful.

According to Barnier and Mitchell's (2005) analysis, there are two ways in which hypnosis may aid response production. First, the "good hypnotic subject" wishes to comply with the hypnotist. As noted above, hypnotic subjects show a cognitive preparedness – "natures predisposed" in White's (1937, 1941) earlier language – to interpret and respond to the hypnotist's communications (McConkey, 1991; Sheehan,

1991, 1992; see also McConkey, chapter 4, this volume). Subjects' willingness to prioritize the hypnotist's suggestion over reality, which Shor (1959, 1962) called a "shift in generalized reality orientation", should make the target response more salient and receive particular attention from the individual. This provides an additional source of activation compared to the nonhypnotic setting. Second, the hypnotic setting is typically one of concentration and relaxation. As a result, competing thoughts are kept to a minimum. One major feature of the hypnotic induction process, at least the traditional induction procedure, is to banish all thoughts from the mind and to listen exclusively to the hypnotist's voice. And then there is the dimly lit room with few salient features, which further focuses attentional resources.

So in this highly motivating, yet impoverished context, the suggested goal is highly activated and competing thoughts are reduced. In essence, although a response may be no less physically or cognitively demanding in hypnosis, there is perhaps less indecisiveness about whether or not to execute it. This indecision would, under normal circumstances, increase difficulty and perceived effort. Another way to say this is that we lose or at least reduce our "No Go" option (Logan, 1994, 2002).

Why such different attributions? At the beginning of this chapter, we asked: why do some suggestions produce distortions in the feeling of control and others produce distortions of reality? According to Barnier and Mitchell's (2005) account, responses in hypnosis may be surprisingly easy and this ease must be attributed to some source. The attribution is made to the most obvious or natural source. The true source is, of course, the impoverished environment and the fact that the participant and hypnotist are colluding in the activation of the suggested response. However, at least for highly hypnotizable people, this true source is generally not recognised and the increased ease must be attributed to something else. Given cultural notions of hypnosis (e.g., Green, Page, Rasekhy, Johnson,

& Bernhardt, 2006; McConkey, 1986; Spanos, Brett, Menary, & Cross, 1987), it is not surprising that individuals make the attributions that they do.

For instance, if raising your arm following an arm levitation suggestion is surprisingly easy, a natural conclusion for you to draw in that setting is that it was outside of your control and it just happened. If imagining a cat following a visual hallucination suggestion is surprisingly easy, a natural conclusion for you to draw in that setting is that the cat is real. This is similar to research on mere exposure, where subjects attribute increased fluency to either liking or recognition depending on the context; specifically, whether they are asked "do you like it" or "do you recognize it" (e.g., Bornstein & D'Agostino, 1994)? Hypnotized subjects' attributions of involuntariness and reality are "natural" because certain attributions – to hypnosis, to the hypnotist, to reality - are made more salient than others – attributions to one's own efforts and to the way the setting supports them. And highly hypnotizable people are particularly unlikely to recognise the true source of surprising ease because they are cognitively invested in, via processes of motivation, attention and absorption, believing in the suggested experiences.

Although the fundamental psychological mechanism for both types of illusions is the same – and shared with memory illusions – the subjective experience is very different. This is because, through a lifetime of experience, we have learned that certain experiences demand certain causal explanations. And cultural notions of hypnosis make certain attributions more likely (Green et al., 2006; McConkey, 1986; Spanos et al., 1987). So this fact, that surprising ease is attributed to different sources depending on the circumstances, helps to explain why some hypnotic items are associated more strongly with a sense of involuntariness, while others are associated more strongly with a sense of reality. We might expect then that if you manipulate the context or cues on which attributions are based, you should be able to shift the person's experience.

A reasonable question to ask is: why would such a small discrepancy between the expected ease and the actual ease of producing a response or constructing a mental event have such a profound impact on subjective experience? One answer is that, since everything we do in hypnosis is normal nonhypnotic behaviour, and since we have thousands, if not millions, of trials of doing exactly these sorts of things (moving our limbs, seeing things in the world, remembering events), we have specific expectations for what they feel like. Barnier and Mitchell (2005) base this argument, in part, on Blakemore, Frith and Wolpert's analysis of abnormalities in the awareness of actions, especially in neuropsychiatric disorders (e.g., Blakemore, Smith, Steel, Johnston, & Frith, 2000; Blakemore, Wolpert, & Frith, 2002; Wolpert, 1997; Wolpert et al., 2001). These researchers describe two types of internal models of the motor system: the "forward model" and the "inverse model", which represent aspects of one's body, its actions, and its interactions with the environment. Importantly, these models make particular predictions about responses including: (1) the outcome of motor commands, which is compared to the desired outcome; and (2) the sensory consequences of movement, which are compared to actual sensory-perceptual feedback. Blakemore et al. (2002) wrote that: "we seem to be unaware of the results of the comparison between the predicted and intended outcome of motor commands, and the comparison between the predicted and actual sensory feedback, *as long as the desired state is successfully achieved"* (our italics; p. 237). So slight perturbations will be detected and must be explained. Thus, the qualities of hypnosis are the result of violated, rather than met, expectations (c.f., Kirsch & Braffman, 2001; Kirsch & Lynn, 1997; see also Lynn & Kirsch, chapter 5, this volume).

A related question is: will any manipulation that makes production slightly easier result in a compelling hypnotic experience? During a hypnotizability testing session, Wickless and Kirsch (1989) surreptitiously manipulated the external reality of six bogus

items (e.g., for a suggestion to see the colour red they turned on a low wattage red light). For these items, producing the hypnotic response was presumably easier because the reality of the suggested stimulus was manipulated by the experimenters. Following these manipulations, Wickless and Kirsch then tested hypnotizability with the SHSS:C (Weitzenhoffer & Hilgard, 1963). Subjects for whom external reality was manipulated scored higher on the SHSS:C than other subjects, which implies that aiding suggested responses with a real stimulus helped subjects to pass later SHSS:C items, at least behaviourally. However, it is not clear that this manipulation lead to compelling experiences of subjective reality. For example, in his review of a program of research that compared objectively vs. subjectively real hypnotic events, McConkey (chapter 3, this volume) described experiments in which hypnotized subjects were given a metal ball to hold and suggested that it would heat up. Whereas for some subjects the metal ball was empty and inert, for other subjects the metal ball contained chemicals that mixed to heat the ball 7-10 degrees. Subjects given the empty, inert ball reported as compelling and real an experience of the ball heating up as subjects given the chemical ball. What is more, the former subjects never become suspicious about the source of their hypnotic experience, whereas the latter subjects often did. In the absence of true absorption and involvement in the hypnotic interaction, which is characteristic of highly hypnotizable people, an external manipulation of the ease of processing may not be sufficient to yield compelling hypnotic experiences. In other words, you need more than just a stimulus flashed on the wall for subjects to believe that it is real (for a more analysis of the consequences of manipulated reality, see McConkey, chapter 3, this volume).

We also noted earlier that even incomplete or partial responses, especially for difficult, cognitive-delusory suggestions, are still experienced as real. This may be because of the very high benchmark of objectively real experiences. Consider how

difficult it might be outside of hypnosis to simply imagine to a realistic level a negative visual hallucination such as seeing two boxes instead three (as in the SHSS:C) It is perhaps not surprising that the modest increase in ease brought about by hypnosis – even though it yields an incomplete or partial experience, such as seeing the third box indistinctly rather than not at all – generates enough of a discrepancy for the hallucination to be evaluated as real. One needs only a slight discrepancy between expected and actual ease of production, even if the baseline of ease is very low. Future research could focus on the relationship among difficulty, expectancies, completeness of responding, attributions, and subjective feelings of hypnosis.

    How active construction yields to compelling experience. Barnier and Mitchell's (2005) use of the distinction between production and evaluation helps to explain how participants can be strategic and active during the suggestion phase of a hypnotic item, yet still experience their response during the test phase as compellingly involuntary or real. According to discrepancy-attribution theory, even if the production of a hypnotic response takes time and effort on the part of the subject (e.g., McConkey, 1991; McConkey, chapter 3, this volume; McConkey & Barnier, 2004; Sheehan, 1991, 1992), as long as there is a discrepancy between the expected and actual ease of its production, a surprising sense of fluency will be generated and, in turn, attributed to the most natural or salient source (lack of control or stimulus reality). It does seem a little contradictory that hypnotic subjects will acknowledge that they were actively involved in the production of their hypnotic responses, yet still describe the response itself in compelling terms (e.g., Barnier & McConkey, 1995, 1996, 1998b, 1999a, 1999b, 2001), especially given popular views and expectations that hypnosis just happens. But, according to Whittlesea's (2002) SCAPE theory, expectancies for production are implicit. Thus, subjects need not see a contradiction between their active efforts and their involuntary or real experiences. For the

generation of surprising fluency, Barnier and Mitchell's (2005) account requires only a slight discrepancy between the expected and actual ease of production. To the extent that the hypnotic state makes response production slightly easier, it does not matter how much (or how little) effort a subject initially invested in producing their response.

Individual differences, item difficulty. Within the discrepancy-attribution account, why might individuals differ in hypnotic ability and their hypnotic experiences? High hypnotizable people may be: (a) those who are particularly influenced by the hypnotic setting in terms of focusing on the target response and limiting alternatives – reduced No Go – and so experience a larger discrepancy between hypnotic and nonhypnotic contexts; and/or (b) those who are especially sensitive to discrepancies and so would be expected to show cognitive illusions in nonhypnotic domains such as memory).

These possibilities also help us to understand why some suggestions are more difficult than others. Barnier and Mitchell's (2005) account suggests that illusions result from detailed implicit expectations derived from normal conditions, which are then violated in hypnosis. Most people have clear expectations for motor movements under normal conditions. For instance, how our arms move. Technically speaking, we have a relatively clear idea of the relationship between the voluntary initiation of motor responses and the visual and kinaesthetic feedback that accompanies them. Also, motor responses may be more believable simply because they have more stimulus support (an arm that is moving) and less conflicting reality information. In contrast, we may have less clear expectations for cognitive alterations. For instance, our ability to imagine a cat. Also, seeing a cat may be less believable because it has less stimulus support (no cat in the room) but more conflicting reality information (an empty room when we open our eyes).

Given clear expectations, and the greater potential for discrepancy between expected and actual ease, it makes sense that involuntary motor responses are a common

form of hypnotic illusion – most everybody experiences simple ideomotor suggestions (Barnier & McConkey, 2004; McConkey, Barnier, Maccallum, & Bishop, 1996). For other types of suggestions and illusions, generating the discrepancy (and thus surprising ease) may depend on people's nonhypnotic experience with the underlying cognitive events. In other words, individuals may be susceptible to some but not other illusions depending on their particular skills or developmental history. For instance, someone who commonly engages in imaginative activity and has a clear idea (and thus expectation) of its nonhypnotic effort and ease may be more likely to be surprised by a slight change in effort and ease in hypnosis, and thus experience an illusion related to the imagined event, than someone who has little or no ability or tendency to imagine.

Research that supports discrepancy-attribution theory. Discrepancy-attribution could be supported by several types of research methods and research data. In line with the above discussion, we organise the relevant research into evidence that supports Barnier and Mitchell's (2005) proposals about the hypnotic state and about the time course of production and evaluation. We also point to research that is suggestive of how attributions may be altered, and of the source of individual differences and item difficulty.

Research supports the discrepancy-attribution view of the hypnotic state. Barnier and Mitchell (2005) suggested that particular features of the hypnotic setting make suggested responses slightly easier. They made three arguments. First, Barnier and Mitchell (2005) argued that hypnotic responses are produced in essentially the same way as nonhypnotic responses. We have already addressed this above (in our discussions of previous cognitive theories and of cold control theory). But we note again here that there is a raft of experimental findings to support the conclusion that suggestion influences subjects' experiences rather than the cognitive processes themselves. Other telling illustrations include Bryant's work on hypnotic blindness, in which, for instance, high

hypnotizable subjects in hypnosis said they couldn't see words following a suggestion for

blindness, but after hypnosis spelled these words consistent with having seen them (for

review, see Bryant & Cox, chapter 12, this volume); Barnier and McConkey's work on

posthypnotic suggestion, in which, for instance, high hypnotizable subjects who had been

hypnotized and given a posthypnotic suggestion to mail one postcard every day sent

postcards for the same (often lengthy) period as control subjects who had not been

hypnotized and were simply asked to send the postcards, but described their experience

quite differently – as compulsive (for review, see McConkey, chapter 3, this volume); and

recent work by Hung and Barnier on hypnotic elimination of the Stroop effect, in which,

for instance, high hypnotizable subjects who were given either a hypnotic or posthypnotic

suggestion to see words as a foreign language or to not know the meaning of words

reported that they could not understand words presented in a Stroop task, but still showed

the Stroop interference effect.[3] And in summarizing current neuroimaging findings on

hypnosis, Oakley (chapter 14, this volume) concluded that basic aspects of information

processing (including pain perception, processing of sensory information, and sense of

agency over action) remain essentially normal after an hypnotic induction procedure.

Second, Barnier and Mitchell (2005) proposed that the hypnotic setting promotes,

and within this setting hypnotized individuals show, qualities such as focused attention

and cognitive preparedness. This is supported, for instance, by findings that within Stroop-

type tasks, high hypnotizable subjects make more efficient use of attentional strategies

than lows (Dixon & Laurence, 1992; Rubichi, Ricci, Padovani, & Scaglietti, 2005; for

review, see Laurence et al., chapter 9, this volume; but see Jamieson & Sheehan, 2004).

This view of hypnosis is supported also by findings that: hypnotized subjects feel strong

rapport with the hypnotist, prioritise the hypnotist's message, counter prehypnotic

expectations in favour of the hypnotist's suggestions, and engage in selective encoding

and retrieval of material consistent with the suggested experiences (Burn et al., 2001; McConkey, 1991; Sheehan, 1991; see also McConkey, chapter 3, this volume). Of relevance also, Hilgard (1992) argued that the "usual initiative of the executive is lost" (p. 95), such that during hypnosis subjects do not "independently undertake new lines of thought or action" (p. 95). This is consistent with Oakley's summary from neuroimaging findings that hypnosis is associated with "physical relaxation, mental calming, attentional absorption and a reduction in spontaneous conceptual thought" (p. 52). Overall, these findings imply that the hypnotic setting is a highly motivating, yet impoverished, context in which the hypnotist and the subject work together to make the suggested response more salient and to keep competing thoughts to a minimum.

Third, Barnier and Mitchell (2005) proposed that although hypnotic responses are produced in essentially the same way as nonhypnotic responses, these aspects of the hypnotic state (attention, relaxation, cognitive preparedness) aid response production – they make responses slightly easier. This is supported by research, for example, on hypnotically suggested anomalous control. For instance, in a laboratory analogue of "alien control" of motor action, Haggard et al. (2004) used Libet's time estimation procedure to index participants' judgements of the time at which they experienced the occurrence of their own motor actions. When movements are produced voluntarily – when they are highly intentional and involve substantial preplanning – the individual shows more anticipatory awareness than for movements that are produced voluntarily and lack preparation (Haggard, Clark, & Kalogeras, 2002; Haggard et al., 2004; Haggard, Newman, & Magno, 1999).

Twelve highly hypnotizable individuals used a clock display to verbally report as precisely as possible when their right index finger moved downward in contact with a response button (based on a procedure developed by Libet, Gleason, Wright, & Pearl,

1983). Subjects made time estimations under three conditions: voluntary movements, passive movements (when the response button was moved from below and their finger moved passively), and involuntary ("anomalous") movements (the same as voluntary movements, but during hypnosis and following suggestions that these movements would be involuntary). The main measure was "judgement error": the time difference between a subject's actual finger movements and his or her report of it (negative judgement errors indicate anticipatory awareness). Whereas truly voluntary movements were judged at -79.5 ms, truly passive movements were judged at -49.0 ms. Hypnotic movements fell in between, at -61.0 ms, indicating less anticipatory awareness. This suggests that hypnotically controlled movements were slightly easier than nonhypnotic voluntary movements. As predicted by discrepancy-attribution theory, these unexpectedly easier movements were interpreted by subjects as involuntary.

The view that hypnosis aids response production is supported also by research on posthypnotic amnesia. In a series of studies, Barnier and colleagues compared hypnotically created forgetting (posthypnotic amnesia; PHA), with nonhypnotically created forgetting (directed forgetting; DF; for review, see Barnier, 2004; see also Barnier, 2002a, 2002b; Barnier, Conway, Mayoh, Speyer, Avizmil, & Harris, in press; Barnier & McConkey, 1999c; Barnier, Wright, & McConkey, 2004). In one experiment, high and low hypnotizable subjects generated specific autobiographical episodes during hypnosis in response to cue words. After generating the first set of memories to list 1 cues, half the participants received a PHA suggestion to forget them and half received a DF instruction to forget them. They then generated a second set of memories to list 2 cues. After deinduction, subjects' memories were tested by free recall before (Recall 1) and then after a cancellation cue (Recall 2). On Recall 1, both PHA and DF groups recalled fewer list 1 than list 2 memories. And on Recall 2, both groups recalled additional list 1 memories

after the cancellation cue. Notably, PHA created more forgetting of both list 1 and list 2 memories, as well as more recovery, than DF. Barnier's (2004) analysis identified features shared by PHA and DF, including recall patterns, disruptions in recall (not recognition), and a dissociation between explicit and implicit memory. This suggests that although both hypnotic and nonhypnotic forgetting may share their (intentional and effortful) mechanism (e.g., retrieval inhibition), hypnotically controlled forgetting is slightly easier. As predicted by discrepancy-attribution theory, this unexpectedly easier forgetting is interpreted by subjects as involuntary.

This, and other research, supports the discrepancy-attribution view of the time-course of hypnotic responses: participants can be strategic and active during the suggestion phase of a hypnotic item, yet because the result is produced with surprising ease, they still experience their response during the test phase as compellingly involuntary or real. We have already discussed McConkey and colleagues' "dial" and EAT findings. Another example of this fascinating time course comes from a recent study conducted by Barnier and Coltheart. In a study that aimed to develop a laboratory analogue of the neuropsychological condition of "mirrored self misidentification" (e.g., Breen, Caine, Coltheart, Hendy, & Roberts, 2000), they gave 12 very high hypnotizable subjects a suggestion during hypnosis to see a stranger, not themselves, in a mirror: "The mirror you will see will have properties of a normal mirror, with one major difference. The person you see in the mirror will not be you, it will be a stranger." During a postexperimental EAT inquiry, one male participant described how he prepared to experience himself as a stranger as he listened to the suggestion. But when he opened his eyes to look in the mirror he said "Who's that, another person?" He claimed that the person in the mirror was not him, but was copying him, and he looked around the room to find the person in the mirror, in a manner that reminds us of Orne's (1959) concept of "trance logic". During the

EAT, this subject said that he really thought the person in the mirror was someone else. In other words, this subject's active efforts to respond to the suggestion yielded to a compellingly real response.

Issues to resolve and future directions. Hypnosis research provides some directions for testing Barnier and Mitchell's other proposals: of how attributions may be altered, and of the source of individual differences and item difficulty. However, more work is needed to apply and validate discrepancy-attribution theory in these areas. We turn to consider these now.

Barnier and Mitchell (2005) argued that if you manipulate the context or cues on which attributions are based, you should be able to shift the person's experience. We've already noted above that whereas some items are associated strongly with involuntariness (and not necessarily reality), other items are associated strongly with reality (and not necessarily involuntariness). Research by Spanos (for review, see Spanos, 1986, 1991, 1992) supports the general notion that by altering contextual cues you can alter subjective experience and bias the explanations that subjects reach to for their responses. In an attempt to more directly test the shift from involuntariness to reality and vice versa, Barnier and Mitchell recently gave high and low hypnotizable subjects one of two versions of the hand lowering item of the Stanford Hypnotic Susceptibility Scale, Form C (Weitzenhoffer & Hilgard, 1962). For half of the subjects, the suggestion focused on the ideomotor action of their arm moving down, and for the other half, the suggestion focused on the reality of the heavy ball they imagined they were holding. Somewhat unexpectedly, high hypnotizable subjects in both conditions rated their experiences as both involuntary and real. This lack of clear results may be due to the fact that the hand lowering item contains elements of ideomotor action (usually associated with involuntariness) and elements of hallucination (usually associated with reality). A manipulated shift in

attributions may be more effective for items that fall more squarely in one or the other category of hypnotic item. A useful start would be to survey in detail the reported experiences of the entire database of hypnotic items (e.g., from standardized scales). This will help us to ensure a flexible theory that can explain the full range of hypnotic responses and experiences.

Barnier and Mitchell (2005) proposed two possibilities to account for individual differences in hypnotizability, as summarized above. Laying aside these alternatives, their theory makes a clear prediction that high hypnotizable individuals should be especially susceptible to memory illusions of the kind investigated by Whittlesea and colleagues (Whittlesea, 2002; Whittlesea & Williams, 2001). In other words, one appropriate way to test discrepancy-attribution theory is to see whether highly hypnotizable individuals in particular, show fluency illusions in nonhypnotic memory paradigms. There is strong evidence that they do, for instance, in research on hypnotic hypermnesia and hypnotic pseudomemory (e.g., Barnier & McConkey, 1992; McConkey, Barnier, & Sheehan, 1998; Nogrady, McConkey, & Perry, 1985). Perhaps of most relevance, Neuschatz, Lynn, Benoit, and Fite (2003) tested high and medium hypnotizable participants in hypnotic and nonhypnotic conditions within Roediger and McDermott's (1995) Deese-Roediger-McDermott (DRM) memory illusion paradigm, in which participants learn lists of semantically related words (pillow, blanket, tired, bedroom), and then (like Whittlesea & Williams, 2001) are later asked to judge whether studied and unstudied words are familiar. Neuschatz et al. (2003) reported that highs and mediums in both hypnosis and waking conditions showed high rates of false recognition of unstudied, but critical words like "sleep" (they did not test low hypnotizable subjects).

Although suggestive, these experiments were motivated more by forensic applications of hypnosis. More theoretically driven research is needed to test: (1) the

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relationship between hypnotizability and (nonhypnotic) memory illusions; (2) hypnotizable individuals' sensitivity to discrepancies and control over misattributions; (3) the relationship between hypnotizability and behavioral illusions; and (4) illusions inside and outside hypnosis. For instance, to test whether high hypnotizable individuals are especially susceptible to memory illusions, individuals across the hypnotizability spectrum could be tested in: (a) Whittlesea and William's (2001, Expt 1) Predictive Context paradigm, in which participants are more likely to falsely judge an unstudied, "new" word (e.g., broom) as studied, "old" when it is preceded by a sentence (and a pause) that predicts the word ("she cleaned the kitchen floor with a …."), rather than by a sentence that merely is consistent with the word ("she couldn't find a place to put the …"); (b) Jacoby, Kelley, Brown, and Jasechko's (1989) False Fame paradigm, in which participants are more likely to falsely judge an old nonfamous name as famous after one presentation and a delay than a new nonfamous name; and (c) Roediger and McDermott's (1995) DRM paradigm (as in the Lynn et al. study). Such work would help to validate the discrepancy-attribution account.

To examine whether the relationship between hypnotizability and nonhypnotic illusions extends to behavioral illusions (since hypnotic responding involves behavioral acts as well as cognitive events), individuals across the hypnotizability spectrum could be tested also in procedures that reliably create behavioral illusions, such as Wegner, Fuller, and Sparrow's (2003) Clever Hands paradigm and Wegner and Erskine's (2003) Suppressed Volition paradigm. Of course, since Barnier and Mitchell's (2005) account predicts that susceptibility to illusions interacts with the hypnotic state, the most important test of discrepancy-attribution theory would be provided by an analysis of misattribution rates for memory and behavioral illusions across hypnotizability levels inside and outside hypnosis. For example, highs, mediums, and lows could be tested using a selection of the

most sensitive memory illusion and behavioural illusion procedures. Half of the participants would be tested following a hypnotic induction procedure and half tested in the absence of a hypnotic induction procedure. Ability factors should interact with the effects of the hypnotic context on response production and evaluation to create the strongest memory and behavioral illusions for highs in hypnosis.

Finally, Barnier and Mitchell (2005) argued that the difficulty level of suggestions may be explained by people's nonhypnotic experiences with the underlying motor acts or cognitive events (and thus the nature of their implicit expectancies). Research is needed to clarify the link between nonhypnotic performance (including individuals' developmental history, abilities, and expectancies; J. Hilgard, 1979) and hypnotic performance (see also Laurence et al., chapter 9, this volume). For instance, above we offered the example of nonhypnotic imagination as one route to the hypnotic hallucination of a cat. However, research by Szechtman et al. (1998) suggests that not all highs need or use imagination to achieve hypnotic responses such as hallucinations. This implies that if hypnotic item difficulty is driven by experience, and individuals' nonhypnotic experiences are different (for example, due to developmental histories or cognitive abilities), their pathways to nonhypnotic response production will be different, and so too will be their pathways to hypnotic response production. Perhaps it doesn't matter how individuals produce their responses, as long as there is a discrepancy between the expected ease of (whatever method of) production and its hypnotic production. Our suggestions for interpreting hypnotizability within discrepancy-attribution theory (as well as cold control theory) need more work. Discrepancy-attribution suggests a mechanism by which hypnotic illusions are produced, but more time and research is needed to understand its fullest implications.

In summary. Barnier and Mitchell's (2005) discrepancy-attribution theory extends Whittlesea's (2002; Whittlesea & Williams, 2001) SCAPE theory of memory attributions

and discrepancy-attribution hypothesis of false recognition to hypnosis. It draws a distinction between *production* and *evaluation*, which parallels Hilgard's distinction between *control* and *monitoring*. According to discrepancy-attribution, hypnosis "happens" because subjects' responses are slightly easier in hypnosis, and this surprising ease is misattributed the most salient explanation: involuntariness or reality. That is, hypnotic responses are the product of normal cognitive functioning under extraordinary conditions. The (motor or cognitive) system is not calibrated to operate within the hypnotic context – the responses are too easy. But it is not obvious to the system why this might be, so the normal attribution process identifies the most "natural" source (at least in that setting) of this surprising ease. In this way, discrepancy-attribution theory departs from past theorizing within the domain of hypnosis, but it is entirely consistent with a large body of recent evidence from studies of the attributional processes that produce false recognition memory.

Theoretical Integration

We have presented two new theories of hypnosis – cold control and discrepancy-attribution – both of which have their roots in contemporary cognitive theorizing. As noted above, these theories have salient common features as well as important differences. And since both theories have been informed by previous generations of dissociative, interactionist and sociocognitive theories it is useful to compare our accounts with current, competing accounts that draw on similar foundations: dissociated-experience theory (Hilgard, 1992; Kihlstrom, 1994), dissociated-control theory (Woody & Bowers, 1994; Woody & Sadler, chapter 4, this volume) and response set theory (Kirsch & Lynn, 2001; see also Lynn, Kirsch, & Hallquist, chapter 5, this volume). In this section, we consider how these five theories address: the source of the feelings of hypnosis, executive function and consciousness, the role of the hypnotic context, and the role of expectancies.

Source of the Feelings of Hypnosis

In cold control, hypnotic experiences occur when a response is executed in the absence of any awareness (the HOTs) of having initiated that response. HOTs, which would normally accompany an intention, are disrupted by subjects' expectancies (Dienes & Perner, 2007). In discrepancy-attribution, hypnotic experiences occur when a response is executed slightly more easily in hypnosis. This slightly easier production generates a discrepancy that is attributed to local, salient factors (of involuntariness, of reality Barnier & McConkey, 2005). In dissociated-experience, hypnotic experiences occur when a response is executed normally, but control of that response is dissociated from conscious awareness (via an amnesic barrier) (Hilgard, 1992). In dissociated-control, hypnotic experiences occur when a response is directly activated (controlled) by the hypnotist's suggestions (Woody & Bowers, 2004; Woody & Sadler, chapter 4, this volume). Finally, in response set theory, hypnotic experiences occur when an expectancy directly activates a response set for the behaviour (Kirsch & Lynn, 2001; Lynn, Kirsch, & Hallquist, chapter 5, this volume).

Given their differences in genesis and focus, each of these theories looks to different supporting evidence. Cold control focuses on how context affects monitoring, so the most relevant comparison is between hypnotic and other nonhypnotic contexts that disrupt HOTs. Discrepancy-attribution focuses on aspects of the hypnotic setting that make production easier and that influence subjects' evaluations, as well as on nonhypnotic factors that relate to hypnotic performance (both in terms of responding in the setting and specific expectancies for suggestions). So the most relevant comparison is between high and low hypnotizable subjects tested in hypnotic and wake conditions (where highs in hypnosis should show the greatest effects on hypnotic and other illusions). Dissociated-experience focuses on the nature of dissociations (divisions of awareness) in hypnosis, so

the most relevant comparison is between hypnotizable subjects' performance on tasks that index the effects of suggestion on levels of awareness (e.g., explicit vs. implicit measures). Dissociated-control focuses on factors that influence the highly hypnotizable person's reduction in control during hypnosis, so the most relevant comparison is between highs' performance on theoretically relevant tasks (e.g., attentional tasks) inside and outside hypnosis. Finally, response set theory focuses on expectancy factors that automatically initiate responding, so the most relevant comparison is between hypnotic and nonhypnotic conditions that influence expectancies in comparable ways to produce hypnotic-like responses.

Executive Function and Consciousness

Our theories and other current theories differ in important ways in how they view the production of responses within the hypnotic setting. According to both cold control and dissociated-experience, the production of responses is under normal executive control (whereas discrepancy-attribution considers control to be slightly easier in hypnosis). But cold control and dissociated-experience differ in the way in which they explain failures in monitoring: whereas cold control postulates that HOTs of intending are themselves disrupted, dissociated-experience postulates a separate (dissociated) stream of experience with its own accurate HOTs or attributions; in dissociated-experience, the subject can become aware of their control (as shown by the hidden observer manipulation). Cold control is similar to Kihlstrom's (e.g., 1992) proposal that suggestions are carried out by forming intentions, but failing to be aware of those intentions (i.e., by cold control/misattribution). However, Kihlstrom does not restrict himself to just cold control. By his view, dissociative responses may also come about, for instance, in negative hallucinations by having only first-order states of perceiving in the absence of accurate HOTs of perception, a perceptual analogue of cold control (i.e., cold perception) or by

having HOTs of seeing without any first-order states of seeing (a process Dienes &

Perner, 2007, called "empty heat" because it involves HOTs without first-order states).

According to dissociated-control, and unlike cold control and discrepancy-

attribution, the production of responses is not just easier, it is genuinely outside of the

person's control. Hypnotic responses are activated directly by the suggestion, such that

subjects' attributions of involuntariness are accurate (Woody & Bowers, 1994; see also

Woody & Sadler, chapter 4, this volume). Somewhat like dissociated-control, control of

hypnotic responding is altered in response set theory, but the mechanism for this loss of

control is subjects' expectancies for responding (Kirsch & Lynn, 2001; see also Lynn et

al., chapter 5, this volume).

A more recent and subtle form of dissociated-control theory, second-order

dissociated-control (Jamieson & Woody, 2007) is more similar to cold control and

discrepancy-attribution. According to second-order dissociated-control, the hypnotic

response can be under executive control, but executive monitoring is disengaged. In detail,

the theory postulates that hypnosis disrupts the process of matching the specifications of

an action with the degree to which those specifications have been met. This is a different

proposal than cold control. In cold control, one lacks specifically the thought that one is

intending. Lacking that thought does not rule out a process of matching current behaviour

with the suggested specification. A match can occur between the first-order intention and

the ongoing outcome without the person ever explicitly representing that they have the

intention. Conversely, the process of matching could be disrupted while the person

represents they do have the intention. In discrepancy-attribution, the process by which the

match is made between production and specification is not disrupted. Indeed, in

discrepancy-attribution the matching process is normal, it is production that has been

made slightly easier. In second-order dissociated-control, unlike both cold control and

discrepancy-attribution, the disengagement of the monitoring process should reduce the quality of the response. In particular, the subject may show perseveration – the response will be made even when it is no longer achieving the goal. In contrast, cold control and discrepancy-attribution allow any amount of flexibility that can be produced by first-order intentions.

In their chapter, Woody and Sadler (chapter 4, this volume) align discrepancy-attribution with dissociated-experience and dissociated-control. They argue that discrepancy-attribution is similar to dissociated-control because both argue for reduced cognitive effort in responding. As noted above, in dissociated-control responses are driven, to some extent, by the environment (e.g., the hypnotist) rather than by executive functions; thus, cognitive effort is reduced. One important difference between discrepancy-attribution and dissociated-control is that whereas in dissociated-control, executive function is *substituted* by the hypnotist's suggestion, in discrepancy-attribution theory, executive function is merely *supported* by it. In both cold control and discrepancy-attribution, the subject is in control of which responses should be emitted, and so the environment cannot automatically trigger responses (as suggested by dissociated-control).

Role of the Hypnotic Context

The role of the hypnotic context is another interesting point of comparison across these theories. Cold control follows response set theory (and other social cognitive theories) in allocating no special role to the hypnotic setting, and in seeing no theoretical value in defining an identifiable hypnotic "state" (Kirsch & Braffman, 2001; see also Lynn et al., chapter 5, this volume). However, it does suggest that HOTs will be most often disrupted when subjects have good reason to expect their responding to be experienced differently. Because the hypnotic context may generate such expectancies, according to cold control, it has the potential to increase the experience of involuntariness.

The hypnotic setting, though, is not special in this way. Cold control allows that many other settings (e.g., religious or psychic contexts), which produce changes in expectations (about responses will be experienced), might equally disrupt HOTs and therefore produce an increase in responding experienced as involuntary.

In contrast, discrepancy-attribution is more similar to dissociated-experience and dissociated-control in assigning particular value to the hypnotic setting and to a hypnotic state (see also Barabasz & Barabasz, chapter 13; Oakley, chapter 14; Spiegel, chapter 7, this volume) According to discrepancy-attribution, the hypnotic setting is influential in two ways. First, cognitive preparedness, concentrated focus, and an impoverished setting (e.g., eyes closed, listening only to the hypnotist's voice) directs attention to the target response, and, second, the subject enters into a social contract to comply with the hypnotist's requests, a person to whom they feel strong rapport. It is these factors in combination that make responding easier: by creating a context that effectively reduces the number of possible alternative responses and that reduces the influence of each of those responses. The fact that self-hypnosis is possible suggests, of course, that the presence of a second person as hypnotist is not essential in this process (in self-hypnosis, the subject could still create for him or herself a context of focused attention to the target response; notably, hetero-hypnotizability and self-hypnotizability is a related, but not, identical ability; Orne & McConkey, 1981). Although the hypnotic setting is given more "explanatory work" within discrepancy-attribution, the theory allows that hypnotic-like events can occur outside of hypnosis. Any situation in which responding is made surprisingly easy may have the potential to produce the subjective experience of involuntariness or reality, but perhaps only with additional components of attention, absorption and involvement (for a similar view based on neuroscience evidence, see Oakley, chapter 14, this volume).

Role of Expectancies

One final comparison worth making is in how these theories conceptualize the role of expectancies. In cold control, expecting something will happen by itself may later trigger the thought that it is happening by itself. This expectancy is quite abstract and can be verbalized. In other words, the expectation can be represented as a belief in propositional form. One consequence of this is that it should be possible to manipulate subjects' expectancies by verbal instruction. This is quite different from the way in which expectancies play a role in discrepancy-attribution. According to discrepancy-attribution, the expectancies that produce hypnotic experiences are related to the detailed sensory predictions and feedback that normally accompanies responding (Blakemore et al., 2000; Blakemore et al., 2002; Wolpert, 1997; Wolpert et al., 2001). Thus, I have an expectation of how my arm will feel when I raise it. However, I cannot describe that expectation; specifically, I am unaware of comparisons between predicted sensory consequences and actual sensory feedback so long as my desired response is successful achieved (Blakemore et al., 2002; Wolpert, 1997). Similarly, I have an expectation of how vivid the image of an imagined cat will be, but I cannot describe that expectation either. According to discrepancy-attribution, these sensory-perceptual expectancies (or "predictions" in the language of internal motor models) are the basis for hypnotic experience, specifically, the discrepancy between expectancies about ease of production and its actual ease. These detailed expectancies should be immune from instructional manipulation (although, of course, instructions can be expected to affect hypnotic responding to the extent that they are taken to be part of a suggestion or are translated into suggestions; Weitzenhoffer, 1974). For example, I may know that raising my arm might feel different, or even easier than normal, within the hypnotic context. However, that knowledge will not prepare me

for the actual experience itself, which is accompanied by extremely detailed sensory information that is very specific to the response.

Like cold control and discrepancy-attribution, response set theory sees expectations as crucial (Kirsch & Lynn, 2001; Lynn & Kirsch, chapter 5, this volume). But the mechanism by which expectancies produce hypnotic experience is quite different across these theories. Unlike response set theory, in cold control and discrepancy-attribution the expectancy does not produce the entire hypnotic experience. In cold control, it merely disrupts the HOTs of the intention that produced the suggested activity and feelings; the hypnotic experience comes about because the subject experiences themselves making a response that they did not intend to make. In discrepancy-attribution, the expectations are not heightened in hypnosis; it is the match between production and the non-propositional expectation that is important.

Towards a Broader Integration

Can all of these positions be accommodated within a single (perhaps multifaceted) overarching theory of hypnosis? Perhaps cold control, discrepancy-attribution, dissociated-experience, dissociated-control and response set theories are all correct in some respects, but apply to different subjects, different hypnotic items, or different subjects enacting different hypnotic items under different circumstances (see also McConkey, chapter 3, this volume; Woody & McConkey, 2003). Certainly, it seems possible that some hypnotic responses might be produced by alterations of control, some by alterations of monitoring, and some by alterations of both control and monitoring. Indeed, all of these mechanisms may play a role simultaneously to produce a single hypnotic experience.

Implications and Future Directions for the Field of Hypnosis

In sketching some implications of cold control and discrepancy-attribution theories for the field of hypnosis, we adopt Reyher's (1962; see also Barnier, 2002b; Oakley, chapter 14, this volume) distinction between intrinsic and instrumental hypnosis. Intrinsic research focuses on the phenomena and nature of hypnosis itself, whereas instrumental research uses hypnosis as a tool to investigate phenomena outside its immediate domain. And we distinguish these areas of research focus from applications of hypnosis.

Implications for Intrinsic Hypnosis

What do we offer intrinsic research on hypnosis? In describing our accounts above, we laid out hypnosis research that supports cold control and discrepancy-attribution, as well as issues to resolve and future directions. Thus, these theories offer new ways to organize existing research and new questions to motivate the next generation of research. These theories also: connect hypnotic and nonhypnotic processes; make clear, testable predictions for the locus of hypnotic effects; suggest new avenues for correlates of hypnosis; and offer a fresh take on hypnotic items and hypnotizability scales. For example, in terms of the locus of hypnotic effects, cold control identifies monitoring processes as most important, particularly those processes responsible for maintaining accurate HOTs of intending. In contrast, discrepancy-attribution identifies features of the hypnotic setting that aid response production, violated expectancies as the source of surprising ease, and local contextual/suggestion factors as the determinant of attributions. These features are empirically verifiable, and these analyses can be extended inside and outside the domain of hypnosis.

In terms of new correlates, cold control directs researchers to how expectancies change biases in experience, and whether people have control over the accuracy of their HOTs in different contexts. Discrepancy-attribution directs researchers to processes of absorption and attention (see also Laurence et al., chapter 9; Oakley, chapter 14, this

volume), sensitivity to discrepancy, and susceptibility to (hypnotic and nonhypnotic) illusions given an individual's developmental history. In terms of hypnotic items and hypnotizability scales, discrepancy-attribution suggests that item difficulty is not an artefact, but may represent particular building blocks of hypnotic response (viz., ability to experience particular kinds of illusions), that hypnotic items may be categorized and related in terms of the core experiences that they engender, and that if susceptibility to memory and behavioral illusions predict hypnotic susceptibility, then new forms of hypnotizability measures may be possible.

Implications for Instrumental Hypnosis

What do we offer instrumental research? Since at least the 1930s, researchers have taken advantage of the rigorous experimental control of hypnosis paradigms to create laboratory models of basic processes relevant to psychopathology (e.g., Kihlstrom, 1979; Barnier, 2002a; see also Bryant & Cox, chapter 12, this volume). Cold control and discrepancy-attribution promise new contributions to this tradition. For instance, posthypnotic amnesia and clinical amnesias share a compelling phenomenological experience; forgetting is experienced as dramatic and outside of the individual's control (Barnier, 2002a; Kihlstrom & Schacter, 1995). According to discrepancy-attribution theory, hypnosis is one context in which controlling responses, such as forgetting, is slightly easier. This slightly easier production is surprising (discrepant) and leads to an attribution of a lack of control over memory. In other words, the circumstances of hypnosis effectively transform intentional forgetting into forgetting experienced as unintentional and uncontrollable. Certain clinical disorders may provide the circumstances for a similar transformation. Just as there may be nothing especially hypnotic in the production of posthypnotic amnesia, but something uniquely hypnotic in its evaluation,

there may be nothing particularly "disordered" in the production of clinical forgetting, but something uniquely disordered in its evaluation.

In recent years there has also been a surge in the instrumental use of hypnosis in the context of neuroscience investigations of pathological and nonpathological phenomena (e.g., Halligan, Athwal, Oakley, & Frackowiak, 2000; Rainville, Duncan, Price, Carrier, & Bushnell, 1997; Szechtman et al., 1998; for review, see Oakley, chapter 14, this volume). Cold control and discrepancy-attribution offer guidance to these investigations as well. For instance, since cold control theory sees hypnotic and nonhypnotic control of responding as equivalent, it claims no particular benefits for the use of hypnosis in producing and studying first-order states (e.g., of pain, of hallucination). However, certain individuals, such as highly hypnotizable people, may be especially skilled in producing certain first-order states, and selection of such individuals is important for neuroscience work. More importantly, comparisons of hypnotic and nonhypnotic performance of tasks, in which awareness of intending is manipulated, will be very useful for neuroscience investigations of higher order states, and in understanding the nature of consciousness generally.

Implications for Applied Hypnosis

Finally, what do we offer clinical and other applications of hypnosis? On both accounts, hypnosis does not generate responses that we could not generate without hypnosis (see also Killeen & Nash, 2003), although discrepancy-attribution allows for slightly easier response production. But hypnosis alters the experience of responding. Thus it would make sense to tailor suggestions to take advantage of this impact. For example, in their postcard study of posthypnotic suggestion, Barnier and McConkey (1998a) found that although the posthypnotic suggestion was no more effective than a simple request to mail the postcards, subjects' experiences were worlds apart. Barnier and

McConkey (1998a) suggested that a posthypnotic suggestion (or indeed any hypnotic suggestion) may help to manage or create an experiential readiness for change and the maintenance of that change. To illustrate its clinical relevance, a posthypnotic suggestion to quit smoking may be no more (or only slightly more) effective behaviorally than simply telling a person to stop, but it should lead the individual to experience their attempts to stop smoking as less effortful and the consequences as more manageable. This change in experience should feedback into control of the behaviour, further reinforcing the success of the suggestion.

According to the discrepancy-attribution theory, it would also make sense for clinicians to consider the natural or most salient attribution that a client might make for each suggestion, since local contextual factors will determine the person's experience (Barnier & Mitchell, 2005). That is, if an experience of involuntariness would have greater clinical utility than an experience of reality, the clinician can select the response to suggest and manipulate the context to direct the client's attributions about their responding. The clinician might also consider whether their client has the ability, the developmental experiences, necessary to engender specific expectancies (which will generate discrepancies in hypnosis) for the most clinically useful hypnotic experiences.

According to cold control theory, individuals can acquire control and a sense of control in different ways, mixing hot and cold control to suit their tastes, abilities, and circumstances (which we might label the "bath model of clinical hypnosis").For instance, a common clinical practice when helping a client to manage pain is to ask the person to control the colour of an image in order to control the pain ("as the image turns blue the pain will fade"). As a result of this suggestion, an unconscious executive intention may be formed to link the colour change to pain change. So in this case, the person controls the pain, but without a conscious intention of doing so. They have a HOT of intending to

control the colour, but no HOT of intending to control the pain; the pain seems to go of its own accord as the person is aware of deliberately changing the colour. In other words, the pain is managed via a combination of hot and cold control. To the extent that hypnosis involves and assists cold control, clinicians could usefully "piggyback" clinically useful, but more (subjectively) difficult, experiences (such as reducing pain) with more mundane, intentionally experienced actions (such as manipulating an image).

<div align="center">Conclusions: A Transformational Advance?</div>

Our cold control and discrepancy-attribution theories of hypnosis offer two new perspectives on how hypnosis happens. Hypnosis is fascinating, not because it creates entirely novel responses or creates responses in entirely novel ways, but because it influences the relationship between (as well as the feedback between) the control and monitoring of responding in compelling ways. It is neither uninteresting nor especially telling that we can achieve results similar to hypnotic suggestion via nonhypnotic means. Focusing on this fact alone misses the bigger picture that hypnosis generates responding that, although perhaps similar in many ways to nonhypnotic responding, feels surprisingly involuntary and/or surprisingly real. We need theories that seek explanations for the complicated and evolving relationship between what hypnotized people do and how they feel across the entire time-course of a hypnotic session and hypnotic items.

In his chapter on the generations and landscapes of hypnosis, McConkey wrote that:

> we need to move away from doing more of the same in terms of research, and we
> must try to do some things differently. We need transformational as well as
> incremental advances in knowledge (chapter 3, this volume, p. 45)

Our two accounts offer distinct and novel ways to think about hypnosis. These accounts forge new links with areas of current theorizing, methods and programs of research,

predictions and people from outside the field of hypnosis. They reflect collaborations between a cognitive scientist interested in learning and conscious states (and a former graduate student of McConkey, Dienes) and a developmental psychologist interested in metarepresentational states (Perner); and between a cognitive psychologist interested in hypnosis and memory (and a 4th generation Australian hypnosis researcher; Barnier) and a cognitive psychologist trained in animal learning and interested in learning, memory and attention (Mitchell). These collaborations are in the spirit of McConkey's view that:

> we need to be more adventurous and collaborative in our hypnosis research for the
>
> sake of the relevant disciplines and professions as a whole. We need to reach
>
> outside the field for inspiration and perspiration (chapter 3, this volume, pp. 45).

Just as links outside the field served earlier generations of hypnosis theorists in the development of their accounts, we believe that these collaborations will serve us in the development and refining of our accounts.

Our cold control and discrepancy-attribution theories are by no means complete or final; they are very much works in progress as our hypnosis, and nonhypnosis, research programs continue (e.g., Barnier, 2002a; Barnier et al., in press; Barnier, Hung, & Conway, 2004; Barnier, Levin & Maher, 2004; Dienes, in press; Dienes & Perner, 2007; Mitchell, 2004; Mitchell, Livesey, & Lovibond, 2007; Mitchell, Lovibond, & Gan, 2005; Perner & Dienes, in press; Woody et al., 2005). Musing on one of these accounts, Woody wrote that "the perspective advanced is likely to be generative, even if it turns out not to be correct in some important respects" (Woody, personal communication). In explicitly connecting hypnosis to the most current work on conscious states, behavioral control, and memory illusions, our accounts offer novel directions for intrinsic hypnosis (not to mention, in time, instrumental and applied hypnosis), which may reveal hypnosis, hypnotic phenomena, and hypnotic responding in an entirely new light. So even if our

accounts turn out not to be correct, they should at least stimulate a wave of new research and transform the field of hypnosis in initially modest, but important, ways.

References

Baker, S. L., & Kirsch, I. (1993). Hypnotic and placebo analgesia: Order effects and the placebo label. *Contemporary Hypnosis, 10*, 117-126.

Balthazard, C. G., & Woody, E. Z. (1985). The "stuff" of hypnotic performance: A review of psychometric approaches. *Psychological Bulletin, 98*, 283-296.

Bandura, A. (1978). The self system in reciprocal determinism. *American Psychologist, 33*, 344-358.

Barber, T. X. (1966). The effects of "hypnosis" and motivational suggestions on strength and endurance: A critical review of research studies. *British Journal of Social and Clinical Psychology, 5*, 42-50.

Barber, T. X. (1969). *Hypnosis: A scientific approach*. New York: Van Nostrand Reinhold.

Barber, T. X., & Calverley, D. S. (1963). The relative effectiveness of task-motivating instructions and trance-induction procedure in the production of "hypnotic-like" behaviors. *Journal of Nervous and Mental Disease. 137*, 107-116.

Barber, T. X. & Calverley, D. S. (1964a). Empirical evidence for a theory of "hypnotic" behavior: Effects of pretest instructions of response to primary suggestions. *Psychological Record, 14*, 457-467.

Barber, T. X. & Calverley, D.S. (1964b). Toward a theory of hypnotic behavior: Effects on suggestibility of defining the situation as hypnosis and defining response to suggestions as easy. *Journal of Abnormal and Social Psychology, 68*, 585-592.

Barnier, A. J. (1999). Posthypnotic suggestion: Attention, awareness, and automaticity. *Sleep and Hypnosis*, *1*, 57-63.

Barnier, A. J. (2002a). Posthypnotic amnesia for autobiographical episodes: A laboratory model of functional amnesia? *Psychological Science, 13,* 232-237.

Barnier, A. J. (2002b). Remembering and forgetting autobiographical events: Instrumental uses of hypnosis. *Contemporary Hypnosis, 19*, 51-61.

Barnier, A. J. (2004, August). Forgetting emotional events from the past: Insights from experimental hypnosis. Invited (Early Career Award) Talk presented at the 112th Annual Meeting of the American Psychological Association (Division 30, Psychological Hypnosis), Honolulu, Hawaii.

Barnier, A. J., Conway, M. A., Mayoh, L., Speyer, J., Avizmil, O, & Harris, C. B. (in press). Directed forgetting of recently recalled autobiographical memories. *Journal of Experimental Psychology: General*.

Barnier, A. J., Hung, L., & Conway, M. A. (2004). Retrieval-induced forgetting of autobiographical episodes. *Cognition & Emotion* (Special Issue, "Emotional Memory Failures"), *18,* 457-477**.**

Barnier, A. J., & Levin, K., & Maher, A. (2004). Suppressing thoughts of past events: Are repressive copers good suppressors? *Cognition & Emotion* (Special Issue, "Emotional Memory Failures"), *18,* 513-531.

Barnier, A. J., & McConkey, K. M. (1992). Reports of real and false memories: The relevance of hypnosis, hypnotizability, and context of memory test. *Journal of Abnormal Psychology*, *101*, 521-527.

Barnier, A. J., & McConkey, K. M. (1995). An experiential analysis of conflict resolution in hypnosis. In G. D. Burrows & R. O. Stanley (Eds.), *Contemporary international hypnosis* (pp. 89-96). London: Wiley Publications.

Barnier, A. J., & McConkey, K. M. (1996). Action and desire in posthypnotic responding. *International Journal of Clinical and Experimental Hypnosis*, *44*, 120-139.

Barnier, A. J., & McConkey, K. M. (1998a). Posthypnotic responding away from the hypnotic setting. *Psychological Science*, *9*, 256-262.

Barnier, A. J., & McConkey, K. M. (1998b). Posthypnotic responding: Knowing when to stop helps to keep it going. *International Journal of Clinical and Experimental Hypnosis*, *46*, 204-219.

Barnier, A. J., & McConkey, K. M. (1998c). Posthypnotic suggestion, amnesia, and hypnotisability. *Australian Journal of Clinical and Experimental Hypnosis*, *26*, 10-18.

Barnier, A. J., & McConkey, K. M. (1999a). Hypnotic and posthypnotic suggestion: Finding meaning in the message of the hypnotist. *International Journal of Clinical and Experimental Hypnosis*, *47*, 192-208.

Barnier, A. J., & McConkey, K. M. (1999b). Posthypnotic suggestion, response complexity, and amnesia. *Australian Journal of Psychology*, *51*, 1-5.

Barnier, A. J., & McConkey, K. M. (1999c). Autobiographical remembering and forgetting: What can hypnosis tell us? *International Journal of Clinical and Experimental Hypnosis*, *47*, 267-285.

Barnier, A. J., & McConkey, K. M. (2001). Posthypnotic responding: The relevance of suggestion and test congruence. *International Journal of Clinical and Experimental Hypnosis, 49*, 207-219.

Barnier, A. J., & McConkey, K. M. (2003). Hypnosis, human nature, and complexity: Integrating neuroscience approaches into hypnosis research. *International Journal of Clinical and Experimental Hypnosis* (Special Issue, "Hypnosis and the Brain"), *51*, 282-307.

Barnier, A. J., & McConkey, K. M. (2004). Defining and identifying the highly hypnotisable person. In M. Heap, R. Brown, & D. Oakley (Eds.), *The highly hypnotisable person: Theoretical, experimental and clinical issues* (pp. 30-60). London: Brunner-Routledge.

Barnier, A. J., Wright, J., & McConkey, K. M. (2004). Posthypnotic amnesia for autobiographical episodes: Influencing memory accessibility and quality. *International Journal of Clinical and Experimental Hypnosis, 52,* 260-279.

Bentall, R. P. (1990). The illusion of reality: a review and integration of psychological research on hallucinations. *Psychological Bulletin, 107*, 82-95.

Bertrand, L. D., & Spanos, N. P. (1985). The organization of recall during hypnotic suggestions for complete and selective amnesia. *Imagination, Cognition, and Personality, 4*, 249-261.

Blakemore, S. J., Smith, J., Steel, R., Johnstone, E. C., & Frith, C. D. (2000). The perception of self-produced sensory stimuli in patients with auditory hallucinations and passivity experiences: Evidence for a breakdown in self-monitoring. *Psychological Medicine, 30*, 1131-1139.

Blakemore, S. J., Wolpert, D. M., & Frith, C. D. (2002). Abnormalities in the awareness of action. *Trends in Cognitive Sciences, 6(6)*, 237-242.

Block, N. (2001). Paradox and cross purposes in recent work on consciousness. *Cognition, 79*, 197-219.

Bornstein, R. F., & D'Agostino, P. R. (1994). The attribution and discounting of perceptual fluency: Preliminary tests of a perceptual fluency/attributional model of the mere exposure effect. *Social Cognition, 12*, 103-128.

Bowers, K. S. (1981). Do the Stanford scales tap the "classic suggestion effect"? *International Journal of Clinical and Experimental Hypnosis, 29*, 42-53.

Bowers, K. S. (1990). Unconscious influences and hypnosis. In J. L. Singer (Ed.), *Repression and dissociation: Implications for personality theory, psychopathology, and health* (pp. 143-178). Chicago: University of Chicago Press.

Bowers, K. S. (1992). Dissociated control and the limits of hypnotic responsiveness. *Consciousness and Cognition, 1*, 32-39.

Bowers, K. S. (1994). Three levels of consciousness: Implications for dissociation. In R. M. Klein, & B. K. Doane (Eds.), *Psychological concepts and dissociative disorders* (pp. 155-186). Hillsdale, NJ: Lawrence Earlbaum

Braffman, W., & Kirsch, I. (1999). Imaginative suggestibility and hypnotizability: An empirical analysis. *Journal of Personality and Social Psychology, 77*, 578-587.

Braffman, W., & Kirsch, I. (2001). Reaction time as a predictor of imaginative suggestibility and hypnotisability. *Contemporary Hypnosis, 18(3)*, 107-119.

Breen, N., Caine, D., Coltheart, M., Hendy, J., & Roberts, C. (2000). Towards an understanding of delusions of misidentification: Four case studies. In M. Coltheart & M. Davies (Eds.), *Pathologies of belief* (pp. 75-1010). Oxford: Blackwell Publishers.

Bryant, R. A., & McConkey, K. M. (1999). Functional blindness: A construction of cognitive and social influences. *Cognitive Neuropsychiatry, 4*, 227-241.

Burn, C., Barnier, A. J., & McConkey, K. M. (2001). Information processing during hypnotically suggested sex change. *International Journal of Clinical and Experimental Hypnosis, 49*, 231-242.

Carruthers, P. (2000). *Phenomenal consciousness naturally*. Cambridge: Cambridge University Press.

Comey, G., & Kirsch, I. (1999). Intentional and spontaneous imagery in hypnosis: The phenomenology of hypnotic responding. *International Journal of Clinical and Experimental Hypnosis, 47,* 65-85.

Cox, R. E. (2007). Autobiographical memory during hypnotic identity delusions. Unpublished doctoral dissertation, University of New South Wales, Australia.

Derbyshire, S. W. G, Whalley, M. G., Stenger, V. A., & Oakley, D. A. (2004) Cerebral activation during hypnotically induced pain. *NeuroImage*, *23*, 392-401

Dienes, Z. (2004). Assumptions of subjective measures of unconscious mental states: Higher order thoughts and bias. *Journal of Consciousness Studies, 11*, 25-45.

Dienes, Z. (in press). Subjective measures of unconscious knowledge. In R. Banerjee & B. Chakrabarti (Eds.), *Models of brain and mind: Physical, computational and psychological approaches*. Elsevier.

Dienes, Z., Altmann, G., Kwan, L., & Goode, A. (1995). Unconscious knowledge of artificial grammars is applied strategically. *Journal of Experimental Psychology: Learning, Memory, & Cognition, 21*, 1322-1338.

Dienes, Z., & Perner, J. (1999). A theory of implicit and explicit knowledge. *Behavioural and Brain Sciences, 22*, 735-755.

Dienes, Z., & Perner, J. (2007). The cold control theory of hypnosis. In G. Jamieson (Ed.), *Hypnosis and conscious states: The cognitive neuroscience perspective* (pp. 293-314). Oxford: Oxford University Press.

Dienes, Z., & Scott, R. (2005). Measuring unconscious knowledge: Distinguishing structural knowledge and judgment knowledge. *Psychological Research, 69*, 338-351.

Dixon, M., & Laurence, J. -R. (1992). Hypnotic susceptibility and verbal automaticity: Automatic and strategic processing differences in the Stroop color-naming task. *Journal of Abnormal Psychology, 101*, 344-347.

Egner, T., Jamieson, G., & Gruzelier, J. (2005). Hypnosis decouples cognitive control from conflict monitoring processes of the frontal lobe. *Neuroimage, 27*, 969-978.

Evans, F. J. (1980). Posthypnotic amnesia. In G. D. Burrows & L. Dennerstein (Eds.), *Handbook of hypnosis and psychosomatic medicine* (pp 85-103). Amsterdam: Elsevier/North-Holland.

Fu, Q., Fu, X., & Dienes, Z. (in press). Implicit Sequence learning and conscious awareness. *Consciousness and Cognition.*

Gennaro, R. W. (Ed.) (2004) *Higher-order theories of consciousness*. John Benjamins Publishers: Amsterdam.

Goldinger, S. D., & Hansen, W. A. (2005). Remembering by the seat of your pants. *Psychological Science, 16*, 525-529.

Green, J. P., Page, R. A., Rasekhy, R., Johnson, L. K., & Bernhardt, S. E. (2006). Cultural views and attitudes about hypnosis: A survey of college students across four countries. *International Journal of Clinical and Experimental Hypnosis, 54*, 263-280.

Haggard, P., Cartledge, P., Dafydd, M., & Oakley, D. A. (2004). Anomalous control: When "free will" is not conscious. *Consciousness and Cognition, 13*, 646-654.

Haggard, P., Clark, S., & Kalogeras, J. (2002). Voluntary action and conscious awareness. *Nature Neuroscience, 5*, 382-385.

Haggard, P., Newman, C., & Magno, E. (1999). On the perceived time of voluntary actions. *British Journal of Psychology, 90*, 291-303.

Halligan, P. W., Athwal, B. S., Oakley, D. A. & Frackowiak, R. S. J. (2000). The functional anatomy of a hypnotic paralysis: Implications for conversion hysteria. *The Lancet*, *355*, 986-987.

Hammer, A. G. (1961). Reflections on the study of hypnosis. *Australian Journal of Psychology*, *1*, 3-22.

Hilgard, E. R. (1965). Hypnosis. *Annual Review of Psychology, 16*, 157-180.

Hilgard, E. R. (1973). The domain of hypnosis: With some comments on alternative paradigms. *American Psychologist, 23*, 972-982.

Hilgard, E. R. (1974). Toward a neodissociation theory: Multiple cognitive controls in human functioning. *Perspectives in Biology and Medicine, 17*, 301-316.

Hilgard, E. R. (1975). Hypnosis. *Annual Review of Psychology, 26*, 19-44.

Hilgard, E. R. (1977). *Divided consciousness: Multiple controls in human thought and action.* New York: Wiley-Interscience.

Hilgard, E. R. (1979). Consciousness and control: Lessons from hypnosis. *Australian Journal of Clinical and Experimental Hypnosis, 7*, 103-115.

Hilgard, E.R. (1991). A neodissociation interpretation of hypnosis. In S. J. Lynn & J. W. Rhue (Eds.), *Theories of hypnosis: Current models and perspectives* (pp. 37-58). New York: Guilford Press.

Hilgard, E. R. (1992). Dissociation and theories of hypnosis. In E. Fromm, & M. R. Nash, (Eds), *Contemporary hypnosis research* (pp. 69-101). New York: Guilford Press.

Hull, C. L. (1933). *Hypnosis and suggestibility: An experimental approach*. New York: Appleton-Century Crofts.

Jacoby, L. L. (1991). A process dissociation framework: Separating automatic from intentional uses of memory. *Journal of Memory and Language, 30*, 513-541.

Jacoby, L. L., Kelley, C., Brown, J., & Jasechko, J. (1989). Becoming famous overnight: Limits on the ability to avoid unconscious influences of the past. *Journal of Personality and Social Psychology, 56*, 326-338.

Jamieson, G. A., & Sheehan, P. W. (2004). An empirical test of Woody and Bowers's dissociated-control theory of hypnosis. *International Journal of Clinical and Experimental Hypnosis, 52*, 232-249.

Jamieson, G. A., & Woody, E. Z. (2007). Dissociated control as a paradigm for cognitive neuroscience research and theorising in hypnosis. In G. Jamieson (Ed.), *Hypnosis and conscious states: The cognitive neuroscience perspective* (pp. 111-129). Oxford: Oxford University Press.

Kihlstrom, J. F. (1979). Hypnosis and psychopathology: Retrospect and prospect. *Journal of Abnormal Psychology, 88*, 459-473.

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

Kihlstrom, J. F. (1992). Hypnosis: A sesquicentennial essay. *International Journal of Clinical and Experimental Hypnosis, 50,* 301-314.

Kihlstrom, J. F. (1997). Convergence in understanding hypnosis? Perhaps, but not quite so fast. *International Journal of Clinical and Experimental Hypnosis, 45*, 324-332.

Kihlstrom, J. F. (1998). Dissociations and dissociation theory in hypnosis: Comment on Kirsch and Lynn (1998). *Psychological Bulletin, 123*, 186-191.

Kihlstrom, J. F. (2000). Laboratory research on hypnotic analgesia. http://www.institute-shot.com/laboratory research.htm. Retrieved April 2007.

Kihlstrom, J. F. (2003). The fox, the hedgehog, and hypnosis. *International Journal of Clinical and Experimental Hypnosis, 51*, 166-189.

Kihlstrom, J. F. (2005). Is hypnosis an altered state of consciousness *or what*? [Commentary on "Hypnotic phenomena and altered states of consciousness: A multilevel framework of description and explanation" by S. Kallio & A. Revonsuo]. *Contemporary Hypnosis*, *22*, 34-38.

Kihlstrom, J. F. (in press). Consciousness in hypnosis. In P. D. Zelazo, M. Moscovich & E. Thompson (Eds.), *Cambridge handbook of consciousness*. New York: Cambridge University Press.

Kihlstrom, J. F., & Schacter, D. L. (1995). Functional disorders of autobiographical

memory. In A. D. Baddeley, B. A. Wilson, & F. N. Watts (Eds.), *Handbook of*

memory disorders (pp. 337-364). New York: Wiley.

Killeen, P. R., & Nash, M. R. (2003). The four causes of hypnosis. *International Journal*

of Clinical and Experimental Hypnosis, 51, 195-231.

Kirsch, I. (1991). The social learning theory of hypnosis. In S. J. Lynn, & J. W. Rhue,

(Eds), *Theories of hypnosis: Current models and perspectives* (pp. 439-465). New

York: Guilford Press.

Kirsch, I. (2001). The response set theory of hypnosis: Expectancy and physiology.

American Journal of Clinical Hypnosis, 44, 69-73.

Kirsch, I., & Braffman, W. (2001). Imaginative suggestibility and hypnotizability. *Current*

Directions in Psychological Science, 10, 57-61.

Kirsch, I., & Lynn, S. J. (1995). Altered state of hypnosis: Changes in the theoretical

landscape. *American Psychologist, 50*, 846-858.

Kirsch, I., & Lynn, S. J. (1997). Hypnotic involuntariness and the automaticity of

everyday life. *American Journal of Clinical Hypnosis, 40*, 329-348.

Kirsch, I., & Lynn, S. J. (1998a). Dissociation theories of hypnosis. *Psychological*

Bulletin, 123, 100-115.

Kirsch, I., & Lynn, S. J. (1998b). Social-cognitive alternatives to dissociation theories of

hypnotic involuntariness. *Review of General Psychology, 2*, 66-80.

Kirsch, I., & Lynn, S. J. (1999). Hypnotic involuntariness and the automaticity of

everyday life. In I. Kirsch, A. Capafons, E. Cardena-Buelna, & S. Amigo (Eds.),

Clinical hypnosis and self regulation: Cognitive-behavioral perspectives (pp. 49-

72). Washington: American Psychological Association.

Lau, H. C., & Passingham, R. E. (2006). Relative blindsight in normal observers and the neural correlate of visual consciousness. *Proceedings of the National Academy of Science, 103,* 18763–18768.

Leboe, J. P., & Whittlesea, B. W. A. (2002). The inferential basis of familiarity and recall: Evidence for a common underlying process. *Journal of Memory and Language 46*, 804-829.

Logan, G. D. (1994). On the ability to inhibit thought and action: A users' guide to the stop signal paradigm. In D. Dagenbach & T. H. Carr (Eds.), *Inhibitory processes in attention, memory, and language* (pp. 189-239). New York: Academic Press.

Logan, G. D. (2002). An instance theory of attention and memory. *Psychological Review*, *109*, 376-400.

Lynn, S. J., & Kirsch, I. (2006). *Essentials of clinical hypnosis: An evidence-based approach*. Washington DC: American Psychological Association.

Lynn, S. J., Kirsch, I., Knox, J., Fassler, O., & Lilienfeld, S. O. (2007). Hypnosis and neuroscience: Implications for the altered state debate. .In G. Jamieson (Ed.), *Toward a cognitive neuroscience of hypnosis and conscious states* (pp. 145-165). Oxford: Oxford University Press.

Lynn, S. J., Rhue, J. W., & Weekes, J. R. (1990). Hypnotic involuntariness: A social-cognitive analysis. *Psychological Review, 97*, 169-184.

McConkey, K. M. (1986). Opinions about hypnosis and self-hypnosis before and after hypnotic testing. *International Journal of Clinical and Experimental Hypnosis, 34*, 311-319.

McConkey, K. M. (1991). The construction and resolution of experience and behavior in hypnosis. In S. J. Lynn & J. W. Rhue (Eds.), *Theories of hypnosis: Current models and perspectives* (pp. 542-563). New York: Guilford Press.

McConkey, K. M., & Barnier, A. J. (2004). The highly hypnotisable person: Unity and diversity in behaviour and experience. In M. Heap, R. Brown, & D. Oakley (Eds.), *The highly hypnotisable person: Theoretical, experimental and clinical issues* (pp. 61-84). London: Brunner-Routledge.

McConkey, K. M., Barnier, A. J., Maccallum, F. L., & Bishop, K. (1996). A normative and structural analysis of the HGSHS:A with a large Australian sample. *Australian Journal of Clinical and Experimental Hypnosis*, *24*, 1-11.

McConkey, K. M., Barnier, A. J., & Sheehan, P. W. (1998). Hypnosis and pseudomemory: Understanding the findings and their implications. In S. J. Lynn & K. M. McConkey (Eds.), *Truth in memory* (pp. 227-259). New York: Guilford Press.

McConkey, K. M., Gladstone, G., & Barnier, A. J. (1999). Experiencing and testing hypnotic anaesthesia. *Contemporary Hypnosis*, *16*, 55-67.

McConkey, K. M., Glisky, M. L., & Kihlstrom, J. F. (1989). Individual differences among hypnotic virtuosos: A case comparison. *Australian Journal of Clinical and Experimental Hypnosis, 17*, 131-140.

McConkey, K. M., & Sheehan, P. W. (1995). *Hypnosis, memory, and behaviour in criminal investigation*. New York: Guilford Press.

McConkey, K. M., Szeps, A., & Barnier, A. J. (2001). Indexing the experience of sex change in hypnosis and imagination. *International Journal of Clinical and Experimental Hypnosis*, *49*, 123-138.

McConkey, K. M., Wende, V., & Barnier, A. J. (1999). Measuring change in the subjective experience of hypnosis. *International Journal of Clinical and Experimental Hypnosis*, *47*, 23-39.

Merikle, P. M., Smilek, D., & Eastwood, J. D. (2001). Perception without awareness: Perspectives from cognitive psychology. *Cognition, 79,* 115-134

Miller, M. E., & Bowers, K. S. (1993). Hypnotic analgesia: Dissociated experience or dissociated control? *Journal of Abnormal Psychology, 102*, 29-38.

Milling, L. S., Kirsch, I., Meunier, S. A., & Levine, M. R. (2002). Hypnotic analgesia and stress innoculation training: Individual and combined effects in analog treatment of experimental pain. *Cognitive Therapy and Research, 26*, 355-371.

Mischel, W. (1979). On the interface of cognition and personality: Beyond the person-situation debate. *American Psychologist, 34*, 740-754.

Mitchell, C. J. (2004). Mere acceptance produces apparent attitude in the Implicit Association Test. *Journal of Experimental Social Psychology, 40*, 366-373.

Mitchell, C. J., Livesey, E., & Lovibond, P. F. (2007). A dissociation between causal judgement and the ease with which a cause is categorized with its effect. *Quarterly Journal of Experimental Psychology, 60*, 400-417.

Mitchell, C. J., Lovibond, P. F., & Gan, C. Y. (2005). A dissociation between causal judgment and outcome recall. *Psychonomic Bulletin & Review, 12*, 950-954.

Naish, P. L. N. (1985). The "trance" described in signal detection terms. *British Journal of Experimental and Clinical Hypnosis, 2*, 139-142.

Neuschatz, J., Lynn, S. J., Benoit, G., & Fite, R. (2003). Hypnosis and memory illusions: An investigation using the Deese/Roediger and McDermott paradigm. *Imagination, Cognition, and Personality*, *22*, 3-12.

Noble, J., & McConkey, K. M. (1995). Hypnotic sex change: creating and challenging a delusion in the laboratory. *Journal of Abnormal Psychology, 104*, 69-74.

Nogrady, H., McConkey, K. M., & Perry, C. (1985). Enhancing visual memory: Trying hypnosis, trying imagination, and trying again. *Journal of Abnormal Psychology, 92*, 223-235.

Norman, D., & Shallice, T. (1986). Attention to action: Willed and automatic control of behavior. In Davidson, R., Schwartz, G., & Shapiro, D. (Eds.), *Consciousness and self regulation: Advances in research and theory, Volume 4* (pp. 1-18). New York: Plenum.

Oakley, D. A. (1999). Hypnosis and consciousness: A structural model. *Contemporary Hypnosis, 16*, 215-223.

Orne, M. T. (1959). The nature of hypnosis: Artifact and essence. *Journal of Abnormal and Social Psychology, 58,* 277-299.

Orne, M. T., & McConkey, K. M. (1981). Images: Imagined and believed. *Journal of Mental Imagery, 4,* 50-53.

Perner, J., & Dienes, Z. (in press). *A theory of implicit knowledge*. Oxford: Oxford University Press.

Polczyk, R., & Pasek, T. (2006). Types of suggestibility: Relationships amongst compliance, indirect, and direct suggestibility. *International Journal of Clinical and Experimental Hypnosis, 54*, 392-415.

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*, 968-971.

Raz, A., Shapiro, T., Fan, J., & Posner, M. I. (2002). Hypnotic suggestion and the modulation of Stroop interference. *Archives of General Psychiatry, 59*, 1155-1161.

Reyher, J. (1962). A paradigm for determining the clinical relevance of hypnotically induced psychopathology. *Psychological Bulletin, 59*, 344-352.

Roediger, H. L., & McDermott, K. B. (1995). Creating false memories: Remembering words not presented in lists. *Journal of Experimental Psychology: Learning, Memory and Cognition, 21*, 803-814.

Rosenthal, D. M. (1986). Two concepts of consciousness. *Philosophical Studies, 49*, 329-359.

Rosenthal, D. M. (2002). Consciousness and higher-order thought. In the *Macmillan Encyclopedia of Cognitive Science* (pp. 717-726). Macmillan Publishers Ltd.

Rosenthal, D. M. (2005). *Consciousness and mind*. Oxford: Clarendon Press.

Rubichi S, Ricci F, Padovani R., & Scaglietti, L. (2005). Hypnotic susceptibility, baseline attentional functioning, and the Stroop task. *Consciousness and Cognition, 14*, 296–303.

Sackheim, H. A., Nordlie, J. W., & Gur, R. C. (1979). A model of hysterical and hypnotic blindness: Cognition, motivation, and awareness. *Journal of Abnormal Psychology, 88*, 474-489.

Sarbin, T. R. (1992). Accounting for "dissociative" actions without invoking mentalistic constructs. *Consciousness and Cognition, 1*, 54-58.

Sarbin, T. R. (1993). Whither hypnosis? A rhetorical analysis. *Contemporary Hypnosis, 10*, 1-9.

Sarbin, T. R. (2002). Dialogical components in theory building: Contributions of Hilgard, Orne, and Spanos. *Contemporary Hypnosis, 19*, 190-197.

Sheehan, P. W. (1991). Hypnosis, context, and commitment. In S. J. Lynn & J. W. Rhue (Eds.), *Theories of hypnosis: Current models and perspectives* (pp. 520-541). New York: Guilford Press.

Sheehan, P. W. (1992). The phenomenology of hypnosis and the Experiential Analysis

    Technique. In E. Fromm & M. R. Nash (Eds.), *Contemporary hypnosis research*

    (pp. 364-389). New York: Guilford Press.

Sheehan, P. W., & McConkey, K. M. (1982). *Hypnosis and experience: An analysis of*

    phenomenon and process. Hillsdale, NJ: Erlbaum.

Sheehan, P. W., & Perry, C. W. (1976). *Methodologies of hypnosis: A critical appraisal of*

    contemporary paradigms of hypnosis. Oxford: Lawrence Erlbaum.

Shor, R. E. (1959). Hypnosis and the concept of the generalized reality-orientation.

    American Journal of Psychotherapy, 13, 582-602.

Shor, R. E. (1962). Three dimensions of hypnotic depth. *International Journal of Clinical*

    and Experimental Hypnosis, 10, 23-38.

Shor, R. E., & Orne, E. C. (1962). *Harvard Group Scale of Hypnotic Susceptibility, Form*

    A. Palo Alto, CA: Consulting Psychologists Press.

Spanos, N. P. (1986). Hypnotic behaviour: A social-psychological interpretation of

    amnesia, analgesia, and "trance logic." *Behavioural and Brain Sciences, 9*, 449-

    502.

Spanos, N. P. (1991). A sociocognitive approach to hypnosis. In S. J. Lynn & J. W. Rhue,

    (Eds) *Theories of hypnosis: Current models and perspectives* (324-361). New

    York: Guilford Press.

Spanos, N. P. (1992). Compliance and re-interpretation in hypnotic responding.

    Contemporary Hypnosis, 9, 7-15.

Spanos, N. P., Brett, P. J., Menary, E. P., & Cross, W. P. (1987). A measure of attitudes

    toward hypnosis: Relationships with absorption and hypnotic susceptibility.

    American Journal of Clinical Hypnosis, 30, 139-150.

Spanos, N. P., Radtke, H. L., & Dubreuil, D. L. (1982). Episodic and semantic memory in post-hypnotic amnesia: A re-evaluation. *Journal of Personality and Social psychology, 43*, 565-573.

Sutcliffe, J. P. (1960). "Credulous" and "skeptical" views of hypnotic phenomena: A review of certain evidence and methodology. *Journal of Abnormal and Social Psychology, 62,* 189-200.

Sutcliffe, J. P. (1961). "Credulous" and "skeptical" views of hypnotic phenomena: Experiments on esthesia, hallucination and delusion. *Journal of Abnormal and Social Psychology, 62*, 189-200.

Szechtman, H., Woody, E. Z., 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*, 1956-1960.

Wagstaff, G. F. (1981). *Hypnosis, compliance and belief.* New York: St Martin's Press.

Wagstaff, G. F. (1998). The semantics and physiology of hypnosis as an altered state: Towards a definition of hypnosis. *Contemporary Hypnosis, 15*, 149-165.

Wegner, D. M., & Erskine, J. A. K. (2003). Voluntary involuntariness: Thought suppression and the regulation of the experience of will. *Consciousness and Cognition: An International Journal, 12*, 684-694.

Wegner, D. M., Fuller, V. A., & Sparrow, B. (2003). Clever hands: Uncontrolled intelligence in facilitated communication. *Journal of Personality and Social Psychology, 85*, 5-19.

Weiskrantz, L. (1997). *Consciousness lost and found.* Oxford: Oxford University Press.

Weitzenhoffer, A. M. (1974). When is an "instruction" an instruction? *International Journal of Clinical and Experimental Hypnosis, 22*, 258-269.

Weitzenhoffer, A. M., & Hilgard, E. R. (1962). *Stanford Hypnotic Suscpetibility Scale,*

Form C. Palo Alto, CA: Consulting Psychologists Press.

White, R. W. (1937). Prediction of hypnotic susceptibility from a knowledge of subject's attitudes. *Journal of Psychology: Interdisciplinary and Applied, 3*, 279-289.

White, R. W. (1941). A preface to the theory of hypnotism. *Journal of Abnormal and Social Psychology, 36*, 477-505.

Whittlesea, B. W. A. (1997). Production, evaluation, and preservation of experiences: Constructive processing in remembering and performance tasks. In D. L. Medin (Ed.), *The psychology of learning and motivation: Advances in research and theory, Vol 37* (pp. 211-264). San Diego: Academic Press.

Whittlesea, B. W. A. (2002). Two routes to remembering (and another to remembering not). *Journal of Experimental Psychology: General, 131*, 325-348

Whittlesea, B. W. A., & Leboe, J. P. (2000). The heuristic basis of remembering and classification: Fluency, generation, and resemblance. *Journal of Experimental Psychology: General, 129*, 84-106.

Whittlesea, B. W. A., Masson, M. E. J., & Hughes, A. D. (2005). False memory following rapidly presented lists: The element of surprise. *Psychological Research, 69*, 420-430.

Whittlesea, B. W. A., & Williams, L. D. (1998). Why do strangers feel familiar, but friends don't? A discrepancy-attribution account of feelings of familiarity. *Acta Psychologica, 98*, 141-165.

Whittlesea, B. W. A., & Williams, L. D. (2001). The discrepancy-attribution hypothesis: I. The heuristic basis of feelings and familiarity. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 27*, 3-13.

Wickless, C., & Kirsch, I. (1989). Effects of verbal and experiential expectancy manipulations on hypnotic susceptibility. *Journal of Personality and Social Psychology, 57*, 762-768.

Wilson, E. O. (1998). *Consilience: The unity of knowledge*. New York: Knopf.

Wolpert D. M. (1997). Computational approaches to motor control. *Trends in Cognitive Sciences, 1*, 209-216.

Woody, E. Z., Barnier, A. J., & McConkey, K. M. (2005). Multiple hypnotizabilities: Differentiating the building blocks of hypnotic response. *Psychological Assessment, 17*, 200-211.

Woody, E. Z., & Bowers, K. S. (1994). A frontal assault on dissociated control. In S. J. Lynn & J. W. Rhue (Eds.), *Dissociation: Clinical and theoretical perspectives* (pp. 52-79). New York: Guilford Press.

Woody, E. Z., Drugovic, M., & Oakman, J. M. (1997). A re-examination of the role of non-hypnotic suggestibility in hypnotic responding. *Journal of Personality and Social Psychology, 72*, 399-407.

Woody, E. Z., & McConkey, K. M. (2003). What we don't know about the brain and hypnosis, but need to: A view from the Buckhorn Inn. *International Journal of Clinical and Experimental Hypnosis*, 51, 309-338.

Woody, E. Z., & Szechtman, H. (2007). To see feelingly: Emotion, motivation, and hypnosis. In G. Jamieson (Ed.), *Hypnosis and conscious states: The cognitive neuroscience perspective* (pp. 241-256). Oxford: Oxford University Press.

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Footnotes

[1]The intention to "imagine a cat" is a mental state about a mental state but does not satisfy our requirement for a higher-order state because it does not assert that one is in a certain state. Thus, "imagine a cat" is a first-order intention. Thinking "I am intending to imagine a cat" is a higher-order state. Our definition of higher-order state corresponds to David Rosenthal's (2006) requirement for a higher-order thought in his theory of consciousness.

[2]The claim rests on the assumption that HOTs of intending are not needed for first-order intentions to do their jobs. Indeed, it is difficult to specify what on earth a HOT of intending is useful for. HOTs are sometimes relevant to control; for example, one may form the intention "If I see the word, I will say another word", predicating an action on a HOT of seeing. Other than such cases, first-order intentions typically do not require HOTs, including HOTs of intending.

[3]Hypnotic elimination or modulation of the Stroop effect has generated significant attention in recent years. Raz and his colleagues reported that high hypnotizable subjects successfully enacted a posthypnotic suggestion to alter visual and lexical processing and eliminate the Stroop effect. They argued that the posthypnotic suggestion prevented reading at the primary processing level and that subjects' performances were strategy-free (Raz, Shapiro, Fan, & Posner, 2002; see also, Raz, Kirsch, Pollard, & Nitkin-Kaner, 2005;). In seven experiments and two case studies at the University of New South Wales, Sydney, Lynette Hung and Amanda Barnier recently attempted to replicate and explore hypnotic elimination of the Stroop effect; they explored the impact of suggestion type, the time of suggestion test, the role of strategy, the phenomenology of subjects' enactments, and the maintenance of suggested effects. Hung and Barnier's (2004, 2005) key finding was a dissociation between subjects' experiences of reading and their performance on the

Stroop task. Subjects strongly claimed to not see, understand, or read the target words, but still showed a robust Stroop effect, even when they employed naturally-motivated or suggested attentional focusing strategies. Although a few highly hypnotizable subjects showed some modulation and, even occasionally, elimination of the Stroop effect, Hung and Barnier failed to find evidence of a strong group effect on Stroop performance. Notably, those highs who altered Stroop performance also did so on waking tests; and all subjects tested in hypnosis showed a lower level of Stroop interference than is usually reported in the literature. This implies that processes other than hypnotic suggestion may be at work in such research. We are aware of work in at least three other laboratories attempting, so far unsuccessfully, to replicate hypnotic elimination of Stroop interference (but see Raz, Kirsch, Pollard, & Nitkin-Kaner, 2006). Given the level of interest both inside and outside hypnosis in Raz et al.'s (2002) initial report, this area needs more attention, including closer comparisons of the procedures and conditions that generate or fail to generate an effect.

[4]Although social cognitive views of hypnosis are relevant to both theories presented in this chapter, space precludes their detailed review (see instead Lynn, Kirsch, & Hallquist, chapter 4, this volume). We note their specific relevance as we lay out our accounts and we make detailed comparisons with them in our theoretical integration section below.