Part 3

Similarities and differences

Chapter 6

Hypnosis and meditation: a neurophenomenological comparison

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Abstract

A necessary first step in collaboration between hypnosis research and meditation research is clarification of key concepts. The authors propose that such clarification is best advanced by neurophenomenological investigations that integrate neuroscience methods with phenomenological models based on first-person reports of hypnotic versus meditative experiences. Focusing on absorption, the authors argue that previous treatments of hypnosis and meditation as equivalent are incorrect, but that they can be fruitfully compared when characteristic features of the states described by these concepts are examined. To this end, the authors use the "phenomenological and neurocognitive matrix of mindfulness" (PNM), a multidimensional model recently proposed by Lutz and colleagues. The authors compare focused attention meditation and open monitoring meditation with hypnosis across the dimensions of the PNM, using it to interpret empirical research on hypnosis, and to shed light on debates about the role of meta-awareness in hypnosis and the role of suggestion in meditation.

Introduction

A fruitful exchange has begun between hypnosis researchers and meditation researchers, with the dawning recognition that the two practices give rise to comparable experiences and may share certain causal processes. Nevertheless, comparing research from the two areas makes salient that many key concepts need clarification and more precise phenomenological description. We propose that a neurophenomenological investigation of these concepts provides the clarification needed for further research. To begin with, we introduce the core ideas of neurophenomenology and how it approaches the study of mental processes. We also point to some ways in which meditation and hypnosis can be used as tools in neurophenomenological investigations.

Our focus in this chapter is absorption. Absorption is a key feature of the hypnotic experience as well as an integral part of advanced concentration meditation. Recent authors have caught on to the exchange that is possible between the study of hypnosis and the study of meditation, using absorption as a comparison point (Lynn, Malaktaris, Maxwell, Mellinger, & van der Kloet, 2012; Rainville & Price, 2003). In Chapter 14, Ulrich Ott also discusses empirical evidence on trait and state absorption in meditation and hypnosis.

Comparison between hypnosis and meditation presents difficulties however, since the lack of clear conceptual and phenomenological definitions makes it hard to identify what absorption is, both within and across hypnosis and meditation. Previous discussions of absorption in hypnosis and meditation have often suffered from a lack of systematic means of comparison and problematic literal interpretations of Buddhist texts.

In this chapter, we review how absorption has been conceptualized in hypnosis research. We examine the phenomenal characteristics of absorption and how they arise out of the experience of hypnosis, as well as how they relate to other features of the hypnotic experience, such as alterations in sense of self and time. We then consider how absorption is conceptualized in Buddhist meditative traditions, focusing on the Indian Buddhist *dhyāna* framework as an example of a theory of meditative absorption. We examine a previous scholarly effort to integrate the two perspectives (Holroyd, 2003). We argue that shared features between the two states make the comparison worthwhile, but that a linear mapping from increasingly deep hypnosis to *dhyāna* is unfeasible. We emphasize several issues that arise for such a mapping, the most important of which is the normative and doctrinal nature of Buddhist descriptions of absorption. Because accounts such as the *dhyāna* framework present an ideal for practitioners to follow, we should proceed with caution when looking for descriptions of the phenomenal experiences of actual meditators.

We believe that a promising way to proceed is to formulate a phenomenal model of states of meditation and hypnosis more generally. On the one hand, this approach bypasses certain issues, such as the ecological validity of Buddhist accounts, the presence of multiple frameworks for conceptualizing absorption, and questions concerning which aspects of experience are essential to absorption and which are incidental. On the other hand, this approach helps us to see which phenomenal features are shared and which differ between hypnosis and meditation, and how these features may relate to one another. We can use this picture of how phenomenal states converge to interpret neurophysiological evidence and point to further avenues for research. In these ways, the phenomenal map functions as an heuristic.

Recently, Lutz and colleagues presented such a phenomenal model as a guide for mindfulness meditation research (Lutz, Jha, Dunne, & Saron, in press). Their "phenomenological and neurocognitive matrix of mindfulness" (PNM) is a multidimensional framework intended for comparing mindfulness practices in a manner amenable to empirical research. The model consists in a three-dimensional state space, dimensions of which correspond to the features of experience most commonly targeted by mindfulness training, namely, "object orientation," "meta-awareness," and "dereification." The model also includes a number of additional phenomenal features, namely, "effort," "aperture," "clarity," and "stability." Although the PNM is intended mainly for mindfulness practices, the authors suggest that it may be useful for examining features of other practices and associated experiential states. We believe that it can also be productively used for clarifying some general phenomenal features of hypnosis and for comparing experiences in meditation and hypnosis. Our discussion focuses on locating and comparing hypnosis, "open monitoring" meditation, and "focused attention" meditation in the space of the phenomenal matrix. We examine neuroscientific research on hypnosis and meditation, and use the picture generated by the phenomenal matrix to guide our interpretation of these data. Since our investigation is concerned with comparing absorption in meditation and hypnosis, we highlight focused attention meditation, which is the type of practice traditionally associated with meditative absorption.

Our discussion employing the PNM also highlights and clarifies certain outstanding issues, such as the role of suggestion in various types of meditation practice. Another important point that future research can explore is the possibility of inducing high meta-awareness with hypnosis.

Neurophenomenology

Neurophenomenology is based on the idea that detailed, first-person reports about subjective experience can be used to uncover information about brain activities relevant to understanding conscious mental processes (Fazelpour & Thompson, 2015; Lutz & Thompson, 2003). The working assumption is that first-person reports—especially from individuals either trained in the kind of metacognitive awareness cultivated in mindfulness practices (Lutz, Slagter, Dunne, & Davidson, 2008; Tang, Hölzel, & Posner, 2005) or probed with refined methods for eliciting tacit experience (Petitmengin & Lachaux, 2013; Petitmengin, Remillieux, Cahour, & Carter-Thomas, 2013) (or both)—can stand in a mutually constraining and illuminating relationship to cognitive-neuroscience evidence about the physiological processes enabling subjective experience.

A study by Lutz and colleagues (Lutz, Lachaux, Martinerie, & Varela, 2002) provides an illustration of the neurophenomenological approach. Participants performing a visual task were trained to become aware of trial-by-trial fluctuations in their "cognitive context," that is, fluctuations in attention, spontaneous thought processes, and their strategy for doing the task. The task involved random dot patterns with binocular disparity that could be "fused" so that the participants saw an illusory three-dimensional object. Lutz and colleagues gathered first-person reports from participants about their cognitive context, as well as electroencephalographic (EEG) data about local and long-distance patterns of neural synchrony at scalp electrodes. The EEG data were clustered according to the subjects' reports, specifically how prepared the subjects felt before the image appeared and the quality of their visual percepts, and distinct neural signatures were found for each cluster. In this way, the study revealed new synchrony patterns correlated with subtle aspects of the conscious states of participants. AQ1

Meditation can contribute to neurophenomenological investigation by providing practices that sensitize an individual to their experience. Meditation training builds attention and emotion-regulation skills that allow an individual to access aspects of their experience that would otherwise remain unnoticed (Lutz & Thompson, 2003). One indicator of how meditation could be used in neurophenomenological study is offered by Garrison and colleagues (Garrison et al., 2013a, 2013b). They gave meditators and non-meditators feedback on activation levels in the posterior cingulate cortex (PCC), a region linked to self-referential processing that decreases in activity during various types of meditation practice (Brewer et al., 2011; Kelley et al., 2002; Mason et al., 2007). Feedback was given via a real-time functional magnetic resonance imaging (fMRI) protocol that displayed a graph representing BOLD activity in the PCC relative to baseline. For the baseline task, participants were given adjectives and asked to judge whether the words described them, a task designed to elicit self-related processing. Participants then engaged in a focused attention task during which they were asked to decrease activity on the PCC feedback graph. Meditators, but not non-meditators, were able to significantly reduce PCC activity levels. This study (see also Garrison et al., 2013b) thus reinforced a relationship between PCC activity and effortful and self-related processing, as well as a relationship between PCC deactivity and undistracted awareness. It also illustrates how participants who have the ability to modulate neural activity can be used to investigate how particular cognitive strategies and processes relate to activity in a given brain region or network.

Although hypnosis has received less attention as a neurophenomenological tool, Lifshitz, Cusumano, and Raz (2013) argue that hypnosis can make an important contribution to the neurophenomenology project. Hypnosis provides a means of systematically altering an individual's experience and their awareness of that experience, as well as potentially facilitating phenomenological reporting. For example, hypnotized subjects can be induced into "virtual syndromes"—experiential states that mimic clinical psychopathologies—such as obsessive compulsive disorder,

OUP-FIRST UNCORRECTED PROOF, October 13, 2015

alien-hand syndrome, synesthesia, and visuospatial neglect (Blakemore, Oakley, & Frith, 2003; Kadosh, Henik, Catena, Walsh, & Fuentes 2009; Priftis et al., 2011; Woody & Szechtman, 2011). Such studies indicate that hypnosis could be a powerful tool in reliably generating specific experiential states. Lifshitz and colleagues also propose that hypnosis could potentially be used to enhance meta-awareness, a proposal we discuss in greater detail in this chapter.

In Chapter 15, Cardeña discusses how a neurophenomenological approach can give us a comprehensive understanding of hypnosis and meditation. The study of these states presents particular challenges that we must keep in mind when tailoring research methodologies. Cardeña argues that sophisticated third-person methods (such as EEG and fMRI) must be coupled with a sophistication in our first-person methods for a proper understanding of hypnosis and meditation, and of conscious experience more generally.

We agree with these authors that hypnosis is an important research tool for neurophenomenology and that the latter can make important contributions to hypnosis research. A neurophenomenological framework for hypnosis can help to clarify features of the hypnotic state and relate hypnosis to other experiences. It can also help us to clarify the terms used in hypnosis research and other bodies of research so that they can be mutually informative. In this chapter, we aim to clarify and relate certain phenomenal features of hypnosis and meditation in order to advance collaborations between researchers in these areas.

Absorption in hypnosis research

Hypnosis involves three stages (Egner & Raz, 2007): induction, suggestion, and deinduction. During *hypnotic induction*, the hypnotist typically instructs the subject to focus on their voice and become progressively more relaxed. Subjects can also hypnotize themselves using self-initiated suggestions (Fromm et al., 1981). An induction procedure can be as simple as counting from one to twenty (Cardeña, Jönsson, Terhune, & Marcusson-Clavertz, 2013) or it can involve focusing on an external stimulus, such as the sound of the hypnotist's voice or a point on the ceiling. It can also involve engaging in visual imagination sequences, such as being in a descending elevator (Fromm et al., 1981). Induction leads to a state in which the subject is focused and relaxed. The hypnotist can then issue *suggestions*—for example, that words will appear as meaningless symbols or that the subject will see in black and white. Suggestions can also be *post-hypnotic,* meaning that the hypnotist suggests that the subject behave in a certain way once the session is over. *Deinduction* involves instructing the participant to return to their normal, alert state.

Absorption is a key feature of the hypnotic state (Price & Barrell, 1990; Spiegel & Cardena, 1991). The Tellegen Absorption Scale (TAS), a questionnaire aimed at predicting hypnotic susceptibility, found that trait absorption—that is, one's tendency to enter into an absorbed state in daily life—predicted hypnotic susceptibility (Ashton & McDonald, 1985; Jamieson, 2005; Tellegen & Atkinson, 1974). Further, studies on hypnotic depth have found a significant correlation between depth and absorption ($r = 0.24–0.45$) (Roche & McConkey, 1990).

Induction procedures often include the instruction to focus on an object at the exclusion of other stimuli, and this type of focus can lead to absorbed attention in that object. For example, the subject may be asked to concentrate on the sound of the hypnotist's voice. Absorption is facilitated by the general mental state created by induction, namely, a state of relaxation and letting go of mental tension (Rainville & Price, 2003). The mental ease created by induction supports the passive and effortless concentration of absorption.

Tellegen and Atkinson (1974) define the state of absorption as total engagement of attention, employing all of one's perceptual, motor, and imaginative resources into a unified object representation. They, and other early researchers, connected absorption with imaginative involvement—a tendency to become attentionally and emotionally involved in an imaginative scenario (Hilgard, 1970; Qualls & Sheehan, 1979). Current researchers are more likely to define absorption purely in terms of the quality of one's attention to an object. For example, Rainville and Price (2003) define absorption as the "felt state of engagement of the self toward objects of consciousness." In their account, attention is defined as the embodied self engaging with an object (or objects) of awareness—interacting with, being affected by, or affecting that object. Absorption is thus the *degree* of engagement of the self toward the object(s) of awareness.

Several features of hypnotic experience are characteristic of, or thought to be facilitated by, a state of absorption. The object of attention acquires a heightened sense of reality. For example, imaginary objects of attention, such as memories, are experienced as real and present (Tellegen & Atkinson, 1974). Tellegen and Atkinson hypothesize that this experience occurs because one's representational capacities are fully occupied with the object, leaving no room for metacognition about the object, to the effect that "this is only imaginary." In the case of actually existing objects of attention, such as one's breathing, they acquire heightened reality by being central in attention and more vivid than surrounding objects (Rainville & Price, 2003).

Hypnosis subjects may experience reduced attention to peripheral stimuli (Crawford, 1994; David & Brown, 2002; Rainville & Price, 2003; Tellegen & Atkinson, 1974). Some subjects experience cessation of sensory stimulation altogether at deep levels of hypnosis (Tart, 1970). This experience may be connected to the analgesic properties of hypnosis. Highly hypnotizable individuals exhibit higher tolerance for painful stimuli during hypnosis (De Pascalis & Perrone, 1996; Del Percio et al., 2013; Hilgard & Hilgard, 2013). Some subjects experience reduction of conceptual thought, an experience that may be related to the cessation of perceptual stimuli (Oakley, 2008).

Hypnotized subjects can also experience alterations in the experience of time (Naish, 2001, 2003). For most subjects, time appears to slow down and they underestimate the length of a hypnosis session. Bowers (1979) hypothesizes that inaccuracies in time perception are caused by absorption, a link also made by Tellegen and Atkinson (1974). However, manipulating a subject's level of absorption does not seem to affect time distortion, and so time distortion may be coincidental to absorption but not caused by it (St. Jean & McCutcheon, 1989). At deep levels of hypnosis, the subject may experience a sense of timelessness, feeling as if he or she is no longer in a temporal framework (Cardeña et al., 2013; Tart, 1970).

Some subjects experience alterations of sense of self (Cardeña et al., 2013; Rainville & Price, 2003). A subject may feel a sense of identification with the object of attention (Cardeña, 2005). Highly hypnotizable individuals, in deep levels of hypnosis, can lose a sense of subject/object duality and identify with everything in the universe (Cardeña et al., 2013; Tart, 1970). AQ2

Absorption thus supports many of the remarkable experiential changes associated with hypnosis. As we will see, these states seem to be paralleled in meditative experience.

Absorption in Buddhism

The traditional Indian Buddhist term usually translated as "absorption" is *jhāna* in Pāli or *dhyāna* in Sanskrit. (In this chapter, we will use the Sanskrit versions of Buddhist technical terms.) *Dhyāna* is the name given to deep states of meditative absorption, resulting from the practice of "right concentration." It is traditionally delineated into four stages of progressively deeper and more refined absorption, known as the "four *dhyānas*" (Bodhi, 2005, pp. 227–228; Gethin, 1998, pp. 184–186). It is said to be the culmination of stilling the mind through the practice of "calm" (*śamatha*) meditation, which specifically develops concentration (*samādhi*), the capacity of the mind to rest undisturbed on an object of cognition. Engaging in this type of practice improves one's ability to enter into states of deep concentration and, eventually, absorption. One develops a fine awareness of when one is in an absorbed state and one learns how to fend off distractions that pull one away from that state.

In addition to calm meditation, the Buddhist tradition distinguishes another style of meditation practice called "insight" (*vipaśyanā*) meditation. Whereas calm meditation hones concentration, insight meditation hones wisdom, namely, understanding the nature of phenomena—notably, that they are impermanent, unsatisfactory, and non-self. In current scientific research on meditation, calm meditation is referred to as "concentrative" or "focused attention" meditation, whereas insight meditation is referred to as "open monitoring" meditation (Lutz et al., 2008).

Focused attention practices aim to still the mind by counteracting its tendency to seek out novel stimuli (Gethin, 1998, p. 176). The practice involves concentrating on a particular chosen object of attention. For example, one tries to keep one's attention on one's breathing by focusing on the sensations around the nostrils while inhaling and exhaling. Upon realizing that one's mind has wandered to something else, one notes this fact and brings one's attention back to the breathing. Over time, one develops three attention-regulation abilities: the monitoring ability to notice distractions without destabilizing the focus of attention, the ability to disengage from a distracting thought, and the ability to redirect focus to the breathing (or other object of concentration) after one notices one's focus has shifted (Lutz et al., 2008). Many focused attention meditation practices share the ultimate goal of absorption in the object of attention.

Open monitoring practices involve maintaining awareness of one's field of experience without an explicit focus of attention. The meditator monitors the thoughts and sensations that arise while maintaining an emotionally non-reactive stance toward them. One tries to maintain clear awareness of experience while not "grasping" onto one's thoughts, in the sense of explicitly focusing on them. In contrast with focused attention meditation practices, the purpose of open monitoring meditation is not absorption but, rather, clear awareness of one's experience. Such awareness is rooted in "mindfulness" (*smṛti*), a word used in many ways throughout the Buddhist tradition (Dunne, 2015; Gethin, 2014) but that generally refers to the presence of mind that allows for clear awareness of one's experience. In Anālayo's words: "Owing to such presence of mind, whatever one does or says will be clearly apprehended by the mind, and thus can be more easily remembered later on" (Anālayo, 2004, p. 48).

By engaging in open monitoring meditation practices, one is said to learn to recognize one's habitual cognitive and emotional patterns (Lutz et al., 2008). In this sense, "insight" aims at cultivating wisdom, ridding the practitioner of the mental habits that are said to cause suffering.

There is debate about how the two styles of calm and insight meditation are related, with some schools viewing calm meditation as a prerequisite to insight meditation, and others seeing them as independent practices. Arguably, however, the two practices are meant to work in tandem (Anālayo, 2004, p. 87). Insight meditation allows the practitioner to take the right attitude to observed mental events and keeps calm meditation practice from becoming stagnant. Calm meditation allows the mind to be comfortable resting in the present moment and strengthens concentration so that the practitioner can do insight meditation more effectively. Together, the two practices build the mental qualities—ease and stability of present-moment awareness, and clear awareness of mental events—that are needed to clearly observe the arising and passing away of thoughts (Thanissaro, 1997).

Absorption is the culmination of concentration practice in calm meditation. Theravāda Buddhism, the branch of Buddhism based on the texts of the Pāli Canon (generally considered the oldest extant Buddhist texts), delineates four stages of *dhyāna*. The practitioner proceeds through the stages by focusing awareness on a single chosen object, and thereby building concentration (*samadhi*). Theravāda Buddhist texts, such as the Pāli *Nikāyas* (the collections of the Buddha's discourses) and the *Visuddhimagga (Path of Purification)* by the fifth-century CE philosopher Buddhaghosa, list many possible objects of meditation, depending on the stage of practice and the temperament of the practitioner. A common concentration object, especially favored by contemporary teachers, is the breath. When one sits down to practice, one brings one's attention to the object and tries to maintain this attention. Initially, one's mind will soon wander to other thoughts and sensations. At this stage, one's mind is said to be plagued by the "five hindrances" and to lack the "five limbs" of *dhyāna.* The five hindrances are (i) desire for pleasurable sensory objects, (ii) aversion or ill will, (iii) tiredness, (iv) restlessness, and (v) doubt. As one progresses in calm meditation practice, one lets go of the five hindrances and builds on the five limbs of *dhyāna*. These are (i) placing the attention on the object, (ii) examining the quality of the subjective state, (iii) joy, (iv) happiness, and (v) one-pointed focus wherein one's attention no longer strays to other objects (Gethin, 1998, pp. 184–186). At this point, the practitioner has reached the stage of "access consciousness," the precursor to *dhyāna*.

Access consciousness is not yet *dhyāna* because the limbs are still unstable. *Dhyāna* proper has four stages in which the practitioner refines the five limbs and abides in increasingly deeper stages of absorption. In the first stage of *dhyāna*, the five limbs are present, though the meditator has to exert effort to enter and stay in a state of concentration. In the second *dhyāna*, the practitioner can concentrate on the object without needing conscious placing of attention. After this, one experiences joy and then happiness, which arise and pass away in the third and fourth stages respectively. At the fourth stage, the meditator's mind is calm; one has moved beyond even happiness and entered into a state of profound equanimity. These four *dhyānas* are said to be followed by the "formless attainments," which are essentially refinements of the fourth *dhyāna* (Gethin, 1998, p. 185). These are specified as the experiences of (i) infinite space, (ii) infinite consciousness, (iii) nothingness, and (iv) neither perception nor non-perception.

Other Buddhist traditions provide different characterizations of absorption. For example, in the Tibetan tradition, calm meditation practice progresses through the "nine stages of calm abiding" (Asanga, Rahula, & Boin-Webb, 2001; Wallace, 1999). In the early stages, one is able to place one's attention on the object but cannot maintain it for more than a few minutes. Over the course of the nine stages, one is able to keep one's attentional focus for longer periods of time. Gradually, one stills one's mind while avoiding both excitation and laxity—hyperactivity of the mind versus sluggishness. The culmination of the practice is effortless one-pointed concentration.

Discussions of absorption as a culmination of focused attention meditation are also present in the non-Buddhist yoga tradition. In the yoga tradition expounded by Patañjali (Bryant, 2009), *dhyāna* is one of the "eight limbs" of yoga. The last three limbs, *dhārana, dhyāna*, and *samadhi,* describe a progression in concentrative or focused attention meditation. In the stage of *dhārana*—usually translated as "concentration"—one focuses attention on a specific object. Attention becomes stabilized and sustained continuously in the stage of *dhārana.* In *samadhi*, attention becomes unified with the object. This tradition also distinguishes two types of *samadhi*, one that involves concepts and one that is an objectless absorption devoid of concepts.

Relating hypnotic and meditative absorption

In both the hypnosis literature and Buddhist texts, absorption is a state of focused attention in which there is reduced awareness of or attention to peripheral stimuli, and due to which one may experience altered boundaries of the self and an altered perception of reality

(Pekala & Forbes, 1997). These experiences can include alterations in one's body image or even the sense that one's body has disappeared (Cardeña et al., 2013). Both practices can lead to cessation of speech and thought (Hilgard, 1968), as well as states in which one is unresponsive to external, even painful, stimuli (see Chapter 14). Finally, deep states of hypnosis can parallel some experiences in deep states of meditation, such as loss of individual identity, sense of unification with all things, and experiences of emptiness or voidness (Cardeña et al., 2013; Erickson, 1965; Tart, 1970).

Studies investigating meditators using the TAS, created in the context of hypnosis research, have found that they have higher scores for absorption (Chapter 14; Davidson et al., 1976; Holzel & Ott, 2006).

It may seem that the two traditions are referring to the same absorption experience. Holroyd (2003) takes such a stance. He argues that the altered states referred to by the *dhyāna* framework are the same experiences that subjects have in deep hypnosis. Specifically, he argues that hypnotic induction leading to a deep state of hypnosis is akin to entering the four *dhyānas*. He makes this argument using both phenomenological and neurological data. For the phenomenological case, Holroyd discusses Cardeña's (2005) self-hypnosis study on hypnosis "virtuosos" (for more details on the procedure, see Cardeña, 2005 and Chapter 15). This study employed both concurrent and retrospective report. During hypnosis, participants provided depth ratings and were asked, "What are you experiencing?," approximately every 5 minutes. After hypnosis, participants were administered the Phenomenology of Consciousness Inventory (PCI) (Pekala, 1991; Pekala, Steinberg, & Kumar, 1986)—a questionnaire used to assess subjective experience—and a checklist of 189 consciousness-altering phenomena, such as differences in body image, sense of time, identity, and memory, as well as the level of depth at which they were experienced. These data were then compared to the data gathered by concurrent methods. The study used *neutral hypnosis*, meaning that no suggestions were given by the experimenter other than to become hypnotized (Cardeña et al., 2013; Kihlstrom & Edmonston, 1971).

During light hypnosis, subjects felt little more than relaxation. At medium hypnosis, subjects experienced alterations in body image, such as sensations of "floating" or "spinning," and they began to feel increasingly disconnected from the body and environment. In deep hypnosis, participants reported "free-floating" attention and greater control over their mental states. They also experienced vivid and spontaneous imagery, such as geometric patterns and synesthetic imagery. Interestingly, most participants reported both "brightness" or "flashes of light" and "great obscurity." Emotions during this state were mostly positive (including "love" and euphoric and bliss states), though some participants reported "fear."

Holroyd argues that the experiences had by hypnotized subjects as they moved from medium to deep hypnosis parallel those of meditators moving into deeper stages of *dhyāna*. First, in hypnosis, attention is initially focused on imagery at medium levels, and is then free-floating and absorbed at deep levels. He compares such attention with attention in meditation, which goes from active and concentrated in the first *dhyāna* to still and absorbed in the fourth *dhyāna*. Second, in hypnosis, emotions go from intensely positive at medium levels of hypnosis to absent at deep levels, in a way that seems to parallel the joy and bliss states of the second and third stages of *dhyāna* giving way to equanimity in the fourth *dhyāna*. Not mentioned by Holroyd, but also worth noting, is that experiences of light (which were reported by hypnotized subjects) are taken by some Theravāda Buddhist accounts as a sign that one has reached the initial stages of *dhyāna* (Lindahl, Kaplan, Winget, & Britton, 2013).

Holroyd discusses similarities between the deepest states of hypnosis and the fourth *dhyāna*. First, there seem to be parallels in the quality of attention. Holroyd takes the "free- floating" attention reported in the hypnosis case to be comparable to "attention focused on stillness," the attentional state of the fourth *dhyāna*. Second, thoughts may disappear in both deep hypnosis and meditative states. Third, there are similarities in self-experience. Both hypnotized subjects and meditators can dissociate from the body and lose a separate sense of self. Both can also experience non-duality and a feeling of being at one with all.

We agree that there are important similarities between the two cases and that hypnotized subjects may be experiencing some classic markers of *dhyāna*. Overall, the evidence seems promising for a comparison of absorption states between the two practices. Nevertheless, there are clear differences between the *dhyānas* and hypnotic absorption that make any one-to-one mapping unfeasible.

First, there is an asymmetry in the way that absorption is defined in the *dhyāna* framework versus hypnosis research. The *dhyānas* are specified according to both the content of one's experience and its attentional quality, whereas absorption in the hypnosis literature is specified primarily according to attentional quality. In the hypnosis case, although it is understood that engagement with an object forms the basis of the absorption experience (and hence its content) and that awareness of peripheral stimuli is reduced, there is no specification of the affective state of the subject, as there is in the case of the *dhyānas* (for example, rapture, happiness, and equanimity).

Second, absorption experiences in hypnosis and meditation differ in both content and attentional quality, with the result that the content of hypnotized subjects' experiences do not fit Holroyd's hypothesis that the four *dhyānas* map onto increasing depth of hypnosis. In one direction, Cardeña's study describes phenomena that seem similar to the deepest states of the "formless attainments" beyond the four *dhyānas.* For example, one participant said, "for a while I was just total nothing." Compare this report with a traditional description of the third "formless attainment:" "Through the total overcoming of the sphere of boundless consciousness, and with the idea 'Nothing is there,' he reaches the sphere of nothingness and abides therein" (Thera, 1952, p. 108). Some hypnotic subjects also appear to have experienced a degree of formlessness, as these reports suggest: "merging with pure light or energy and finding one's innermost core," and "I am not matter anymore . . . I'm just energy."

In the other direction, it is not clear whether the experiences of hypnotized subjects possess all of the characteristics of *dhyāna*. One issue worth investigating further is the presence of thoughts in states of absorption. Holroyd notes that thought can cease for hypnotized subjects at deep levels. This is corroborated by evidence that hypnosis results in reduced discursive thinking. Hypnotized subjects report fewer spontaneous thoughts and a reduction in the sense that their mind is cluttered with thoughts (Deeley et al., 2012). There is also an increase in sustained attention and self-reported absorption (Cardeña, 2005; Deeley et al., 2012; Rainville & Price, 2003). Within Buddhism, however, there is disagreement about whether conceptual thought is present in the first *dhyāna* (Analayo, 2004). If even the first *dhyāna* is free of discursive thought, then the progression from medium to deep hypnosis will not proceed parallel to that of the four *dhyānas,* since Cardeña's subjects are still experiencing thoughts at medium levels. In addition, Holroyd compares self-described "free-floating" attention in deep states of hypnosis with the one-pointed attention of *dhyāna*. Yet "free-floating" seems to indicate a state of easy attention switching to various objects, which seems quite distinct from the focused attention of *dhyāna*. We would need more details about the attentional states of hypnotized subjects as well as meditators in order to compare them properly. Without such information, equivalence claims are not warranted.

The main obstacle to comparison is that although absorption in hypnotized subjects may share features with *dhyāna,* the subjects may not experience them in the progression of the *dhyāna* framework. It is also an open empirical question whether meditation practitioners experience absorption in this progressive way, or whether the progression framework needs to be understood as resulting from doctrinal and interpretative constraints. We take these points to mean not that absorption is incomparable between the two practices but rather that a linear, one-to-one mapping is not the best means of comparison.

In fact, such a comparison may not even be desirable. It is important to keep in mind when employing Buddhist texts for research purposes that textual descriptions of meditative states are highly normative. The *dhyāna* framework is not merely descriptive but also presents an ideal for the meditator to follow. One is meant to use this account as a guide and inspiration in one's practice. Moreover, the practice itself has a strong normative component, since the practitioner is aiming for liberation from suffering. A straightforward use of textual descriptions of *dhyāna* as a map of meditative experience glosses over the normative component of Buddhist textual descriptions. As just mentioned, the extent to which any meditator's own experiences follow the trajectory specified in the *dhyāna* framework remains an open question. Recall also that there are multiple interpretative frameworks for meditative absorption, and although there are many commonalities, there is no one way in which absorption is said to arise in meditation practice.

A better approach to comparison is to look at features of hypnosis and meditation more generally. We follow this approach in the rest of this chapter by using a phenomenal model proposed by Lutz and colleagues for the study of mindfulness practices (Lutz et al., in press). This approach maps experiences along certain characteristic dimensions, such as the degree of focus of attention or how vividly the contents of experience present themselves. Creating such a phenomenal state map involves determining the features that are central to each experience and that are most relevant for comparison. These features are then treated as dimensions along which we can map conscious states, in this case hypnosis and meditation. In what follows, we examine the "phenomenological and neurocognitive matrix of mindfulness" (PNM) model, proposed by Lutz and colleagues, and expand it to include hypnosis. We also suggest further dimensions that would be relevant for expanding this model to include hypnosis.

The phenomenological and neurocognitive matrix of mindfulness (PNM)

Lutz and colleagues created the PNM in order to provide an account of the possible range of mindfulness states that would be useful for empirical research (Lutz et al., in press). Instead of providing a unitary definition of mindfulness, they provide a phenomenal matrix (PM)—a family resemblance account that maps different practices and levels of expertise into a multidimensional phenomenal space. More specifically, the PM maps experiential states according to seven phenomenal features that are cultivated by mindfulness practices. Three of these—"object orientation," "dereification," and "meta-awareness"—are core features, insofar as they are targets of all styles of meditation practice and are useful for distinguishing between different practice styles. The four remaining dimensions—"aperture," "clarity," "stability," and "effort"—are secondary, in that they are important features of meditative experience but do not differentiate practice styles. These dimensions are derived from Buddhist texts but the authors note that empirical study needs to be done with practitioners in order to verify that textual descriptions of meditative states are phenomenologically accurate.

Lutz and colleagues have also formulated a neurocognitive framework for the PM, the phenomenological and neurocognitive matrix (PNM). The PNM describes how large-scale functional networks—such as the central executive network and the salience network, discussed in the section "The PNM networks"—underlie the features of PM. In what follows, we outline the dimensions of the PM, provide a short description of the networks involved in the PNM, and, finally, discuss hypnosis within the framework of the PNM, comparing hypnotized individuals with meditators. The most relevant comparison for our purposes will be with focused attention meditation, because this style of practice specifically engenders absorption and its phenomenal profile is most akin to hypnosis. In our discussion, we make the assumption that conscious experience and neural activity changes in systematic ways during hypnosis. We use "state" in a descriptive sense to refer to the phenomenal experiences associated with hypnosis (see Bell et al., 2011; Oakley, 1999). We make no claim to the effect that hypnosis is a distinct process (see Gruzelier, 2000; Wagstaff, 1998, 2000).

One challenge to keep in mind when looking at hypnosis is that the experience depends a lot on which suggestions are given to the participant. We try to avoid confounds, wherever possible, by referring to studies employing neutral induction, that is, induction that does not include suggestion.[1] A second large source of variability is individual differences. We attenuate this difficulty, to some extent, by referring to studies that use highly hypnotizable participants. There are several ways of classifying participants according to hypnotizability but most use a measure of suggestibility, with more suggestible individuals being classified as more hypnotizable. It is worth noting, however, that high hypnotizables also display variability in their experiences. Measures of hypnotizability that are sensitive to the particular response profile of an individual show that high hypnotizables do not have uniform response patterns to suggestion (Hilgard, 1979; McConkey & Barnier, 2004; Pekala et al., 1986; Terhune, Cardeña, & Lindgren, 2011).

Dimensions of the PM

Object orientation is the phenomenal sense that one's experience is directed toward a particular object (including objects of thought). This sense of directedness is not merely about the selection of an object in the sense of there being an object that is experienced more vividly than its surroundings. One's attention can also be directed toward an object that is not present and thus not available for selection. For example, when one looks for a friend in a crowd, one's attention is oriented to that person even when one cannot see them. Thus, object orientation includes a felt sense of attentional engagement with an object. Medium to low object orientation occurs in states of mind wandering, and very low object orientation occurs in expert open monitoring meditation, in which the practitioner observes the occurrence of thoughts but does not engage with them. Very high object orientation occurs in states of focused attention meditation but also in states of addictive craving, both of which have strong engagement with an object of awareness.

Meta-awareness: Lutz and colleagues present a particular view of meta-awareness that they relate to the Buddhist notion of *samprajanya*—usually translated as "clear knowing" (of experiential phenomena, especially one's mental states)—as well as to other Buddhist philosophical notions, such as "reflexive awareness" (*svasaṃvedana*). We use a definition more in line with current Western psychology. In this usage, "meta-awareness" refers to one's ability to access one's current contents of consciousness (Chin & Schooler, 2010). Low meta-awareness often occurs in mind wandering (when a person is often unaware that their mind is wandering), and mind wandering can be interrupted with the return of meta-awareness. Low meta-awareness also occurs in states of craving, in which object orientation is high but the individual is unaware both of how the object appears to them and of their thoughts, feelings, and desires about the object. Meta-awareness is crucial to open monitoring meditation practice, because the ability to access

[1] It may be that hypnosis is never truly neutral. For instance, the same procedure increases suggestibility if subjects are told that it is hypnosis rather than relaxation (Gandhi & Oakley, 2005).

one's contents of consciousness is necessary for the moment-to-moment monitoring of one's experience characteristic of this style of practice. A focused attention meditator requires meta-awareness for detecting and disengaging from distractions, though at later stages, in which attention is absorbed by the object, meta-awareness may no longer be present.

Dereification is the degree to which thoughts are experienced as transient mental events rather than accurate depictions of reality. Dereification also cuts off the tendency to construct from thoughts a fixed and static representation of self. In cases of high reification, thoughts "present themselves as if the objects or situations they represent are occurring in the present moment" (Lutz et al., in press; see also Chambers, Gullone, & Allen, 2009; Hayes & Feldman, 2004; Papies, Barsalou, & Custers, 2012; Teasdale, 1999; Williams, 2010). These include experiences such as addictive craving, wherein the object acquires a solidity and permanence in thought, even resulting in an anticipatory physiological response.

In addition to the three dimensions of object orientation, meta-awareness, and dereification, which make up a three-dimensional state space model, Lutz and colleagues have identified a number of phenomenal qualities that can belong differentially to the experiential states mapped in this three-dimensional space.

Effort refers to how easy or difficult an experience feels to maintain. Focused attention meditation involves a high degree of effort at the novice level, but the effort diminishes as the practitioner gains experience. Open monitoring meditation aims to use less effort, as too much effort could encourage object selection.

Aperture refers to the scope of attention. In focused attention meditation, aperture is narrow, in the sense of being focused precisely on the target object. In open monitoring meditation, aperture is broad, extending to the entire field of conscious experience.

Clarity is the phenomenal vividness of the experience. Depressive rumination and craving can both have high clarity, since their objects typically appear salient and vivid. Clarity is said to be a feature of experts' experience in both focused attention and open monitoring styles of meditation.

Stability is the degree to which a quality of experience persists over time. This can occur even if the contents of experience are highly changeable. For example, an open monitoring meditator can observe the rapid flow of thoughts—an experience in which the content is continuously changing—while the quality of observing, including dereification and meta-awareness, stays constant. For both open monitoring and focused attention meditators, stability is middling at the novice level and high at expert levels.

The PNM networks

The *central executive network*, also called the dorsolateral or top-down attentional system (Corbetta & Shulman, 2002), includes the bilateral dorsolateral prefrontal cortex (PFC), ventrolateral PFC, dorsomedial PFC, and lateral parietal cortices. It is responsible for endogenous directing of attention as well as planning behavior and keeping information in working memory (Miller & Cohen, 2001; Seeley et al., 2007). Lutz and colleagues propose that the central executive network underlies object orientation because of its role in monitoring stimuli and maintaining attention.

The *salience network* is composed of the bilateral anterior insulae (aI) and dorsal anterior cingulate cortex (dACC), as well as subcortical structures involved in emotion, reward, and homeostasis. The salience network picks out salient stimuli in the environment using interoceptive and affective information. According to several models (Craig, 2009, 2010; Damasio & Dolan, 1999; Damasio, Everitt, & Bishop, 1996), the insulae, thalamus, and brainstem are responsible for creating a real-time representation of the bodily self using somatosensory signals. Because the salience network provides continuously updated information about the embodied self, Lutz and colleagues propose that it plays a central role in the meta-awareness dimension of the PNM. Open monitoring meditation may involve both the salience network and the monitoring and evaluative capacities of the central executive network.

The PNM: comparisons between hypnosis and meditation

Object orientation

Object orientation is a key dimension for absorption. Some definitions, like that of Rainville and Price (2003), identify absorption almost exclusively by its object-directedness.

The degree of object orientation in hypnosis is comparable to that of focused attention meditation experts and novices. Like focused attention meditation, hypnosis is characterized by focused attention and absorption in an object (Rainville & Price, 2003). Hypnotized individuals' object orientation seems stronger than that of focused attention novices because their attention is less frequently pulled away from its object.

Lutz and colleagues connect the object orientation dimension to central executive network activity because of this network's role in endogenous orienting, that is, voluntary directing of attention to a certain stimulus. Several studies demonstrate either increased central executive network activity in meditation (Hasenkamp, Wilson-Mendenhall, Duncan, & Barsalou, 2012) or increased activation of this network in attention tasks following meditation training (Jha, Krompinger, & Baime 2007; van den Hurk, Giommi, Gielen, Speckens, & Barendregt, 2010). In the hypnosis literature, studies show conflicting evidence regarding the role of executive attention in hypnosis (Semmens-Wheeler & Dienes, 2012). Some studies and theories of hypnosis claim that the executive attention system is more active in hypnosis (Crawford, 1994; Gruzelier, 1998; Rainville & Price, 2003; Woody & Bowers, 1994), whereas others claim that it is less active (Dietrich, 2003; Gruzelier, 2000; Hilgard, 1977; Kallio, Revonsuo, Hämäläinen, Markela, & Gruzelier, 2001). Interestingly, Rainville and Price (2003) found increased prefrontal cortex activation specifically associated with the absorption dimension of hypnotic experience. Perhaps conflicting results about central executive network activation can be explained by the degree of absorption present. Another potential resolution is to distinguish between different functions of executive processing (Lynn et al., 2012; to be discussed further in the section "Meta-awareness").

To further support their claim that endogenous attention orienting is the system underlying object orientation, Lutz and colleagues identify four functional markers of attention orienting and argue that meditation training improves their efficiency. These markers are improved task performance, greater neural activation to attended versus unattended stimuli, biasing activation of early perceptual neurons, and engagement of frontal and parietal cortices. Examining hypnosis in terms of functional markers is more difficult because the performance exhibited by participants could vary greatly depending on the suggestions given by the experimenter. Furthermore, many studies eschew placing participants in attentional tasks during hypnosis but rather test participants using post-hypnotic suggestion (e.g., Raz & Campbell, 2011). With regard to the first marker of improved performance, there is evidence that suggestion improves performance on tests of attentional orienting—namely, the Stroop and ANT (attention network test) (for a review, see Raz, 2005). Nevertheless, highly hypnotizable people differ at baseline on these tests, typically showing less efficient performance without suggestion (Dixon, Brunet, & Laurence, 1990; Dixon & Laurence, 1992; Raz, Shapiro, Fan, & Posner, 2002), though some studies show superior attentional performance and improved cognitive flexibility among highly susceptible individuals (see Crawford, 1994; Enea & Dafinoiu, 2013; Gruzelier, 1998).

We need a more detailed picture of attentional processes in hypnosis before we can say exactly where it fits in comparison with meditation. Particularly, the issue for future research is to determine the role of endogenous or executive attention and in what ways it may be present in hypnosis. This issue turns out to be complex, as discussed in the section "Meta-awareness."

Meta-awareness

Lutz and colleagues tie meta-awareness to the dynamic activity of both the central executive network and the salience network, and these networks remain important to our conception of meta-awareness as accessing the current contents of consciousness. The central executive network is involved due to its role in monitoring, maintaining, and integrating information; and the salience network is important due to its role in supporting the phenomenal sense of a bodily self through its moment-to-moment facilitation of feeling states.

It seems reasonable to suppose that hypnotized subjects have lower meta-awareness than focused attention meditators, whether novices or experts, given the suggestibility of hypnosis subjects. Meta-awareness is linked to executive control skills required for monitoring one's experience. Some theorists claim that a reduction or diversion of executive resources explains how hypnotized subjects can allow contradictions in their experience to go unquestioned (Kirsch & Lynn, 1998; Wagstaff, Heap, Oakley, & Brown, 2004; Woody & Bowers, 1994). For example, self-initiated movements can be experienced as automatic or subjects can maintain a hypnotically induced false belief in the face of contradictory evidence (e.g., Bryant & McConkey, 1989; Noble & McConkey, 1995).

Semmens-Wheeler and Dienes (2012) outline four ways in which the subjective experience of absorption could occur:

(i) One could be mind wandering and not notice it.

(ii) One might be distracted by irrelevant thoughts but notice the distraction, using meta-awareness, and thereby disengage from them.

(iii) Irrelevant thoughts occur but one does not attend to them and is not distracted by them.

(iv) One has single-pointed focus on the object of attention.

The first state is not genuine absorption because it is an illusion that results from inaccurate meta-representations of one's experience. Attention is not absorbed but it appears to be, or one believes that it is because meta-representations do not convey what is happening at the first-order level of experience.

The authors advance the idea that a meditator experiences (iii) or (iv) because they train meta-awareness concurrently with absorbed attention and thus accurately represent themself as being in the absorbed state. They argue that hypnosis does not train or engage meta-awareness and thus may evince the earlier states of absorption, including perhaps the pseudo-absorption of (i). They support this claim with evidence that highly hypnotizable individuals have less accurate "higher-order thoughts"—meta-representations about their current experiences (Dienes, Beran, Brandl, Perner, & Proust, 2012).

In opposition to the aforementioned claim, Lifshitz, Cusumano, and Raz (2013) argue that hypnosis could be a useful shortcut method for generating meta-awareness in subjects without the need for years of practice (as in the meditative traditions). Meta-awareness requires maintaining openness to experience and overriding one's habitual tendency for conceptual elaboration. Lifshitz and colleagues argue that hypnotic suggestion is a plausible candidate as a tool for inducing meta-awareness, because it is capable of affecting attention and altering other processes typically thought to be automatic or unalterable via conscious control. As evidence that hypnosis can alter automatic processes, hypnotized subjects under suggestion to see the world in black and white reported seeing colored images in grayscale and had reduced activity in low-level brain regions associated with color processing (Kosslyn, Thompson, Costantini-Ferrando, Alpert, & Spiegel, 2000). As evidence that hypnosis can alter attentional processing, it is possible to reduce or even eliminate the Stroop effect with hypnosis (Augustinova & Ferrand, 2012; Parris, Dienes, & Hodgson, 2012; Raz & Campbell, 2011; Raz, Fan, & Posner 2006; Raz, Moreno-Íniguez, Martin, & Zhu, 2007; Raz et al., 2002, 2003). This finding is significant, because reading, once learned, is thought to be done automatically, and the robustness of the Stroop effect is a testament to how difficult it is to ignore linguistic stimuli. So, given that hypnotic suggestion is able to affect automatic and attentional processes, Lifshitz and colleagues argue that suggestion could also possibly induce meta-awareness.

An objection to the possibility of high meta-awareness in hypnosis subjects is that meta-awareness seems to conflict with suggestibility. That a subject is able to act and form beliefs that go against their previous beliefs and experience—for example, failing to recognize themself in the mirror—seems to indicate that they are not receptive to their entire field of experience in the manner characteristic of meta-awareness. There seems to be an element of self-deception in hypnosis that meta-awareness ought to eliminate. That hypnosis involves a degree of self-deception or inattentiveness is in line with dissociation and cold control theories of hypnosis, which posit that a hypnotic response consists in intending to perform a given action while being unaware of this intention (Dienes, Perner, & Jamieson, 2007; Hilgard, 1977; Spanos, 1986). Semmens-Wheeler and Dienes (2012) are working from a cold control framework when they argue that hypnotized subjects have inaccurate meta-representations. Although these authors tend to discuss meta-representations or higher-order thoughts (which are a type of meta-representation), we can see how a disparity between first- and second-order thoughts could be a problem for meta-awareness.

At the neuroscientific level, the issue of meta-awareness and hypnotic response hinges on executive control processing. High meta-awareness is thought to be the result of executive control activity, since executive regions are involved in endogenous attention and monitoring (Corbetta & Shulman, 2002; Ridderinkhof, van den Wildenberg, Segalowitz, & Carter, 2004). Previous research has found that activity in the dorsolateral PFC (dlPFC), a key region in top-down attention and executive control, distinguished between accurate and inaccurate higher-order thoughts. Lau and Passingham (2006) isolated two conditions in a perceptual discrimination task in which subjects were equally good at discriminating a masked shape but differed in the accuracy of their higher-order thoughts. Increased activity in the dlPFC was correlated with accurate higher-order thoughts. Further, an experimental study that disrupted dlPFC activity with transcranial magnetic stimulation (TMS) found that TMS interfered with subjects' awareness of seeing in a case where first-order perception was held constant (Rounis, Maniscalco, Rothwell, Passingham, & Lau, 2010).

It would seem that executive network activity would block suggestion because of its function as a monitoring process, and some hypnosis researchers have argued along the lines that hypnosis increases suggestibility because it reduces executive control function (Dietrich, 2003; Gruzelier, 1998, 2006). This reduction contrasts with meditation, which is meant to improve executive control function. Research on meditation typically finds increased central executive network activity in meditators—albeit with experience-related differences, which we discuss in the section "Dereification"). Neurophysiological evidence about executive activity in hypnosis is mixed. Studies finding increased activity in central executive network regions, such as the prefrontal cortex (e.g., Rainville & Price, 2003), might support the claim that hypnosis subjects possess high meta-awareness.

Relevant to this debate are EEG studies finding increased theta activity in the frontal cortex (Crawford, Burrows, & Stanley, 2001; Crawford & Gruzelier, 1992; Graffin, Ray, & Lundy, 1995; Holroyd, 2003). This pattern of activity has been found in tasks requiring focused attention and effort (Crawford, 1994; Schacter, 1977). Although some authors (e.g., Holroyd, 2003) argue that high frontal theta activity is indicative of cortical inhibition and a *reduction* in executive processing, Dienes and Hutton (2013) conducted an experimental study in which the dlPFC was disrupted in hypnosis subjects using low-frequency, repetitive transcranial magnetic stimulation (rTMS). They found that impairing dlPFC activity with rTMS enhanced the hypnosis response. This finding supports the view that hypnosis involves impaired meta-representations. Additionally, in Chapter 7, Dienes and colleagues defend the claim that hypnosis involves inaccurate metacognitions, that is, inaccurate second-order thoughts about one's first-order state. They characterize mindfulness as enhanced metacognition and argue for a tension between mindfulness and hypnotic response.

One way of resolving the issue about meta-awareness in hypnosis is presented by Lynn and colleagues (2012). They differentiate the monitoring and control functions of the executive system, claiming that the two do not always appear in tandem: "in hypnosis, there may be a decoupling between brain regions associated with monitoring and cognitive control" (see Egner, Jamieson, & Gruzelier, 2005; see also Sadler & Woody, 2006; Woody & Sadler, 2008). Cognitive control is the "flexible management of response processes" (Egner et al., 2005), whereas the monitoring function has the role of monitoring response conflicts that may arise, such as when one has to override a habitual response to a stimulus (Botvinick, Cohen, & Carter, 2004). Egner and colleagues (2005) found a decoupling between activity in the anterior cingulate cortex (ACC) and the lateral frontal cortex (LFC) (a region that includes the dorsolateral PFC). The ACC is thought to be responsible for conflict monitoring, whereas the LFC is a region responsible for cognitive control. These regions are *more* coupled during meditation (Brewer et al., 2011). Such a pattern of activity opens up the explanation that, in hypnosis, there is monitoring of the situation—and thus the subject may have high meta-awareness—but monitoring is decoupled from executive processing, so that suggestions are still followed.

The decoupling explanation also offers an interesting way of looking at guided meditation. Lynn and colleagues (2012) posit that decoupling between control and monitoring regions may be the product of the hypnotist "taking the lead" or, in a sense, standing in for the executive processing of the hypnotized subject (Lynn, Rhue, & Weekes, 1990). Such an effect may also be behind the empirical findings we see in guided meditation. Several studies of guided meditation have shown reduced executive control processing, which contrasts with the increased central executive network activity seen in unguided meditation (Cahn & Polich, 2006). These findings suggest the possibility that hypnotic suggestion (on a looser definition of hypnosis; see Lynn et al., 2012) may be a key mechanism behind guided meditation. Future research could investigate this suggestion in greater detail.

Further along this line, we can consider the differing roles that suggestion plays in meditation versus hypnosis. Mindfulness practice instruction often involves suggestions that encourage meta-awareness and dereification, such as the following (which is often a part of focused attention meditation instruction): "Should you find yourself judging, simply remind yourself to return to observing or just following your breathing." Hypnosis participants, however, are encouraged to become absorbed and experientially involved in their experience (Lynn et al., 2012). So, there is an empirical question about whether hypnosis could also achieve increases in dereification and meta-awareness if the content of suggestion was similar to that of meditation instructions. Given the richness and complexity of meditation practice, future research could look at the extent to which different elements of the practice—such as training, suggestion, and individual differences—affect the dimensions of phenomenal experience seen in meditators.

Dereification

A dereified stance toward one's experience treats the contents of experience strictly as mental contents rather than as accurate depictions of reality. Dereification is closely related to meta-awareness, since awareness of one's experience is part of what allows one to take a dereified stance toward it. For this reason, we believe that meta-awareness is necessary for dereification. It follows that the two dimensions of meta-awareness and dereification cannot be orthogonal, as they are presented in the PNM. Nevertheless, the notion of dereification gets at something important and distinct from meta-awareness. Dereification refers to the more affective components of decentering or disidentifying from thoughts. When they are dereified, thoughts are not only monitored but also disconnected from elaborative processing, and their affective consequences are altered. They no longer carry the same impact.

All meditation styles probably train dereification to some degree but a paradigm case of low dereification occurs in open monitoring meditation in which one is taught to observe thoughts as passing and insubstantial phenomena. Focused attention meditation also includes noting one's thoughts when attention is distracted from the object of focus, a technique that trains dereification. Initially, dereification is effortful and consciously cultivated, but it eventually becomes habitual through repeated practice.

It is difficult to judge the degree of dereification in hypnosis, since no specific data are available on the topic. It is plausible, however, that hypnotized subjects have lower dereification than both focused attention meditation experts and novices. Focused attention meditation novices try to maintain enough emotional distance from their experience to concentrate on their object of attention, whereas hypnotized subjects are not under the same constraints. Additionally, early researchers of hypnosis related high hypnotizability to one's tendency to become emotionally involved in imaginary scenarios (Hilgard, 1979, 1970; Tellegen & Atkinson, 1974). It is not clear to what extent current researchers hold this view.

Lutz and colleagues believe that meditators' high level of dereification is evinced by their responses to forms of suffering, such as pain, social threat, and depression. With dereification, the sensory aspects of pain, for instance, become detached from its affective and personal significance. Thus, meditators show reduced activation in the central executive network and affective regions, such as the amygdala. They also show improved pain tolerance and reduced pain anticipation, even though their sensory activation to painful stimuli is increased relative to non-meditators (Grant, Courtemanche, & Rainville, 2011; Lutz, McFarlin, Perlman, Salomons, & Davidson, 2013).

Studies have shown that hypnosis can be an effective means of attenuating pain (Derbyshire, Whalley, & Oakley, 2009). Attenuation may occur through differential activity in the ACC and insulae, which indicates that the salience network may be involved in pain perception (Baron Short et al., 2010; Kupers, Faymonville, & Laureys, 2005; Rainville, Duncan, Price, Carrier, & Bushnell, 1997; Spiegel, White, & Waelde, 2010). Pain intensity may also be modulated by the central executive network, due to involvement of the dorsolateral PFC (Lorenz, Minoshima, & Casey, 2003).

That hypnosis can attenuate pain means that it has the potential to induce high dereification (though there are other paths to pain attenuation such as distraction; see Chapter 21). The discussion of meta-awareness in this chapter is also relevant. If hypnotized subjects are capable of exhibiting meta-awareness, then they may be capable of dereification as well. That hypnotized subjects can have emotional experiences similar to those of meditators, including experiences of equanimity, is promising evidence in this regard.

Effort

The hypnotized person exerts a low degree of effort, perhaps comparable to that of the focused attention meditation expert. According to Rainville and Price (2003), the state of focused attention achieved in hypnosis requires effort at the beginning of the session but then becomes passive and relatively effortless. Other authors also note the felt sense of effortlessness in hypnosis (e.g., Lifshitz et al., 2013). In Buddhist texts, the state of the focused attention expert is said to be effortless (Wallace, 1999). It is an empirical question whether this is the case or whether effortlessness is a normative ideal. Some attempts to address this issue have found that focused attention meditation experts have reduced dorsolateral PFC activity compared to novices and mid-level practitioners (Brefczynski-Lewis, Lutz, Schaefer, Levinson, & Davidson, 2007). According to the authors, these data support the claim that meditation experts are in an effortless state, although it is not clear that reduced dorsolateral PFC activity can be straightforwardly taken to indicate reduced effort (for related studies see Barch et al., 1997; Braver et al., 1997; Frith, Friston, Liddle, & Frackowiak, 1991; Levy & Goldman-Rakic, 2000; Petrides, 2000).

Aperture

The aperture of a hypnosis state may be small—comparable to that of a focused attention meditation state—since attention is thought to be object-focused in hypnosis, and both focused attention meditation and hypnosis are conducive to absorption (Rainville & Price, 2003). Some research indicates that hypnotized subjects are less responsive to irrelevant stimuli, a finding that supports this hypothesis (Fehr & Stern, 1967). Nevertheless, there are reasons to think that hypnosis results in more diffuse attention than does focused attention meditation. For instance, hypnotized subjects report their state as having "free-floating" attention (Cardeña, 2005).

Lutz and colleagues highlight the differences in aperture between focused attention and open monitoring meditators using differences in performance on a global-to-local attention task. This task measures speed of spatial attention allocation to a global pattern versus a local detail (Navon, 1977). It reveals a global precedence effect, meaning that most individuals are faster at detecting global targets than local ones. Focused attention meditators are able to override this preference and respond faster to local features. Other research has shown that both open monitoring and focused attention meditators disengage attention more quickly than controls from the global level. Studies of hypnotized subjects using this same task have found that highly hypnotizable people show the same effect as focused attention meditators during hypnosis, though they show a global precedence effect when not hypnotized (Enea & Dafiniou, 2013). (Note that this study used mood induction rather than neutral hypnosis. Subjects were asked to recall autobiographical events that made them feel either "happy and optimistic" or "sad and pessimistic" in order to induce either a positive or negative affect respectively.) The global-to-local attention task is an interesting way of studying spatial attention in the context of the PNM, though given that control participants already show a bias toward the global level, it is not clear whether the task is measuring aperture or some higher-order ability along the lines of attention switching or cognitive flexibility.

Clarity

Lutz and colleagues treat "clarity" as referring to both phenomenal vividness and the vividness of visual experiences. Given this notion of clarity, hypnotized individuals will score highly on the clarity dimension. Hypnosis is often accompanied by vivid visual imagery (Cardeña, 2005; Cardeña et al., 2013). Highly hypnotizable people also report more vivid imagery overall than low hypnotizables (Crawford, 1989; Hilgard, 1970; Sheehan, Fromm, & Shor, 1979; Tellegen &

Atkinson, 1974). Some studies show that hypnosis enhances vividness of imagery (Erickson, 1952), though others show mixed or no results (Coe, St. Jean, & Burger, 1980; Starker, 1974). More broadly, it is a hallmark of hypnosis to experience suggested states in a vivid and detailed manner regardless of sense modality. For instance, the Stanford Hypnotic Susceptibility Scale includes measures on auditory and taste experience, such as hearing a buzzing mosquito or having a sweet taste in one's mouth (Weitzenhoffer & Hilgard, 1962). Thus, we expect hypnosis to result in a clearer and more vivid overall experience.

Stability

The hypnotized subject's state is more stable than that of a focused attention novice because the former does not have to bring their attention back to its object when the mind wanders. Also, the hypnotized subject is more likely to experience absorption (Deeley et al., 2012; Rainville & Price, 2003), which is a stable attentional state. Rainville and Price (2003) report absorption- specific increases in the ACC which is part of the central executive network, indicating that this network may be involved in maintaining stability. The relationship between subjects in deep hypnosis and expert focused attention meditators on this dimension is not clear. The two states may be comparable or, if attention is more variable in deep hypnosis (Cardeña, 2005; Fromm et al., 1981), hypnosis may be less stable than focused attention.

Lessons for comparison

The PNM provides a useful framework for comparing hypnosis to focused attention meditation. Both states are high in object orientation, which is what gives each state the propensity toward absorption. Nevertheless, there is conflicting evidence regarding object orientation in the hypnosis case, since the hypnosis subject experiences more changing contents and free-floating attention. Further research could look to placing hypnosis subjects on this dimension, perhaps by examining performance on tasks involving endogenous attentional orienting (Lutz et al., in press).

Focused attention meditators and hypnosis subjects differ insofar as meditation involves more stability and effort. Effort is a particularly interesting dimension, given that in hypnosis, similar ratings can be obtained on other dimensions key to meditation training but with reduced effort, even at the novice level.

An important lesson that arises from comparing hypnosis and meditation using the PNM is that several features that have been thought of as uniquely meditative are also features of hypnosis. States with high object orientation, narrow aperture, and perhaps even high meta-awareness can be brought about by other interventions besides meditation, namely, by hypnosis.

Meta-awareness and dereification, in particular, are dimensions that need further study in hypnosis. Future research could look at how to separate out meta-awareness from cognitive control at the behavioral level in hypnosis, in order to better assess hypnotized subjects on that dimension. Additionally, it is not clear what is the typical aperture of a hypnosis state. When subjects describe having free-floating attention as well as absorption, is their state one with a narrow aperture whose object is ever-changing, or one with a wide aperture but high engagement with a particular object?

A further question is the causal role of these dimensions in hypnotic experience. For instance, is a state low in object orientation or effort more conducive to generating hypnotic experience? Future research could investigate such causal links.

Additional potential features

There are additional relevant features that could be incorporated into future efforts at mapping hypnosis experiences. These features could be used to compare hypnosis with states such as dreaming and mind wandering. They would also provide us with a more fine-grained method of examining hypnosis, since they are dimensions along which hypnosis participants differ. Research along these lines could examine whether these differences are systematic and what their neural, behavioral, and personality correlates are. The following are some examples based on the research of Pekala and Forbes (1997).

Dialoguing. This is the amount of discursive thought present as part of an experience. High dialoguing occurs in mind wandering and rumination as well as intentional goal-directed thought. Low dialoguing occurs in expert focused attention meditation. Hypnosis subjects differ in the extent to which they experience discursive thought (Pekala & Forbes, 1997).

Imagery. The PM includes clarity of visual experiences, but a useful measure for hypnosis research is the amount of visualization present in the experience. Examples of low imagery states include watching television and some instances of problem solving. High visualization states occur in hypnosis as well as some forms of meditation.

Rationality. This is the degree to which thoughts seem coherent and rational. Dream states are low in rationality, whereas goal-directed thinking is high in rationality. Hypnotic suggestions can reduce the rationality of thoughts and induce agnosia. For example, hypnotized participants in one study were induced to not recognize their faces in the mirror (Connors, Cox, Barnier, Langdon, & Coltheart, 2012). Some subjects experience reduced rationality during deep states of neutral hypnosis (Cardeña, 2005; Pekala et al., 1986).

Control. This is the extent to which one feels able to direct the experience. High control would often be coextensive with high rationality as well as high meta-awareness, though there are notable counter-examples. Mind wandering can be low in control, though it is relatively high in rationality. Lucid dreams can be high in meta-awareness while being low in control, that is, one is aware of one's state as a dream state but unable to change its contents or one's own reactions. Similarly, hypnosis, if Lynn and colleagues (2012) are correct, can have high meta-awareness but low control.

Conclusion

In this chapter, we aimed to contribute to the collaborative efforts between hypnosis and meditation researchers by mapping hypnosis into a phenomenal state space derived from meditation research (Lutz et al., in press). We examined differences in how an absorbed state is instantiated in hypnosis versus meditation. We found key differences in effort and stability, while finding similarities in the object orientation of both experiences. We also tried to address difficult questions about the presence of meta-awareness in hypnosis. Overall, it is interesting to note that features of meditation are present in other states, and future research could examine how various factors, such as suggestion, practice, and individual differences, contribute to different dimensions of meditative experience.

We focused specifically on absorption and, to that end, we reviewed notions of absorption in hypnosis research literature as well as in traditional Indian Buddhist thought. We examined a recent attempt to integrate the two perspectives but argued that differences in the way that absorption is conceptualized in hypnosis and meditation literature preclude a direct comparison. We thus took a step back and examined hypnosis and meditation states more generally, along the dimensions of Lutz and colleagues' PNM of mindfulness. Central issues that arose were the contribution of suggestion to meditation practice and the possibility of engendering meta-awareness in hypnosis participants. We also noted some features of hypnotic experience that could be employed by future phenomenal state mapping.

Being able to see hypnosis and meditation experiences along the dimensions of the PNM has helped to clarify subtle ways in which the two types of experience differ and has pointed out gaps in our knowledge of these experiences. The PNM illustrates a broader approach of using phenomenological features as dimensions for comparing different conscious states. We believe that a state space framework systematizes first-person reports of experience in a manner useful to experimental neurophenomenological research. We have used it as a neurophenomenological tool for comparing hypnosis and meditation, though the phenomenal state space approach can also be applied to other states. As one example, it may be interesting to look at mind wandering using this framework. The framework may provide a way of distinguishing between mind wandering and related states such as rumination—for example, rumination seems higher in object orientation and more stable—as well as a way of distinguishing subtypes of mind wandering such as tuning out versus zoning out (marked by the presence and absence of meta-awareness, respectively).

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Chapter 6

Q. No.	Query
AQ1	the date for reference "Tang, Hölzel, & Posner, 2005" in list is 2015. Which is correct? Please amend accordingly.
AQ2	Naish 2001 and 2003 are not included in the reference list. Please add details for both references.