

OPINION PAPER

State or non-state: that is the question. How a modern understanding of altered states of consciousness can help redefine the idea of hypnosis.

Donato Giuseppe Leo^{1,2} and Jacqueline M. Wheatcroft²

Authors' affiliations:

¹*Department of Pharmacology and Therapeutics, Institute of Systems, Molecular and Integrative Biology, Faculty of Health and Life Sciences, University of Liverpool, Liverpool, UK*

²*School of Psychology, Faculty of Health, Innovation, Technology & Science, Liverpool John Moores University, Liverpool, UK, Research Centre for Brain & Behaviour (RCBB).*

Authors' ORCID:

- **Donato Giuseppe Leo:** 0000-0002-0709-3073
- **Jacqueline M. Wheatcroft:** 0000-0001-7212-1598

Word Count: 8,108 words (excluding title page, abstract, declarations, and list of references)

Corresponding author: Dr Donato Giuseppe Leo, Department of Pharmacology and Therapeutics, Institute of Systems, Molecular and Integrative Biology, Faculty of Health and Life Sciences, University of Liverpool, Liverpool, United Kingdom; e-mail: d.g.leo@liverpool.ac.uk

© <2026> This manuscript version is made available under the CC-BY-NC-ND 4.0 license <https://creativecommons.org/licenses/by-nc-nd/4.0/>

Conflict of Interest

The authors declare no conflict of interest.

Authors' Contribution

DGL: conception and design of the paper, drafting of the manuscript and critical revision.

JMW: conception and design of the paper, drafting of the manuscript, and critical revision.

Funding

None.

Acknowledgments

The authors want to thank Professor Graham Wagstaff (Emeritus Professor of Cognitive-Social Psychology) from the Department of Psychology at the University of Liverpool for his valuable insights and advice in the writing of this manuscript.

Ethics Statement

Not applicable.

Data availability Statement

Not applicable.

OPINION PAPER

State or non-state: that is the question. How a modern understanding of altered states of consciousness can help redefine the idea of hypnosis.

Abstract

A continuing debate in the academic and clinical literature concerns whether hypnosis is best conceptualised as a special state, distinct from normal consciousness, or whether hypnosis and related phenomena are better construed in terms of more mundane, everyday psychological processes. As a possible move toward reconciling these positions, in this paper we argue that, if we introduce the notion of hypnosis as a set of fairly routine procedures designed to achieve a state of non-pathological dissociation, then there is no necessary contradiction between the idea that hypnosis may involve the induction of an altered state of consciousness and the proposal that this arises from and is influenced by the kinds of standard psychological processes encountered in everyday life. To this end, with particular reference to neurophysiological findings, we examine the possible processes involved in the application of standard hypnotic induction procedures and discuss their role in hypnotic responding. However, we also argue that the cultural meanings attached to hypnosis, and other contextual elements such as attitudes and expectancies, are fundamental components of the hypnotic induction process and the experiences we associate with the concept of hypnosis. With these considerations in mind, we propose a new working procedural definition of hypnosis and examine the possible significance of this analysis for therapeutic applications of hypnosis.

Keywords: Altered state of consciousness, dissociation, hypnosis, hypnotherapy, trance state

Introduction

In its 2015 definition, the American Psychological Association (APA) defines hypnosis as a “state of consciousness involving focused attention and reduced peripheral awareness characterised by an enhanced capacity for response to suggestion” (Elkins et al., 2015). As such, this definition would appear to endorse the traditional and popular view of hypnosis as a distinct altered state of consciousness or ‘trance’. However, the issue of whether hypnosis is most appropriately or usefully construed as a special altered state is a continuing source of controversy (Steven Jay Lynn, Joseph P Green, et al., 2015; Wagstaff, 2014). It is also true that most state theorists see hypnosis as a measurable change in experience, attention, or cognition, without necessarily considering it a separate mental state (Kirsch & Lynn, 1995). In contrast with the ‘state’ perspective of hypnosis, those who endorse the ‘non-state’ perspective argue that hypnosis and the phenomena attributed to it are more readily described and explained in terms of more standard psychological concepts such as imagination, suggestion, attention, relaxation, conformity, attitudes, expectancies, beliefs, etc., without reference to special altered state or trance processes. This perspective is often also referred to as the ‘socio-cognitive’ view, as it argues that hypnotic phenomena are best described and explained in terms of more mundane social and cognitive processes (Lynn et al., 2008; Wagstaff, 1998; Wagstaff, 2014). Again, this does not mean that non-state theorists do not acknowledge alterations in the subjective experience of hypnosis, but they attribute these alterations to normal psychological mechanisms rather than to a special distinct state (Kirsch & Lynn, 1995).

In many respects, the continuing appeal of the state perspective on hypnosis has been influenced by advances in the technology and application of neuroscience, and the growth in findings indicating that responses to hypnotic suggestions can involve neural and physiological changes. These have frequently been interpreted as attesting to the reality of a hypnotic state (Elkins et al., 2015; Hilgard, 1977a; Hoeft et al., 2012; Jiang et al., 2016; Kallio & Revonsuo, 2003). However, debate continues as to whether these effects are specific to hypnosis and offer support for the concept of a special state or trance process, or whether they are again simply the correlates of more mundane social and cognitive processes (Mazzoni et al., 2013; Wagstaff, 1998; Wagstaff, 2014). However, in this paper, as an alternative way of conceptualising this debate, we will argue that there is no necessary contradiction between the idea that there exists what we could term an ‘altered state’ associated with hypnosis, that

has related physiological parameters and effects, and the possibility that its properties may arise from a variety of everyday phenomena.

As background to this idea, it is useful to consider what is meant by the concept of an altered state of consciousness or 'ASC' in the context of hypnosis.

Altered States of Consciousness and the Centrality of Dissociation

In his *'De Anima'*, Aristotle defines consciousness simply as the reflexive awareness of one's own perceptions (Hicks, 2015). However, if we examine and merge the three main modern theories of consciousness, i.e. the 'Information Integration Theory' (Tononi, 2004), the 'Global Workspace Theory' (Baars, 1993), and the 'Higher Order Thoughts Theory' (Rosenthal, 2005), it may be possible to define consciousness in a more nuanced way as a process where internally and externally derived information (through, for example, thoughts and visual perception) are integrated in an ongoing stream of awareness made accessible to both higher (e.g., planning, executive control) and lower (fast and automatic, often operated unconsciously; e.g., basic attention mechanisms) cognitive processes, thus enabling an adaptive and subjective interaction with the external world. Within this conceptualisation, an ASC can be defined as a change or disruption in an individual's awareness, accompanied by a shift in the experiential structure (e.g., sense of agency, perception of time and space) (Lanius, 2015; Timmermann et al., 2023). This may occur spontaneously, or may be induced by various means, such as through psychedelic drugs, meditation, prayer, chanting, and, according to many, hypnosis procedures (Preller & Vollenweider, 2018; Vaitl et al., 2005). Instances of ASCs would include daydreaming and absorption (i.e., mental states in which an individual is fully immersed, engaged, and focused on an activity).

Numerous accounts of what we would term ASCs can be found in historical sources, and ASCs have been evident in religious and medical practices since ancient times; examples include the activities of the Egyptian and Greek Sleep Temples (Yiannaki et al., 2020), and ecstatic trance rituals (Facco, 2017; Lewis, 2002). In Eastern culture, mind absorption practices associated with ASC experiences, such as meditation, yoga and mindfulness, have long been cultivated in religious and philosophical settings as tools to reach enlightenment and achieve various mental and physical benefits (Razzaq, 2021). In Western society, in the 17th Century, the exorcisms practised by Gassner and the theory of animal magnetism proposed by Mesmer opened the door to a broader interest in the therapeutic value of ASCs (Forrest, 2002; Peter,

2005). But perhaps most significant, it was theorising and investigation into ASCs in the 19th Century by those such as d'Henin de Cuwillers and James Braid that ultimately led to modern conceptions of what we now term hypnosis, and the birth of the popular idea that there exists a particular form of ASC that increases responsiveness to suggestion and thereby has therapeutic value (Gravitz, 1993; Yeates, 2018).

However, both historically and in modern theorising, the concept that has perhaps been most centrally related to the idea of hypnosis as an ASC is that of dissociation (Cleveland et al., 2015; Hilgard, 1977b; Woody & Bowers, 1994). Dissociation has been described as the mental process of disconnecting from one's thoughts, feelings, and memory, along with a reduction or loss of the sense of identity (depersonalisation), and the experience of a detachment from reality (derealisation) (Spiegel et al., 2011). As such, dissociation can be defined as a psychological state in which there is a disruption or separation in the normal integration of psychological functions (thoughts, feelings, perceptions, and identity) (Spiegel et al., 2011). Significantly, dissociation has been conceptualised as something that most people experience in at least a mild form in everyday life (Butler, 2006; de Ruiter et al., 2006; Menon, 2021), and dissociative episodes have been related to a range of phenomena including daydreaming, absorption in imaginings, fantasy-proneness, cognitive failure and parasomnias (sleep disorders) such as sleepwalking (Sodré et al., 2023). The proposition that a tendency to dissociate may relate to mental illness also has a long history, as evident in the pioneering work of Charcot, Janet, and Freud and their studies on hysteria in the 19th and 20th Centuries (Bogousslavsky, 2020). Accordingly, dissociation is seen as existing on a spectrum that ranges from mild non-pathological forms, such as day-dreaming, mind wandering and absorption in imaginings, to more severe pathological forms, such as dissociative amnesia, and identity and depersonalisation disorders (Butler, 2006; Dalenberg et al., 2012; de Ruiter et al., 2006; Menon, 2021). One popular model used to explain pathological dissociative states is the trauma model; the idea being that pathological dissociative states can serve as defence mechanisms to cope with repeated trauma (Dalenberg et al., 2012); though debate continues over the status of some of the more profound and extreme phenomena associated with pathological dissociative states, such as multiple selves or personalities, which according to some may be better explained in broader socio-cognitive terms by social, cultural and cognitive variables, such as shared beliefs about dissociation, fantasy-proneness, and high-suggestibility (Giesbrecht et al., 2008). However, current evidence supports neither that

suggestibility directly causes dissociation (socio-cognitive model), nor that suggestion plays no role in it (trauma model); rather, evidence suggests that the level of suggestibility may function as a predisposing factor (Wieder et al., 2023).

Although the idea that hypnosis may involve some kind of dissociative process has traditionally been associated with the state position (Cleveland et al., 2015; Hilgard, 1977a; Wagstaff, 1998), as noted above, it is, nevertheless, assumed that most people will experience at least mild episodes of dissociation in everyday life, outside of contexts defined as hypnosis. It follows, therefore, that when discussing the nature of hypnosis, it would seem unnecessary in principle to have a polarised debate with a special altered state or dissociative process at one extreme and ‘everyday’ processes at the other. Instead, hypnosis could be construed as involving a state of dissociation that arises from the recruitment of a number of everyday processes that may also involve dissociation.

Hypnosis has long been the subject of misconceptions, myths, and scepticism (Geagea et al., 2023; Lynn et al., 2020), but with the advent of modern neuroscientific research, we now potentially have an opportunity to form a clearer idea of what hypnosis may involve. Therefore, with particular reference to this research, in the rest of this opinion paper, we aim to attempt some reconciliation of the state-non-state debate by discussing the idea of hypnosis as a set of procedures which, though encountered in everyday life, if presented in the appropriate context, are capable of inducing an ASC characterised by non-pathological dissociation that may serve to increase response to suggestions. We also aim to highlight some possible implications of this approach for the therapeutic applications of hypnosis.

Hypnosis as a procedure or set of procedures

Within the hypnosis literature, the term ‘hypnosis’ is typically used in two ways. The first is to denote an end state or condition, such as a specific state of consciousness, as in the APA definition referred to earlier (Elkins et al., 2015). The second is as a procedure or set of procedures designed to facilitate entry into this state; these are usually referred to as ‘hypnotic induction procedures’ (Wagstaff, 1991, 1998; Wagstaff, 2014).

Over the years and in different contexts, a variety of induction procedures have been used to invoke hypnosis as an end state. In most modern research and therapeutic sessions, the induction procedures typically involve instructions to concentrate or focus attention on some object or sound, listen to the hypnotist’s voice, close one’s eyes and relax, together with

some kind of countdown to signify the depth of entry into the hypnotic state or 'trance' (Barber, 1969). Although there exist a number of variations, such as the adoption of 'active alert' instructions instead of relaxation (Wagstaff, 1998; Wagstaff, 2014) significantly, overall, these features could be considered particularly likely to invoke two of the main characteristics of the hypnotic state as identified in the APA definition; i.e. a state of focused attention, together with reduced peripheral awareness (Elkins et al., 2015). Further, it has been suggested that this type of induction procedure may enhance responses to subsequent suggestions (Barber, 1969; Brunel et al., 2025; Wagstaff, 1998; Wagstaff, 2014). Consequently, in as much as a state of focused attention and reduced peripheral awareness can be conceptualised as an ASC, then hypnosis (as a procedure) could be said to invoke an ASC (Farthing, 1992) that may increase suggestibility in high-suggestibility individuals ('suggestibility' here referring to the propensity to respond to imaginative suggestions usually administered by the hypnotist or hypnotherapist) (Brunel et al., 2025). On an additional note, although one may argue that systematic studies confirming that the hypnotic state is characterised by focused attention and reduced peripheral awareness are still limited, supporting neuroimaging evidence is available (Jiang et al., 2017; Vázquez et al., 2024).

Moreover, we could further propose that this type of induction is likely to result in dissociative experiences in susceptible individuals. For example, as mentioned previously, profound absorption in some activity, such as being intensely focused on watching a movie or engrossed in reading a book, has been described as inducing a state of dissociation, and measures of dissociation have been linked to the disposition to exhibit absorption (de Ruiter et al., 2006; Menon, 2021). Consequently, induction procedures that encourage focused attention, reduced peripheral awareness and sensations of relaxation might be considered ideal candidates for inducing a state of absorption with associated dissociative experiences. Studies investigating the relationship between a general tendency to dissociate and hypnotic suggestibility have produced some mixed findings, though relationships with absorption seem most robust (Cleveland et al., 2015; Dienes et al., 2009; Green et al., 2020). In addition, individuals with dissociative and related clinical conditions show significantly elevated hypnotic suggestibility (L. Wieder et al., 2022).

In as much as hypnosis shares some features in common with other treatments such as meditation and mindfulness, we could argue that the latter can also be understood fundamentally as tools likely to access ASCs. However, according to the view expressed here,

the characteristics of any resulting ASC may vary, both between and within treatments, according to the details of exact procedures employed, which in turn can be said to influence, or be influenced by, four factors: (i) the depth of absorption, (ii) the engagement of specific large-scale brain networks, (iii) the cultural meaning of the context and (iv) the purpose of the induced ASC.

(i) The depth of absorption

‘Depth of absorption’ is a term commonly used by hypnotic state theorists, particularly in therapeutic contexts, to denote the degree and profundity of changes in consciousness and related parameters accompanying various hypnotic procedures and influences; though it is also applied to other treatments that result in ASCs. Operationalised in socio-cognitive terms, ‘depth of absorption’ can be considered to represent the degree to which the participant has become absorbed or engaged in experiences and effects accompanying various related procedures and influences (Wagstaff, 1998; Wagstaff, 2014).

Thus, if participants become involved with and respond to the instructions (through variously concentrating on breathing, body parts, or the hypnotist’s voice, etc., depending on the treatment), they will tend to show incremental increases in the profundity of ASC experiences as the ‘depth of absorption’ increases. As indirect support for this idea, it may be informative to look at electrophysiological findings in this area. For example, although electroencephalography (EEG) markers are not considered to be direct evidence of, or correlates of ‘depth of absorption’, they do correlate with shifts in attention and relaxation, and thus may help in observing changes that occur during phases of the induction process (Gosseries et al., 2024). According to researchers in the area, what could be construed as a ‘light absorption’ (such as that experienced with simple eye-closure and inward-focused attention) usually exhibits Alpha oscillations (8-12 Hz) (De Pascalis, 2024; Gosseries et al., 2024; Williams & Gruzelier, 2001). Though Alpha oscillations also normally occur when we simply close our eyes anyway (this is known as the Berger effect, resulting from the reduction in visual sensory input), they also increase in areas of the brain that are inhibited during attention-demanding tasks (Niedermeyer & da Silva, 2005). With more engagement and a what can be described as ‘deeper’ level of trance, an increase in Theta oscillations (4-7 Hz) is usually observed (De Pascalis, 2024; Gosseries et al., 2024; Williams & Gruzelier, 2001). Theta oscillations also more generally increase in tasks that require focused attention (frontal

midline Theta) and during shifts in attention, either internally (e.g., between thoughts and memories) or externally (e.g., between sensory cues) (Mitchell et al., 2008).

A variety of findings suggest that a variety of features of typical hypnotic induction procedures, in particular, would appear to facilitate this transition to Theta activity. Thus, procedures that require sustained attention may be associated with increased frontal midline Theta-band activity. Moreover, those that synchronise brainwave activity with external stimuli (neuronal entrainment), such as to focus on the slow beats of a metronome (auditory entrainment) (Nozaradan et al., 2011), can also lead to an increase in Theta oscillations due to the tendency of the brain to synchronise with the rhythm of the repetitive stimulus. It can be noted that metronomes are sometimes used in hypnotic induction procedures (Barber, 1969). This can also happen with slow and repetitive visual stimuli (visual entrainment) that also involve object-place memory in following the predictable spatial position of the object (Sato & Yamaguchi, 2008), such as following with the eyes a swinging pendulum, or a moving pen (Köster et al., 2019), as is found in some older, more traditional hypnotic induction procedures. Arguably, therefore, an understanding of which kinds of induction procedure are most effective in promoting Theta oscillations may be important in enhancing the response to related interventions, as Theta oscillations may reflect the extent to which participants are likely to be engaged with the process (Jensen et al., 2015). As one might predict, neuronal oscillations may also change throughout treatment sessions as the instructions change (Williams & Gruzelier, 2001). However, it is important to note that findings from studies reporting EEG measures of hypnosis are heterogeneous and that there is not an universally accepted EEG signature of hypnosis (De Pascalis, 2024).

(ii) The engagement of specific large-scale brain networks

Although a variety of treatments (e.g., meditation and mindfulness, as well as hypnotic induction) have been associated with generating ASCs, and they can share commonalities in experience (Wagstaff, 2014), how they engage large-scale brain networks may potentially differ. In neuroscientific research, the three main large-scale brain networks identified as involved in cognitive functions are the Default Mode Network (DMN – self-referential processes and recollection of previous experience), (Andrews-Hanna et al., 2014) the Executive Control Network (ECN – goal-oriented thinking, attention, and cognitive control), (Shen et al., 2020) and the Salience Network (SN – detection and regulations of emotions, also

regulating the switch between the DMN and the ECN) (Goulden et al., 2014). These three networks form part of the Triple Network Model of Psychopathology (TNMP) (Menon, 2011), which describe how the interaction of these three large-scale brain networks underlie a wide range of cognitive and affective functions.

Alterations in the activity and functional connectivity of these networks have been observed during a variety of both non-pathological and pathological dissociative states. For example, in non-pathological spontaneous dissociative states, such as those associated with everyday mind wandering and daydreaming, increased activity of the DMN (interpreted as relating to an increase in self-referential thoughts) and decreased activity in the ECN (relating to a reduced focus on external tasks), have been observed (Zhou & Lei, 2018). Also, in such states, low activity in the SN has been associated with prolonged mind wandering, with disfunction of the SN leading to excessive distractibility (Bonnelle et al., 2012; Bozhilova et al., 2018).

Most relevant here, however, are a range of changes in large-scale brain network activity and connectivity reported in relation to non-pathological guided-dissociative states, such as those associated with hypnosis and meditation procedures (Deeley et al., 2012; Garrison et al., 2015; Halsband & Wolf, 2021; Jiang et al., 2017; Palhano-Fontes et al., 2015; Zhang et al., 2023). Significantly, hypnotic induction, in particular, is associated with *reduced* activity in the DMN (Deeley et al., 2012), together with changes in functional connectivity between the DMN, the ECN, and the SN (Jiang et al., 2017). Importantly, it has been argued that the processes involved in these changes may relate to, and could at least partially account for, the increases in suggestibility found with hypnosis procedures (Brunel et al., 2025; Jiang et al., 2017). The rationale here is that reduced activity in the DMN, associated with self-referential thinking (Deeley et al., 2012), coupled with reduced functional connectivity between areas of the DMN (posterior cingulate cortex) and ECN (dorsolateral prefrontal cortex) (Jiang et al., 2017), may accompany or reflect diminished self-monitoring and reduced critical thinking. At the same time, hypnosis procedures have been shown to increase functional connectivity between the ECN and the SN (Jiang et al., 2017), which may potentially reflect an increase in emotional control and the redirection of attention away from rumination. It is important to note, however, that only a few studies have properly investigated the role that hypnotic induction has on suggestibility, showing that hypnosis has a modest and variable effect on it, which is largely determined by baseline levels of suggestibility

(Braffman & Kirsch, 1999). Hypnotic responding arises from multiple interacting cognitive processes and strongly depends on specific suggestions and context (Brunel et al., 2025). Moreover, as variation in consciousness arises from the reconfiguration of large-scale brain networks (Crittenden et al., 2015; Riemer et al., 2020; Weber et al., 2022), it is important to understand that an ASC, such as the one elicited by hypnotic procedures, is not a categorically bounded state, but rather a dynamic, multidimensional configuration of interacting processes (such as attentional control and individual suggestibility). Induction appears to modulate the interaction of major large-scale brain networks, creating a cognitive environment that may enable suggestions to be absorbed and enacted more efficiently, primarily in high-suggestibility individuals (Brunel et al., 2025).

However, if we are to construe hypnosis as inducing non-pathological dissociation, it may also be informative to examine the extent to which their neurophysiological effects can be differentiated from those associated with pathological dissociation. As has been mentioned, hypnosis has been associated with general reduced activity in the DMN (Deeley et al., 2012) and reduced functional connectivity between the DMN and the ECN (Jiang et al., 2017), which together have been associated with diminished self-monitoring and critical thinking (Barnett & Vasiliu, 2025; van Buuren et al., 2010). In contrast, research suggests that, in the case of pathological dissociation, there is hyperconnectivity within the ECN during the resting state, with both increased and decreased connectivity with regions of the DMN (Lebois et al., 2022), such as decreased connectivity between ECN and lateral middle temporal gyrus (inducing depersonalisation/derealisation symptoms) and increased connectivity between ECN and temporal-parietal-occipital junction (increasing feelings of detachment and unreality) (Lebois et al., 2022). Moreover, hyperconnectivity within the DMN contributes to depersonalisation/derealisation symptoms (Lebois et al., 2022). However, it is important to note that these findings only provide data on trait-level neural predisposition, and does not directly capture acute dissociative episodes. Nevertheless, these findings help understand that despite similar networks are engaged during pathological and non-pathological dissociation, they differ in temporal dynamics, reversibility, and functional consequences. For example, a decrease in connectivity between the DMN and ECN may have very different implications for someone undergoing hypnosis compared to someone experiencing a pathological dissociative episode. Thus, with hypnosis, it may simply reflect a reduction in

critical thinking, whereas with pathological dissociation it may be associated with experiences of profound derealisation and unreality.

Consider another example. It has been argued that both pathological and non-pathological dissociation can negatively affect memory recall, as in the case of dissociative amnesia (Kihlstrom & Evans, 2014; Staniloiu & Markowitsch, 2014). Although the status of fully psychogenic dissociative amnesia remains a continuing source of controversy (Otgaar et al., 2019), in both cases, it has been suggested that memory deficits may occur due to failure to adequately activate areas of the ECN (such as the right middle lateral frontal cortex), together with failure in activating areas of the DMN (hippocampi and para-hippocampi) and a decreased connectivity between structures of the DMN (hippocampus) and of the SN (amygdala) (Taïb et al., 2023). Nevertheless, research suggests that manifestations of memory loss shown with hypnosis and pathological dissociation may be both qualitatively and quantitatively different. It is notable, for instance, that reduced hippocampus volume has been observed in patients with dissociative disorders (Dimitrova et al., 2023), which some have suggested may indicate a general propensity for deficiencies in memory and emotional control of stress in those prone to such disorders (Vermetten et al., 2006). In contrast, the evidence suggests that memory loss is not an intrinsic or defining characteristic of hypnosis or hypnotic suggestibility (Hilgard & Cooper, 1965; Terhune et al., 2011). Instead, the research literature indicates that, when they occur, apparent memory deficits with hypnosis are best construed as expectancy or suggestion induced phenomena that can be readily eliminated or reversed if participants are provided with cues or suggestions that imply that full or accurate recall is required or expected (Silva & Kirsch, 1987; Wagstaff, 2000; Wagstaff et al., 2011). Moreover, contrary to the physiological account of dissociative memory loss just mentioned, hypnosis procedures have been shown to increase rather than decrease functional connectivity between the ECN and the SN, which reflects an increase in emotional control and focus away from rumination (Jiang et al., 2017).

The significance of anxiety or stress in precipitating dissociative episodes is another issue that potentially illustrates the importance of examining physiological and psychological effects together when comparing non-pathological and pathological processes. For example, anxiety states have been associated with increased connectivity between the DMN and the SN (the amygdala), reinforcing fear-based thinking and reducing the ability to switch between self-referential thinking and critical thinking, which, in turn, increases emotionally driven

responses (Zhang et al., 2024). Also, during states of emotional distress, a decoupling of activity between the ECN and the DMN has been observed (Xu et al., 2019) together with increased functional connectivity within the DMN (Coutinho et al., 2016; Yuan et al., 2023). This has been assumed to reflect a reduction of control of overanxious thoughts, together with excessive self-referential thinking, respectively (Coutinho et al., 2016; Yuan et al., 2023). The increased functional connectivity within the DMN and the altered activity of the SN observed during anxiety may potentially explain why anxiety level is positively associated with the occurrence of dissociative experiences (dissociative anxiety) (Belli et al., 2017; Krause-Utz et al., 2017; Lofthouse et al., 2023). It can be noted, however, that similar directional changes in brain activity found with hypnosis have been interpreted very differently. For example, although reductions in connectivity between the DMN and the ECN have also been shown in hypnosis, assumed to reflect changes in self-monitoring and critical thinking (Jiang et al., 2017), they have not been associated with a reduction in the control of anxious thoughts as found in anxiety states. On the contrary, as we will discuss later, hypnosis procedures (as well as those for meditation, mindfulness, etc.) are often considered to be valuable tools for reducing anxiety.

The interpretation of physiological findings in this area, therefore, presents obvious challenges. A further particular issue in the case of hypnosis, concerns clarifying the interplay between engagement with areas of the brain with procedures such as eye-closure and relaxation, and subsequent reduction of activity in these same areas found with hypnosis. For example, research suggests that sustained attention tasks engage the ECN more (Fassbender et al., 2004), while eye-closure at rest shift brain activity toward internally oriented, interoceptive processing (Marx et al., 2004). This may affect how focused-attention induction (e.g., eye fixation and focused breathing) and relaxation-based inductions (e.g., eye closure) are perceived and experienced by the individual receiving hypnosis. One possible implication of the latter is that because hypnosis may be related to reduced activity in the anterior part of the DMN (e.g., medial prefrontal cortex) in individuals with high suggestibility (McGeown et al., 2009), very early engagement of DMN (as might occur with an eye closure induction) could lead to an increase in self-referential thinking, negatively affecting the focus on subsequent instructions provided by the hypnotist or hypnotherapist. However, given the popularity and effectiveness of standard relaxation/eye closure instructions in facilitating hypnotic responsiveness, and the fact that they often occur early in the induction sequence

(Barber, 1969), another possibility, is that, paradoxically, to achieve an end state where self-referential thinking is reduced, it helps first to direct attention inward to oneself (like initially inducing tension to facilitate the release of tension in Progressive Muscle Relaxation; PMR) (Muhammad Khir et al., 2024).

However, since DMN and ECN activity is highly context-dependent and sensitive to task demands, individual differences, and analytical methods, interpretation of such findings should remain cautious (Laumann et al., 2024). Nevertheless, notwithstanding these issues, it would seem that the overwhelming bulk of evidence presented here indicates that guided procedures such as hypnosis fit far better within the rubric of non-pathological dissociative processes than pathological ones. Moreover, if we accept the interpretations of various researchers in this area, we can see how, within the context of hypnosis, physiological findings could be considered supportive of the idea that the application of a combination of apparently very mundane everyday activities (closing eyes, focusing attention, relaxing, becoming absorbed, etc.) might potentially evoke effects that can increase responsiveness to subsequent suggestions and engagement with therapeutic instructions (Brunel et al., 2025). As such, with further research, physiological findings may ultimately be able to inform the most appropriate selection and sequencing of inductions for various tasks.

(iii) The importance of cultural meaning

A variety of evidence indicates that efficacy of induction procedures may be extremely reliant on the context in which they are applied. In fact, the label of, or contextualisation of the situation as 'hypnosis', seems critical to whether induction procedures will enhance suggestibility and reports of 'feeling hypnotised' (Barber, 1969; Gandhi & Oakley, 2005; Wagstaff, 2014). Hence, for example, relaxation style hypnotic induction procedures in themselves are ineffective in increasing responsiveness to suggestions; they will only do so if they are explicitly labelled as 'hypnosis' (Gandhi & Oakley, 2005). Similarly, a focused breathing exercise will not of itself generate participant reports of feeling 'hypnotised' unless it is introduced as 'hypnosis' (Wagstaff, 2014). The significance of the label of hypnosis is also illustrated in the finding that simply labelling a cognitive-behavioural therapeutic treatment as 'hypnosis' may be sufficient to enhance its therapeutic effectiveness (Mazzoni et al., 2013).

But why should contextualising the situation as one of 'hypnosis' be so important? To examine this, it may be useful to look at the more general literature indicating that the social

and cultural environment may shape the perception of ASCs and dissociative episodes. It has been argued the idea that personal beliefs and social expectancies can affect the individual tendency to dissociate is evident in ecstatic religions that aim at communicating with the divine (Lewis, 2002; Marie et al., 2024; Randal et al., 2018); examples range from the ancient cult of Dionysus (Mysteries of Dionysus) (Kraemer, 1979) to Haitian Voodoo (Desmangles & Cardeña, 1996), Italian Tarantism (De Martino & Zinn, 2005), Christian mysticism (Pretorius, 2008), and Shamanism (Lewis, 2002). Trance-induced possessions, as in spirit possession, where the trance allegedly induces a spiritual being to take control over the identity and consciousness of an individual, have also been depicted and used in many religious and spiritual practices (Lewis, 2002). In this way, cultural beliefs and practices may not only motivate people to engage in practices that promote dissociation and ASCs, but also to use such experiences to interpret their responses in line with their beliefs and expectations (Leo, 2025). For example, one could argue that the belief that one is in a trance-like state in which one is controlled by an external entity (as in the case of spirit possession, or a hypnotist taking control over an individual's mind) while experiencing a sense of involuntariness (or "automaticity"), is more likely to be accepted if the context is one that involves procedures that induce dissociative episodes involving reduced critical awareness (neurophysiologically related to changes in modulation of activity and connectivity in the DMN) (Leo, 2025; S. J. Lynn et al., 2015; Monsa et al., 2018). This reduced self-monitoring can also be understood as a diminished higher-order awareness of one's intentions, as described in Cold Control Theory (Dienes & Perner, 2007), which may contribute to the experience that actions, although executed voluntarily, are perceived as involuntary.

Examined from the perspective of ASC/dissociation theories, therefore, these considerations present two main possibilities for explaining why inductions need explicitly to be labelled or contextualised as 'hypnosis' to increase suggestibility. The first is that, even if induction procedures produce a state of dissociation with concomitant neurophysiological changes, the induction procedures and any resulting state do not themselves impact *directly* on response to subsequent suggestions. Rather they act *indirectly* to encourage participants to believe that they are in, or are about to enter, a special state of hypnosis associated with increased response to suggestions, and it is the expectancy generated by this interpretation that provides an extra impetus to respond to suggestions (Brunel et al., 2025; Kirsch, 1999; Mazzoni et al., 2013; Wagstaff, 2014).

However, an alternative, or additional view, is that adding the contextual label of hypnosis encourages the participant to recruit features of the ASC experience resulting from the induction procedures to aid directly response to suggestions and therapeutic instructions. For example, sensations of involuntariness and reductions in critical awareness are commonly required or desired as necessary features of hypnotic response to suggestions. Consequently, if the situation is labelled as 'hypnosis', those who respond positively are more likely to recruit or engage any features of the dissociative experience resulting from the induction procedures that can help them respond veridically to such suggestions. Also, more generally, if hypnotic inductions facilitate a reduction in self-monitoring and critical thinking, then participants may be more open to accepting and following any instructions given to them. It can be noted here that for this to happen, we would argue that the situation does not *literally* have to be labelled as 'hypnosis', so long as the participant perceives it to correspond to their cultural interpretation of the concept; which, in Western Culture, is most typically an ASC characterised by focused attention, loss of peripheral awareness, relaxation, increased suggestibility, etc. (Elkins et al., 2015; Wagstaff, 2014).

Related here is the fact that, despite any similarities there may be between hypnosis and other procedures that have been associated with ASCs, such as meditation and relaxation, it is clearly the case that these various procedures have very different cultural meanings. Within meditative practices, for example, although there may be overlaps with hypnosis in terms of them acting as aids for reaching an ASC, such as intense focus on a visual stimulus, word or a phrase repeated multiple times (Kita et al., 2017; Perry et al., 2022), these are often charged with religious and symbolic meaning that is not apparent with hypnosis; and, very significantly, there is generally no expectation that they will result in increased suggestibility. Hence, participants will not be motivated to recruit or engage these processes to meet the expectation that suggestibility will be increased. Importantly, the ASC construct does not compete with mechanistic accounts (e.g., Cold Control Theory) of the cognitive processes underlying responses to hypnosis, but rather aims to characterise the emergent phenomenological and neurocognitive profile associated with sustained engagement in hypnotic procedures.

A final note should be made about highly hypnotisable individuals, as they display considerable heterogeneity in how they respond to hypnotic procedures. While some rely on absorption (Terhune, 2015), others rely more on imaginative involvement or attentional

strategies (Barber, 2000; Pekala & Forbes, 1997; Terhune, 2015). Sociocultural frameworks influence how these mechanisms contribute to the experience of the hypnotic state. They do not determine causality but shape the phenomenology of the hypnotic experience. Importantly, although non-pathological dissociative experiences are proposed as a relatively common component in highly hypnotisable individuals under specific conditions, they are not assumed to be necessary or invariant features of hypnosis (Oakley & Halligan, 2013). Indeed, similarly to meditation, the phenomenological and cognitive profile of these experiences varies across individuals and contexts (Fox et al., 2016). Moreover, the notion of an ASC does not replace factors such as expectancy; rather, it provides an additional level of explanation at which large-scale patterns of experience and brain organisation can be described and systematically investigated (Oakley & Halligan, 2013; Pekala et al., 2010).

(iv) The purpose of the induced Altered State of Consciousness

The different cultural meanings of various procedures related to the achievement of ASCs and dissociative episodes are very much reflected in their goals or purposes. For example, hypnosis has been used mainly for therapeutic purposes in treatments such for anxiety reduction, habit cessation and chronic pain relief (Carmody et al., 2008; Langlois et al., 2022; Valentine et al., 2019). In contrast, though they have also been used for therapeutic purposes (in their Western adaptation), traditionally meditation practices, in their context of origin, have been used primarily for spiritual enlightenment and self-growth (Walsh, 1983). Moreover, one feature of hypnosis, alluded to earlier, is that unlike, say, the therapeutic use of meditation, relaxation and mindfulness for stress relief, hypnosis (as distinct from hypnotherapy) is not usually construed by its practitioners as a therapy in itself. Rather, it is seen as an *adjunct* to therapy; i.e., hypnotherapy can thus be construed as a therapy (typically one involving techniques such as positive suggestions, imagery and cognitive restructuring) facilitated by the addition of 'hypnosis', in the form of hypnosis induction procedures (Kirsch & Braffman, 1999; Kirsch et al., 1995; Wagstaff et al., 2010).

Towards a working definition of hypnosis.

Given these considerations, we can now perhaps look again at what might be a suitable working or operational definition of hypnosis to apply to standard research and therapeutic practice. Although hypnosis can be defined as an end state or condition, arguably, from both

a semantic and practical viewpoint, in the sense of communicating what hypnosis involves in research and clinical contexts, and in promoting the goals of the hypnosis encounter (i.e., facilitating responses to suggestions and related instructions), the use of the term as a procedure or set of procedures might be considered more useful, as also emphasised by other authors (Kihlstrom, 2008; Terhune, 2014).

We would, therefore, suggest the following definition. Hypnosis is:

a procedure involving instructions and suggestions for focused attention, reduced peripheral awareness, and relaxation, aimed at inducing an altered state of consciousness characterised by a non-pathological form of dissociation, presented in and shaped by a social and cultural context that promotes an expectancy for increased responsiveness to suggestion.

As a working or operational definition, this does not preclude alternative procedural definitions that may, for example, exclude relaxation instructions; however, we would argue that instructions for focused attention, reduced peripheral awareness and relaxation most typically apply to the kinds of ‘hypnosis’ procedures described historically and in most research and therapeutic contexts (Wagstaff, 2014).

It should be emphasised that the ASC proposed here is not categorically bounded or unique to hypnotic procedures. Rather, in line with dimensional and network-based framings of consciousness (Dehaene et al., 2017; Tononi et al., 2016; Vaitl et al., 2005), it is conceived as a multidimensional and graded profile characterised by varying degrees of attentional modulation, cognitive control, and dissociative experience (Oakley & Halligan, 2013; Vaitl et al., 2005). This descriptive and integrative model aims to capture the reliable co-occurrence of these features under specific procedural conditions (in this case, hypnotic procedures), rather than to describe a discrete state entity. In turn, this allows for testable inquiries into the modulation of these procedural elements and their neural correlates, together with the individual interpretation of experience.

In most therapeutic situations, hypnosis as so defined will normally take place as part of a ‘session’ which is usually described as involving four phases: (i) the initial hypnosis procedure (where initial techniques and suggestions for focused attention, relaxation, etc.,

are employed), (ii) 'deepening' (where the 'depth of trance', or engagement with the procedure, is increased), (iii) the therapeutic work, and (iv) 'awakening' (where the individual is brought back to normal awareness/alertness). Within this framework, the session can either be facilitated by a second person, i.e., the hypnotist or hypnotherapist (as in hetero-hypnosis), or conducted solely by the participant (as in self-hypnosis).

Hypnotic responsiveness and volition

It is particularly important to note that when applying this definition, although participants may have experiences of reduced critical awareness and sensations of involuntariness following hypnotic induction, there is no assumption that they have actually lost control of their behaviour. On the contrary, the overwhelming majority of theorists and practitioners now agree that responsiveness to the induction procedures and suggestions cannot occur if the person does not wish to, or cannot, collaborate with the process (Geagea et al., 2023; Lynn et al., 2020). In other words, participants can engage with or disengage from the process at any time, in the same way that they can stop being absorbed in a book, watching a play, following relaxation instructions, and so on. In this regard, the propensity to respond to hypnotic suggestions and have related ASC experiences seems crucially to be dependent on appropriate attitudes, expectancies and skills. Thus, those who have negative attitudes and expectancies will tend not to engage with the process; similarly, those who do not have the prerequisite skills or fail to apply them (i.e., skills such as dissociative or imaginative capacities), may also fail to respond (Cleveland et al., 2015; Dasse et al., 2015; Gfeller et al., 1987; Lynn et al., 2008; Steven Jay Lynn, Jean-Roch Laurence, et al., 2015; Wagstaff, 1991; Wagstaff et al., 2010; Lillian Wieder et al., 2022). Correspondingly, responsiveness can be increased, and the therapeutic value of hypnotherapy may be more widely received if these issues are addressed; for example, by addressing misconceptions and fears, and teaching appropriate cognitive strategies and skills (Batty et al., 2006; Gfeller et al., 1987; Wagstaff et al., 2010). The same also applies to other procedures that overlap with hypnotic induction procedures, such as meditation and mindfulness.

Further implications for the therapeutic context and mental health

The preceding analysis may have a number of other further implications for therapeutic applications of hypnosis. For example, the fact that during hypnosis procedures individuals do

not lose agency is fundamental to understanding the ways in which hypnotic induction procedures may influence the efficacy of therapeutic procedures that follow. As mentioned previously, one way in which hypnotic inductions may influence response to therapeutic interventions may be simply that, because of the cultural association with the label of 'hypnosis', they may act indirectly to raise participants' motivation to respond to therapeutic suggestions and instructions and increase positive expectancies of success. However, a second mechanism assumes that characteristics of the procedures themselves may act directly to reduce self-monitoring and to encourage the participants to adopt a less critical mindset in which they are more willing and able to accept and respond to the suggestions and other instructions given by the therapist. In practice, the two mechanisms likely combine to facilitate the same outcome, but importantly, in both cases, because the participants do not actually lose agency, there is no contradiction between the idea that hypnosis procedures may induce a less critical mindset yet be successfully employed to increase responses to suggestions and instructions that promote self-efficacy. On the contrary, most hypnotherapeutic interventions include a variety of techniques found in standard Cognitive Behavioural Therapy such as, guided imagery, positive suggestions, exposure, and cognitive restructuring, specifically designed to promote self-efficacy (Wagstaff et al., 2010). As such, one could perhaps more accurately describe the experience of hypnosis in a therapeutic environment as an 'openness to experience', or 'willingness to accept and engage with therapeutic suggestions and other instructions uncritically', rather than an actual inability to self-monitor and critically evaluate information. Given this, it is also perhaps not surprising that, contrary to occasional media speculation, no link has been established between the administration of standard hypnosis procedures and susceptibility to mental illness (Wagstaff, 2000).

Another possible therapeutic implication concerns the re-examination of the status of hypnosis as a therapy in itself. Whereas hypnosis is most commonly described as an effective adjunct to therapy (to facilitate therapeutic suggestions and instructions), procedures such as meditation and mindfulness are often construed as therapies in themselves, and have now largely been widely accepted in Western medicine as tools for improving mental health and physical health (Chu et al., 2017; Shearer et al., 2016). This is particularly the case with reference to the use of such procedures in the treatment of stress, anxiety and depression (Komariah et al., 2022; Reangsing et al., 2021). As noted earlier, treatments involving the use of hypnosis have also reportedly been beneficial in the treatment of such problems (Milling

et al., 2019; Valentine et al., 2019), though it is important not to confound the effects of hypnosis per se (i.e., applying the induction process) with the effects of suggestions and instructions that follow (Kirsch & Braffman, 1999; Kirsch et al., 1995; Wagstaff et al., 2010). Nevertheless, if we look at the evidence from and interpretation of the neurophysiological literature reviewed earlier, there may be a case for arguing that, in some circumstances, hypnosis, as defined here, may have therapeutic properties in itself. For example, research suggests that anxiety and depression are both characterised by an overactivity of the DMN (Coutinho et al., 2016), reflecting increases in biased threat interpretation, self-referential thinking, and rumination. This may be important with regard to hypnosis, given that hypnosis procedures may be potentially associated with reduced activity of the DMN (Deeley et al., 2012). As such, hypnotic inductions themselves may potentially be used to counter these effects (Deeley et al., 2012; Garrison et al., 2015). Also noteworthy, if the hypnotic induction includes relaxation suggestions, these may help to reduce sympathetic activity and increase parasympathetic activity, deactivating the fight-or-flight response that characterises anxiety (De Benedittis, 2024; Leo et al., 2024). Moreover, the ASC induced by hypnotic procedures have been shown not only to affect the brain's processing of experience and emotions, but also to attenuate activity in sensory and affective pain regions (anterior cingulate cortex, anterior and posterior insula, thalamus, and amygdala) and to increase functional connectivity between these areas and prefrontal control regions (dorsolateral prefrontal cortex, medial prefrontal cortex, and orbitofrontal cortex), consistent with top-down modulation of both the sensory and affective dimensions of pain (Braboszcz et al., 2017; Miltner et al., 2024). These effects can be observed in approaches such as hypnobirthing, where self-hypnosis accompanied by guided imagery and positive suggestion helps pregnant women manage fear, stress, and pain during labour and delivery (Buran & Aksu, 2022; Catsaros & Wendland, 2023), as well as in approaches aiming to manage chronic pain, for example, in fibromyalgia (Dorta et al., 2024).

Finally, it may be worth mentioning a possible further therapeutic feature that hypnosis may share with phenomena such as spirit possession observed in ecstatic religions; that is, its use as a device for allowing clients to divulge or express socially awkward or unacceptable behaviours and information in a socially acceptable way (Leo, 2025). The idea here is that, because of the cultural meaning attached to the idea of 'hypnosis' as an ASC (i.e., a state in which it is anticipated that participants will have unusual experiences, including a

temporary suspension of normal critical faculties), the definition of a context as one of 'hypnosis' may help create a social environment whereby there is tacit permission for the client to behave non-normatively. This might include, for example, expressing or admitting to otherwise socially inappropriate feelings, attitudes, memories and desires that signal a need for therapeutic work, or may aid therapeutic interventions (De Martino & Zinn, 2005; Leo, 2025; Lewis, 2002). In addition, in as much as the induction procedures themselves may act directly to encourage a reduction in self-monitoring and critical thinking, these too may contribute to the relaxation of normal social inhibitions, thus facilitating this effect.

Conclusions

To summarise, according to the view expressed in this paper, it may be appropriate and meaningful to describe the experiences resulting from the application of hypnosis procedures in terms of an altered state of consciousness, characterised by a non-pathological form of dissociation. However, as formulated here, there is no necessary contradiction between this conception as an altered state and the idea that it arises from the sorts of standard kinds of psychological processes found in psychology textbooks and everyday life. In other words, it is unnecessary to polarise hypnotic phenomena as existing at one end of a 'state-non-state' dimension. Nevertheless, a central issue that remains to be resolved is exactly how this resulting 'state' might account for the increase in responsiveness to subsequent suggestions considered to be a fundamental feature of hypnosis. Is it directly through characteristics of the induction procedures themselves, or indirectly because the experiences that result from the induction procedures encourage participants to believe that they are in a special condition in which increased suggestibility is desired and possible? According to the view discussed in this paper, both explanations may be applicable. That is, hypnotic induction procedures and any resulting state may involve characteristics that may both directly and indirectly aid response to suggestions, but, significantly, this will only happen if the context is one in which increased response to suggestion is encouraged and expected. In view of this, we include cultural context and expectancy as fundamental features of our definition.

Whatever the case, however, if we accept the definition and analysis presented in this paper, then one could argue that 'hypnosis' might have a unique status as a therapeutic tool for those predisposed to respond positively (i.e., with positive and appropriate attitudes, beliefs and skills). Its special status comes from the fact that, bolstered by a rather distinct

cultural meaning, it can provide an opportunity to employ procedures and experiences that may be efficacious in themselves, together with a particular capacity to facilitate responses to other therapeutic treatments.

Reference List

- Andrews-Hanna, J. R., Smallwood, J., & Spreng, R. N. (2014). The default network and self-generated thought: component processes, dynamic control, and clinical relevance. *Ann N Y Acad Sci*, *1316*(1), 29-52. <https://doi.org/10.1111/nyas.12360>
- Baars, B. J. (1993). *A cognitive theory of consciousness*. Cambridge University Press.
- Barber, T. X. (1969). *Hypnosis: A Scientific Approach*. Van Nostrand Reinhold. <https://books.google.co.uk/books?id=-U4gAQAAIAAJ>
- Barber, T. X. (2000). A deeper understanding of hypnosis: Its secrets, its nature, its essence. *American Journal of Clinical Hypnosis*, *42*(3-4), 208-272.
- Barnett, K., & Vasiu, F. (2025). Enhanced functional connectivity between the default mode network and executive control network during flow states may facilitate creativity and emotional regulation, and may improve health outcomes. *Frontiers in Behavioral Neuroscience*, *19*, 1690499.
- Batty, M. J., Bonnington, S., Tang, B.-K., Hawken, M. B., & Gruzelier, J. H. (2006). Relaxation strategies and enhancement of hypnotic susceptibility: EEG neurofeedback, progressive muscle relaxation and self-hypnosis. *Brain research bulletin*, *71*(1-3), 83-90.
- Belli, H., Akbudak, M., Ural, C., Solmaz, M., Dogan, Z., & Konkan, R. (2017). Is there a complex relation between social anxiety disorder, childhood traumatic experiences and dissociation? *Nordic journal of psychiatry*, *71*(1), 55-60.
- Bogousslavsky, J. (2020). The mysteries of hysteria: a historical perspective. *International Review of Psychiatry*, *32*(5-6), 437-450. <https://doi.org/10.1080/09540261.2020.1772731>
- Bonnelle, V., Ham, T. E., Leech, R., Kinnunen, K. M., Mehta, M. A., Greenwood, R. J., & Sharp, D. J. (2012). Salience network integrity predicts default mode network function after traumatic brain injury. *Proceedings of the National Academy of Sciences*, *109*(12), 4690-4695. <https://doi.org/doi:10.1073/pnas.1113455109>
- Bozhilova, N. S., Michelini, G., Kuntsi, J., & Asherson, P. (2018). Mind wandering perspective on attention-deficit/hyperactivity disorder. *Neuroscience & Biobehavioral Reviews*, *92*, 464-476. <https://doi.org/https://doi.org/10.1016/j.neubiorev.2018.07.010>
- Braboszcz, C., Brandao-Farinelli, E., & Vuilleumier, P. (2017). Hypnotic analgesia reduces brain responses to pain seen in others. *Scientific reports*, *7*(1), 9778. <https://doi.org/10.1038/s41598-017-10310-4>
- Braffman, W., & Kirsch, I. (1999). Imaginative suggestibility and hypnotizability: an empirical analysis. *Journal of personality and social psychology*, *77*(3), 578.
- Brunel, J., Rainville, P., & Landry, M. (2025). Neural dynamics of hypnotic responding: From unique to multicomponent perspectives on hypnotic phenomena. *Int Rev Neurobiol*, *185*, 99-131. <https://doi.org/10.1016/bs.irn.2025.09.005>
- Buran, G., & Aksu, H. (2022). Effect of Hypnobirthing Training on Fear, Pain, Satisfaction Related to Birth, and Birth Outcomes: A Randomized Controlled Trial. *Clin Nurs Res*, *31*(5), 918-930. <https://doi.org/10.1177/10547738211073394>
- Butler, L. D. (2006). Normative Dissociation. *Psychiatric Clinics of North America*, *29*(1), 45-62. <https://doi.org/https://doi.org/10.1016/j.psc.2005.10.004>
- Carmody, T. P., Duncan, C., Simon, J. A., Solkowitz, S., Huggins, J., Lee, S., & Delucchi, K. (2008). Hypnosis for smoking cessation: a randomized trial. *Nicotine & Tobacco Research*, *10*(5), 811-818.

- Catsaros, S., & Wendland, J. (2023). Psychological impact of hypnosis for pregnancy and childbirth: A systematic review. *Complementary Therapies in Clinical Practice*, 50, 101713. <https://doi.org/https://doi.org/10.1016/j.ctcp.2022.101713>
- Chu, I.-H., Wu, W.-L., Lin, I.-M., Chang, Y.-K., Lin, Y.-J., & Yang, P.-C. (2017). Effects of yoga on heart rate variability and depressive symptoms in women: a randomized controlled trial. *The Journal of alternative and complementary medicine*, 23(4), 310-316.
- Cleveland, J. M., Korman, B. M., & Gold, S. N. (2015). Are hypnosis and dissociation related? New evidence for a connection. *International Journal of Clinical and Experimental Hypnosis*, 63(2), 198-214.
- Coutinho, J. F., Fernandes, S. V., Soares, J. M., Maia, L., Gonçalves Ó, F., & Sampaio, A. (2016). Default mode network dissociation in depressive and anxiety states. *Brain Imaging Behav*, 10(1), 147-157. <https://doi.org/10.1007/s11682-015-9375-7>
- Crittenden, B. M., Mitchell, D. J., & Duncan, J. (2015). Recruitment of the default mode network during a demanding act of executive control. *elife*, 4, e06481.
- Dalenberg, C. J., Brand, B. L., Gleaves, D. H., Dorahy, M. J., Loewenstein, R. J., Cardena, E., Frewen, P. A., Carlson, E. B., & Spiegel, D. (2012). Evaluation of the evidence for the trauma and fantasy models of dissociation. *Psychological bulletin*, 138(3), 550.
- Dasse, M. N., Elkins, G. R., & Weaver III, C. A. (2015). Correlates of the multidimensional construct of hypnotizability: paranormal belief, fantasy proneness, magical ideation, and dissociation. *International Journal of Clinical and Experimental Hypnosis*, 63(3), 274-283.
- De Benedittis, G. (2024). Hypnotic Modulation of Autonomic Nervous System (ANS) Activity. *Brain Sciences*, 14(3), 249.
- De Martino, E., & Zinn, D. L. (2005). *The Land of Remorse: A Study of Southern Italian Tarantism*. Free Association. <https://books.google.co.uk/books?id=d3i1AAAAIAAJ>
- De Pascalis, V. (2024). Brain functional correlates of resting hypnosis and hypnotizability: A review. *Brain Sciences*, 14(2), 115.
- de Ruiter, M. B., Elzinga, B. M., & Phaf, R. H. (2006). Dissociation: cognitive capacity or dysfunction? *Journal of Trauma & Dissociation*, 7(4), 115-134.
- Deeley, Q., Oakley, D. A., Toone, B., Giampietro, V., Brammer, M. J., Williams, S. C., & Halligan, P. W. (2012). Modulating the default mode network using hypnosis. *Int J Clin Exp Hypn*, 60(2), 206-228. <https://doi.org/10.1080/00207144.2012.648070>
- Dehaene, S., Lau, H., & Kouider, S. (2017). What is consciousness, and could machines have it? *Science*, 358(6362), 486-492. <https://doi.org/10.1126/science.aan8871>
- Desmangles, L., & Cardeña, E. (1996). Trance Possession and Vodou Ritual in Haiti. In (pp. 297-309).
- Dienes, Z., Brown, E., Hutton, S., Kirsch, I., Mazzoni, G., & Wright, D. B. (2009). Hypnotic suggestibility, cognitive inhibition, and dissociation. *Consciousness and Cognition*, 18(4), 837-847.
- Dienes, Z., & Perner, J. (2007). awareness: the cold control theory of hypnosis. *Hypnosis and conscious states: The cognitive neuroscience perspective*, 293.
- Dimitrova, L. I., Dean, S. L., Schlumpf, Y. R., Vissia, E. M., Nijenhuis, E. R., Chatzi, V., Jäncke, L., Veltman, D. J., Chalavi, S., & Reinders, A. A. (2023). A neurostructural biomarker of dissociative amnesia: a hippocampal study in dissociative identity disorder. *Psychological Medicine*, 53(3), 805-813.
- Dorta, D. C., Colavolpe, P. O., Lauria, P. S. S., Fonseca, R. B., Brito, V., & Villarreal, C. F. (2024). Multimodal benefits of hypnosis on pain, mental health, sleep, and quality of life in

- patients with chronic pain related to fibromyalgia: A randomized, controlled, blindly-evaluated trial. *Explore (NY)*, 20(6), 103016. <https://doi.org/10.1016/j.explore.2024.103016>
- Elkins, G. R., Barabasz, A. F., Council, J. R., & Spiegel, D. (2015). Advancing research and practice: The revised APA Division 30 definition of hypnosis. *International Journal of Clinical and Experimental Hypnosis*, 63(1), 1-9.
- Facco, E. (2017). Meditation and hypnosis: two sides of the same coin? *International Journal of Clinical and Experimental Hypnosis*, 65(2), 169-188.
- Farthing, G. W. (1992). *The psychology of consciousness*. Prentice-Hall, Inc.
- Fassbender, C., Murphy, K., Foxe, J. J., Wylie, G. R., Javitt, D. C., Robertson, I. H., & Garavan, H. (2004). A topography of executive functions and their interactions revealed by functional magnetic resonance imaging. *Cognitive Brain Research*, 20(2), 132-143. <https://doi.org/https://doi.org/10.1016/j.cogbrainres.2004.02.007>
- Forrest, D. (2002). Mesmer. *International Journal of Clinical and Experimental Hypnosis*, 50(4), 295-308.
- Fox, K. C., Dixon, M. L., Nijeboer, S., Girn, M., Floman, J. L., Lifshitz, M., Ellamil, M., Sedlmeier, P., & Christoff, K. (2016). Functional neuroanatomy of meditation: A review and meta-analysis of 78 functional neuroimaging investigations. *Neurosci Biobehav Rev*, 65, 208-228. <https://doi.org/10.1016/j.neubiorev.2016.03.021>
- Gandhi, B., & Oakley, D. A. (2005). Does 'hypnosis' by any other name smell as sweet? The efficacy of 'hypnotic' inductions depends on the label 'hypnosis'. *Conscious Cogn*, 14(2), 304-315. <https://doi.org/10.1016/j.concog.2004.12.004>
- Garrison, K. A., Zeffiro, T. A., Scheinost, D., Constable, R. T., & Brewer, J. A. (2015). Meditation leads to reduced default mode network activity beyond an active task. *Cognitive, Affective, & Behavioral Neuroscience*, 15, 712-720.
- Geagea, D., Ogez, D., Kimble, R., & Tyack, Z. (2023). Demystifying hypnosis: Unravelling facts, exploring the historical roots of myths, and discerning what is hypnosis. *Complementary Therapies in Clinical Practice*, 52, 101776. <https://doi.org/https://doi.org/10.1016/j.ctcp.2023.101776>
- Gfeller, J. D., Lynn, S. J., & Pribble, W. E. (1987). Enhancing hypnotic susceptibility: Interpersonal and rapport factors. *Journal of personality and social psychology*, 52(3), 586.
- Giesbrecht, T., Lynn, S. J., Lilienfeld, S. O., & Merckelbach, H. (2008). Cognitive processes in dissociation: an analysis of core theoretical assumptions. *Psychological bulletin*, 134(5), 617.
- Gosseries, O., Marie, N., Lafon, Y., Bicego, A., Grégoire, C., Oswald, V., & Vanhaudenhuyse, A. (2024). Exploration of trance states: phenomenology, brain correlates, and clinical applications. *Current opinion in behavioral sciences*, 58, 101400.
- Goulden, N., Khusnulina, A., Davis, N. J., Bracewell, R. M., Bokde, A. L., McNulty, J. P., & Mullins, P. G. (2014). The salience network is responsible for switching between the default mode network and the central executive network: replication from DCM. *NeuroImage*, 99, 180-190.
- Gravitz, M. A. (1993). Etienne Felix d'Henin de Cuvillers: a founder of hypnosis. *American Journal of Clinical Hypnosis*, 36(1), 7-11.
- Green, J. P., Lynn, S. J., Green, O. J., Bradford, V. R., & Rasekhy, R. (2020). Hypnotic responsiveness and dissociation: A multi-variable analysis. *OBM Integrative and Complementary Medicine*, 5(2), 1-21.

- Halsband, U., & Wolf, T. G. (2021). Current neuroscientific research database findings of brain activity changes after hypnosis. *American Journal of Clinical Hypnosis*, 63(4), 372-388.
- Hicks, R. D. (2015). *Aristotle de anima*. Cambridge University Press.
- Hilgard, E. R. (1977a). *Divided Consciousness: Multiple Controls in Human Thought and Action*. Wiley.
- Hilgard, E. R. (1977b). Divided consciousness: Multiple controls in human thought and action.
- Hilgard, E. R., & Cooper, L. M. (1965). Spontaneous and suggested posthypnotic amnesia. *International Journal of Clinical and Experimental Hypnosis*, 13(4), 261-273.
- Hoeft, F., Gabrieli, J. D. E., Whitfield-Gabrieli, S., Haas, B. W., Bammer, R., Menon, V., & Spiegel, D. (2012). Functional Brain Basis of Hypnotizability. *Archives of General Psychiatry*, 69(10), 1064-1072. <https://doi.org/10.1001/archgenpsychiatry.2011.2190>
- Jensen, M. P., Adachi, T., & Hakimian, S. (2015). Brain Oscillations, Hypnosis, and Hypnotizability. *Am J Clin Hypn*, 57(3), 230-253. <https://doi.org/10.1080/00029157.2014.976786>
- Jiang, H., White, M. P., Greicius, M. D., Waelde, L. C., & Spiegel, D. (2016). Brain Activity and Functional Connectivity Associated with Hypnosis. *Cerebral Cortex*, 27(8), 4083-4093. <https://doi.org/10.1093/cercor/bhw220>
- Jiang, H., White, M. P., Greicius, M. D., Waelde, L. C., & Spiegel, D. (2017). Brain activity and functional connectivity associated with hypnosis. *Cerebral Cortex*, 27(8), 4083-4093.
- Kallio, S., & Revonsuo, A. (2003). Hypnotic phenomena and altered states of consciousness: A multilevel framework of description and explanation. *Contemporary Hypnosis*, 20(3), 111-164.
- Kihlstrom, J. F. (2008). The domain of hypnosis, revisited. *The Oxford handbook of hypnosis: Theory, research, and practice*, 21-52.
- Kihlstrom, J. F., & Evans, F. J. (2014). Memory retrieval processes during posthypnotic amnesia. In *Functional Disorders of Memory (PLE: Memory)* (pp. 179-218). Psychology Press.
- Kirsch, I. (1999). Hypnosis and placebos: response expectancy as a mediator of suggestion effects. *Anales de psicología*.
- Kirsch, I., & Braffman, W. (1999). Correlates of hypnotizability: The first empirical study. *Contemporary Hypnosis*,
- Kirsch, I., & Lynn, S. J. (1995). The altered state of hypnosis: Changes in the theoretical landscape. *American Psychologist*, 50(10), 846.
- Kirsch, I., Montgomery, G., & Sapirstein, G. (1995). Hypnosis as an adjunct to cognitive-behavioral psychotherapy: a meta-analysis. *Journal of consulting and clinical psychology*, 63(2), 214.
- Kita, S., Alibali, M. W., & Chu, M. (2017). How do gestures influence thinking and speaking? The gesture-for-conceptualization hypothesis. *Psychological review*, 124(3), 245.
- Komariah, M., Ibrahim, K., Pahria, T., Rahayuwati, L., & Somantri, I. (2022). Effect of mindfulness breathing meditation on depression, anxiety, and stress: A randomized controlled trial among university students. *Healthcare*,
- Köster, M., Martens, U., & Gruber, T. (2019). Memory entrainment by visually evoked theta-gamma coupling. *NeuroImage*, 188, 181-187. <https://doi.org/https://doi.org/10.1016/j.neuroimage.2018.12.002>
- Kraemer, R. S. (1979). Ecstasy and Possession: the Attraction of Women to the Cult of Dionysus. *Harvard Theological Review*, 72(1-2), 55-80.

- Krause-Utz, A., Frost, R., Winter, D., & Elzinga, B. M. (2017). Dissociation and Alterations in Brain Function and Structure: Implications for Borderline Personality Disorder. *Curr Psychiatry Rep*, 19(1), 6. <https://doi.org/10.1007/s11920-017-0757-y>
- Langlois, P., Perrochon, A., David, R., Rainville, P., Wood, C., Vanhauzenhuyse, A., Pageaux, B., Ounajim, A., Lavallière, M., Debarnot, U., Luque-Moreno, C., Roulaud, M., Simoneau, M., Goudman, L., Moens, M., Rigoard, P., & Billot, M. (2022). Hypnosis to manage musculoskeletal and neuropathic chronic pain: A systematic review and meta-analysis. *Neuroscience & Biobehavioral Reviews*, 135, 104591. <https://doi.org/https://doi.org/10.1016/j.neubiorev.2022.104591>
- Lanius, R. A. (2015). Trauma-related dissociation and altered states of consciousness: a call for clinical, treatment, and neuroscience research. *Eur J Psychotraumatol*, 6, 27905. <https://doi.org/10.3402/ejpt.v6.27905>
- Laumann, T. O., Snyder, A. Z., & Gratton, C. (2024). Challenges in the measurement and interpretation of dynamic functional connectivity. *Imaging Neuroscience*, 2, imag-2-00366.
- Lebois, L. A., Kumar, P., Palermo, C. A., Lambros, A. M., O'Connor, L., Wolff, J. D., Baker, J. T., Gruber, S. A., Lewis-Schroeder, N., & Ressler, K. J. (2022). Deconstructing dissociation: a triple network model of trauma-related dissociation and its subtypes. *Neuropsychopharmacology*, 47(13), 2261-2270.
- Leo, D. G. (2025). A Fragmented Mind: Altered States of Consciousness and Spirit Possession Between Rituals and Therapy. *Integrative Psychological and Behavioral Science*, 59(3), 1-20.
- Leo, D. G., Keller, S. S., & Proietti, R. (2024). "Close your eyes and relax": the role of hypnosis in reducing anxiety, and its implications for the prevention of cardiovascular diseases. *Frontiers in Psychology*, 15, 1411835.
- Lewis, I. M. (2002). *Ecstatic religion: a study of shamanism and spirit possession*. Routledge.
- Lofthouse, M. K., Waite, P., & Černis, E. (2023). Developing an understanding of the relationship between anxiety and dissociation in adolescence. *Psychiatry research*, 324, 115219.
- Lynn, S. J., Green, J. P., Kirsch, I., Capafons, A., Lilienfeld, S. O., Laurence, J.-R., & Montgomery, G. H. (2015). Grounding hypnosis in science: The "new" APA Division 30 definition of hypnosis as a step backward. *American Journal of Clinical Hypnosis*, 57(4), 390-401.
- Lynn, S. J., Kirsch, I., & Hallquist, M. N. (2008). Social cognitive theories of hypnosis. *The Oxford handbook of hypnosis: Theory, research, and practice*, 111-139.
- Lynn, S. J., Kirsch, I., Terhune, D. B., & Green, J. P. (2020). Myths and misconceptions about hypnosis and suggestion: Separating fact and fiction. *Applied Cognitive Psychology*, 34(6), 1253-1264.
- Lynn, S. J., Laurence, J.-R., & Kirsch, I. (2015). Hypnosis, suggestion, and suggestibility: An integrative model. *American Journal of Clinical Hypnosis*, 57(3), 314-329.
- Lynn, S. J., Laurence, J. R., & Kirsch, I. (2015). Hypnosis, suggestion, and suggestibility: an integrative model. *Am J Clin Hypn*, 57(3), 314-329. <https://doi.org/10.1080/00029157.2014.976783>
- Marie, N., Lafon, Y., Bicego, A., Grégoire, C., Rousseaux, F., Bioy, A., Vanhauzenhuyse, A., & Gosseries, O. (2024). Scoping review on shamanistic trances practices. *BMC complementary medicine and therapies*, 24(1), 381.
- Marx, E., Deutschländer, A., Stephan, T., Dieterich, M., Wiesmann, M., & Brandt, T. (2004). Eyes open and eyes closed as rest conditions: impact on brain activation patterns.

- Mazzoni, G., Venneri, A., McGeown, W. J., & Kirsch, I. (2013). Neuroimaging resolution of the altered state hypothesis. *Cortex*, 49(2), 400-410.
- McGeown, W. J., Mazzoni, G., Venneri, A., & Kirsch, I. (2009). Hypnotic induction decreases anterior default mode activity. *Consciousness and Cognition*, 18(4), 848-855.
- Menon, V. (2011). Large-scale brain networks and psychopathology: a unifying triple network model. *Trends in cognitive sciences*, 15(10), 483-506.
- Menon, V. (2021). Dissociation by Network Integration. *American Journal of Psychiatry*, 178(2), 110-112. <https://doi.org/10.1176/appi.ajp.2020.20121728>
- Milling, L. S., Valentine, K. E., McCarley, H. S., & LoStimolo, L. M. (2019). A meta-analysis of hypnotic interventions for depression symptoms: high hopes for hypnosis? *American Journal of Clinical Hypnosis*, 61(3), 227-243.
- Miltner, W. H. R., Franz, M., & Naumann, E. (2024). Neuroscientific results of experimental studies on the control of acute pain with hypnosis and suggested analgesia [Review]. *Frontiers in Psychology*, Volume 15 - 2024. <https://doi.org/10.3389/fpsyg.2024.1371636>
- Mitchell, D. J., McNaughton, N., Flanagan, D., & Kirk, I. J. (2008). Frontal-midline theta from the perspective of hippocampal "theta". *Progress in neurobiology*, 86(3), 156-185.
- Monsa, R., Peer, M., & Arzy, S. (2018). Self-reference, emotion inhibition and somatosensory disturbance: preliminary investigation of network perturbations in conversion disorder. *European journal of neurology*, 25(6), 888-e862.
- Muhammad Khir, S., Wan Mohd Yunus, W. M. A., Mahmud, N., Wang, R., Panatik, S. A., Mohd Sukor, M. S., & Nordin, N. A. (2024). Efficacy of Progressive Muscle Relaxation in Adults for Stress, Anxiety, and Depression: A Systematic Review. *Psychol Res Behav Manag*, 17, 345-365. <https://doi.org/10.2147/prbm.S437277>
- Niedermeyer, E., & da Silva, F. L. (2005). *Electroencephalography: basic principles, clinical applications, and related fields*. Lippincott Williams & Wilkins.
- Nozaradan, S., Peretz, I., Missal, M., & Mouraux, A. (2011). Tagging the Neuronal Entrainment to Beat and Meter. *The Journal of Neuroscience*, 31(28), 10234-10240. <https://doi.org/10.1523/jneurosci.0411-11.2011>
- Oakley, D. A., & Halligan, P. W. (2013). Hypnotic suggestion: opportunities for cognitive neuroscience. *Nat Rev Neurosci*, 14(8), 565-576. <https://doi.org/10.1038/nrn3538>
- Otgaar, H., Howe, M. L., Patihis, L., Merckelbach, H., Lynn, S. J., Lilienfeld, S. O., & Loftus, E. F. (2019). The Return of the Repressed: The Persistent and Problematic Claims of Long-Forgotten Trauma. *Perspect Psychol Sci*, 14(6), 1072-1095. <https://doi.org/10.1177/1745691619862306>
- Palhano-Fontes, F., Andrade, K. C., Tofoli, L. F., Santos, A. C., Crippa, J. A. S., Hallak, J. E., Ribeiro, S., & De Araujo, D. B. (2015). The psychedelic state induced by ayahuasca modulates the activity and connectivity of the default mode network. *PLoS one*, 10(2), e0118143.
- Pekala, R. J., & Forbes, E. J. (1997). Types of hypnotically (un) susceptible individuals as a function of phenomenological experience: Towards a typology of hypnotic types. *American Journal of Clinical Hypnosis*, 39(3), 212-224.
- Pekala, R. J., Kumar, V. K., Maurer, R., Elliott-Carter, N., Moon, E., & Mullen, K. (2010). Suggestibility, expectancy, trance state effects, and hypnotic depth: I. Implications for understanding hypnotism. *Am J Clin Hypn*, 52(4), 275-290. <https://doi.org/10.1080/00029157.2010.10401732>

- Perry, G., Polito, V., Sankaran, N., & Thompson, W. F. (2022). How Chanting Relates to Cognitive Function, Altered States and Quality of Life. *Brain Sci*, 12(11). <https://doi.org/10.3390/brainsci12111456>
- Peter, B. (2005). Gassner's exorcism—not Mesmer's magnetism—is the real predecessor of modern hypnosis. *International Journal of Clinical and Experimental Hypnosis*, 53(1), 1-12.
- Preller, K. H., & Vollenweider, F. X. (2018). Phenomenology, structure, and dynamic of psychedelic states. *Behavioral neurobiology of psychedelic drugs*, 221-256.
- Pretorius, S. P. (2008). Understanding spiritual experience in Christian spirituality. *Acta Theologica*, 147-165.
- Randal, P., Geekie, J., Lambrecht, I., & Taitimu, M. (2018). Dissociation, psychosis and spirituality: Whose voices are we hearing? *Psychosis, trauma and dissociation: evolving perspectives on severe psychopathology*, 427-439.
- Razzaq, T. (2021). An analytical comparison of meditation between Hinduism & Buddhism. *Al Sirat-Journal of Islamic and Social Sciences*, 1(2).
- Reangsing, C., Rittiwong, T., & Schneider, J. K. (2021). Effects of mindfulness meditation interventions on depression in older adults: A meta-analysis. *Aging & Mental Health*, 25(7), 1181-1190.
- Riemer, F., Grüner, R., Beresniewicz, J., Kazimierczak, K., Ersland, L., & Hugdahl, K. (2020). Dynamic switching between intrinsic and extrinsic mode networks as demands change from passive to active processing. *Scientific reports*, 10(1), 21463.
- Rosenthal, D. (2005). *Consciousness and mind*. Clarendon Press.
- Sato, N., & Yamaguchi, Y. (2008, 2008//). EEG Theta Regulates Eye Saccade Generation During Human Object-place Memory Encoding. *Advances in Cognitive Neurodynamics ICCN 2007*, Dordrecht.
- Shearer, A., Hunt, M., Chowdhury, M., & Nicol, L. (2016). Effects of a brief mindfulness meditation intervention on student stress and heart rate variability. *International Journal of Stress Management*, 23(2), 232.
- Shen, K. K., Welton, T., Lyon, M., McCorkindale, A. N., Sutherland, G. T., Burnham, S., Fripp, J., Martins, R., & Grieve, S. M. (2020). Structural core of the executive control network: A high angular resolution diffusion MRI study. *Hum Brain Mapp*, 41(5), 1226-1236. <https://doi.org/10.1002/hbm.24870>
- Silva, C. E., & Kirsch, I. (1987). Breaching hypnotic amnesia by manipulating expectancy. *J Abnorm Psychol*, 96(4), 325-329. <https://doi.org/10.1037//0021-843x.96.4.325>
- Sodré, M. E., Wießner, I., Irfan, M., Schenck, C. H., & Mota-Rolim, S. A. (2023). Awake or sleeping? Maybe both... A review of sleep-related dissociative states. *Journal of Clinical Medicine*, 12(12), 3876.
- Spiegel, D., Loewenstein, R. J., Lewis-Fernández, R., Sar, V., Simeon, D., Vermetten, E., Cardeña, E., & Dell, P. F. (2011). Dissociative disorders in DSM-5. *Depress Anxiety*, 28(9), 824-852. <https://doi.org/10.1002/da.20874>
- Staniloiu, A., & Markowitsch, H. J. (2014). Dissociative amnesia. *The Lancet Psychiatry*, 1(3), 226-241.
- Taïb, S., Yroni, A., Lemesle, B., Péran, P., & Pariente, J. (2023). What are the neural correlates of dissociative amnesia? A systematic review of the functional neuroimaging literature. *Front Psychiatry*, 14, 1092826. <https://doi.org/10.3389/fpsy.2023.1092826>
- Terhune, D. B. (2014). Defining hypnosis: The pitfalls of prioritizing spontaneous experience over response to suggestion.

- Terhune, D. B. (2015). Discrete response patterns in the upper range of hypnotic suggestibility: A latent profile analysis. *Consciousness and Cognition*, 33, 334-341.
- Terhune, D. B., Cardena, E., & Lindgren, M. (2011). Dissociative tendencies and individual differences in high hypnotic suggestibility. *Cognitive neuropsychiatry*, 16(2), 113-135.
- Timmermann, C., Bauer, P. R., Gosseries, O., Vanhaudenhuyse, A., Vollenweider, F., Laureys, S., Singer, T., Antonova, E., & Lutz, A. (2023). A neurophenomenological approach to non-ordinary states of consciousness: hypnosis, meditation, and psychedelics. *Trends in cognitive sciences*, 27(2), 139-159.
- Tononi, G. (2004). An information integration theory of consciousness. *BMC neuroscience*, 5, 1-22.
- Tononi, G., Boly, M., Massimini, M., & Koch, C. (2016). Integrated information theory: from consciousness to its physical substrate. *Nat Rev Neurosci*, 17(7), 450-461. <https://doi.org/10.1038/nrn.2016.44>
- Vaitl, D., Birbaumer, N., Gruzelier, J., Jamieson, G. A., Kotchoubey, B., Kübler, A., Lehmann, D., Miltner, W. H., Ott, U., Pütz, P., Sammer, G., Strauch, I., Strehl, U., Wackermann, J., & Weiss, T. (2005). Psychobiology of altered states of consciousness. *Psychological bulletin*, 131(1), 98-127. <https://doi.org/10.1037/0033-2909.131.1.98>
- Valentine, K. E., Milling, L. S., Clark, L. J., & Moriarty, C. L. (2019). The efficacy of hypnosis as a treatment for anxiety: a meta-analysis. *International Journal of Clinical and Experimental Hypnosis*, 67(3), 336-363.
- van Buuren, M., Gladwin, T. E., Zandbelt, B. B., Kahn, R. S., & Vink, M. (2010). Reduced functional coupling in the default-mode network during self-referential processing. *Human brain mapping*, 31(8), 1117-1127.
- Vázquez, P. G., Whitfield-Gabrieli, S., Bauer, C. C. C., & Barrios, F. A. (2024). Brain functional connectivity of hypnosis without target suggestion. An intrinsic hypnosis rs-fMRI study. *World J Biol Psychiatry*, 25(2), 95-105. <https://doi.org/10.1080/15622975.2023.2265997>
- Vermetten, E., Schmahl, C., Lindner, S., Loewenstein, R. J., & Bremner, J. D. (2006). Hippocampal and amygdalar volumes in dissociative identity disorder. *Am J Psychiatry*, 163(4), 630-636. <https://doi.org/10.1176/ajp.2006.163.4.630>
- Wagstaff, G. F. (1991). *Compliance, belief, and semantics in hypnosis: A nonstate, sociocognitive perspective* Guilford Press.
- Wagstaff, G. F. (1998). The semantics and physiology of hypnosis as an altered state: towards a definition of hypnosis. *Contemporary Hypnosis*, 15(3), 149-165. <https://doi.org/https://doi.org/10.1002/ch.125>
- Wagstaff, G. F. (2000). Can hypnosis cause madness? *Contemporary Hypnosis*, 17(3), 97-111. <https://doi.org/https://doi.org/10.1002/ch.198>
- Wagstaff, G. F. (2014). On the Centrality of the Concept of an Altered State to Definitions of Hypnosis. *The Journal of Mind-Body Regulation*, 2(2), 90-108-190-108.
- Wagstaff, G. F., David, D., Kirsch, I., & Lynn, S. J. (2010). The cognitive-behavioral model of hypnotherapy.
- Wagstaff, G. F., Wheatcroft, J. M., & Jones, A. C. (2011). Are high hypnotizables especially vulnerable to false memory effects? A sociocognitive perspective. *Int J Clin Exp Hypn*, 59(3), 310-326. <https://doi.org/10.1080/00207144.2011.570658>
- Walsh, R. (1983). Meditation practice and research. *Journal of Humanistic Psychology*, 23(1), 18-50.

- Weber, S., Aleman, A., & Hugdahl, K. (2022). Involvement of the default mode network under varying levels of cognitive effort. *Scientific reports*, *12*(1), 6303.
- Wieder, L., Brown, R. J., & Terhune, D. B. (2023). Revisiting the role of verbal suggestion in dissociative psychopathology. *Acta Psychiatrica Scandinavica*, *148*(5), 460-462.
- Wieder, L., Brown, R. J., Thompson, T., & Terhune, D. B. (2022). Hypnotic suggestibility in dissociative and related disorders: A meta-analysis. *Neurosci Biobehav Rev*, *139*, 104751. <https://doi.org/10.1016/j.neubiorev.2022.104751>
- Wieder, L., Brown, R. J., Thompson, T., & Terhune, D. B. (2022). Hypnotic suggestibility in dissociative and related disorders: A meta-analysis. *Neuroscience & Biobehavioral Reviews*, *139*, 104751.
- Williams, J. D., & Gruzelier, J. H. (2001). Differentiation of hypnosis and relaxation by analysis of narrow band theta and alpha frequencies. *Int J Clin Exp Hypn*, *49*(3), 185-206. <https://doi.org/10.1080/00207140108410070>
- Woody, E. Z., & Bowers, K. S. (1994). A frontal assault on dissociated control.
- Xu, J., Van Dam, N. T., Feng, C., Luo, Y., Ai, H., Gu, R., & Xu, P. (2019). Anxious brain networks: A coordinate-based activation likelihood estimation meta-analysis of resting-state functional connectivity studies in anxiety. *Neuroscience & Biobehavioral Reviews*, *96*, 21-30. <https://doi.org/https://doi.org/10.1016/j.neubiorev.2018.11.005>
- Yeates, L. B. (2018). James Braid (V): Chemical and hypnotic anaesthesia, psycho-physiology, and Braid's final theories. *Australian Journal of Clinical Hypnotherapy & Hypnosis*, *40*(2), 112-167.
- Yiannaki, S. T., Nomikos, N. N., Gargalianos, D., Stathopoulou, G., & Trakada, G. (2020). Asclepius, the ancient Greek god of medicine. *Vesalius: Acta Internationales Historiae Medicinae*, *26*(1).
- Yuan, M., Liu, B., Yang, B., Dang, W., Xie, H., Lui, S., Qiu, C., Zhu, H., & Zhang, W. (2023). Dysfunction of default mode network characterizes generalized anxiety disorder relative to social anxiety disorder and post-traumatic stress disorder. *J Affect Disord*, *334*, 35-42. <https://doi.org/10.1016/j.jad.2023.04.099>
- Zhang, J., Raya, J., Morfini, F., Urban, Z., Pagliaccio, D., Yendiki, A., Auerbach, R. P., Bauer, C. C., & Whitfield-Gabrieli, S. (2023). Reducing default mode network connectivity with mindfulness-based fMRI neurofeedback: a pilot study among adolescents with affective disorder history. *Molecular psychiatry*, *28*(6), 2540-2548.
- Zhang, Y., Duan, M., & He, H. (2024). Deficient salience and default mode functional integration in high worry-proneness subject: a connectome-wide association study. *Brain Imaging Behav*, *18*(6), 1560-1568. <https://doi.org/10.1007/s11682-024-00951-1>
- Zhou, X., & Lei, X. (2018). Wandering minds with wandering brain networks. *Neuroscience bulletin*, *34*(6), 1017-1028.