Matching Diagnosis and Treatment: The Neuroscience of Hypnosis and Clinical Practice

Fredric Mau
D.Min., M.A., M.Div., LPCS, NCC

British Society of Clinical and Academic Hypnosis
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- Private practice in Columbia, SC, USA.
- Served as Core Faculty for a Graduate Medical Education – Psychiatry Residency Training Program.
- Contributed to the upcoming 5th edition of *Essential Psychopathology & Its Treatment* (W. W. Norton & Company).
- Investigator as part of a multidisciplinary team with Clemson University and Prisma Health Upstate in a randomized controlled trial exploring the efficacy of virtual reality assisted guided imagery (VRAGI) in a home setting for pain management in patients with advanced cancer.
- Wrote the introduction to *Klinische Hypnotherapie - Methoden, Anwendung, Entwicklung* (Clinical Hypnotherapy - Methods, Application, Development; Kohlhammer Verlag).

I have no conflicts or disclosures

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Objectives

1. Participants will be able to describe how hypnosis operates in the brain.
2. Participants will be able to describe the proposed neurological fit between hypnosis and particular DSM-5-TR diagnoses (this uses ICD-10-CM codes)
3. Participants will be able to distinguish the hypnosis from cognitive therapy and mindfulness.
4. Participants will be able to describe the genetic basis of high hypnotizability, and its relationship to hypnosis for physical pain relief.

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What Happens When You Hypnotize Someone?

- The process of hypnosis involves a fractionation or decoupling of conflict-related neural activity in the ACC and cognitive control-related activity in the lateral frontal cortex (Egner et al., 2005).
- In this condition, frontal lobe functioning is reduced (Parris, 2016).
- In highly hypnotizable participants, ACC and prefrontal cortex activity is increased (Bell et al., 2011; Egner et al., 2005).

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Hypnotic Catalepsy & Faking

Clinically trained observers could not distinguish between hypnosis and waking state behavior (Bell, 2011; Ward, 2003)

- Waking rigidity showed increases in the left ventrolateral prefrontal cortex and a number of right posterior cortical structures
- Hypnotic paralysis showed right-sided increases in the orbitofrontal cortex and cerebellum and left-sided increases in the thalamus and putamen

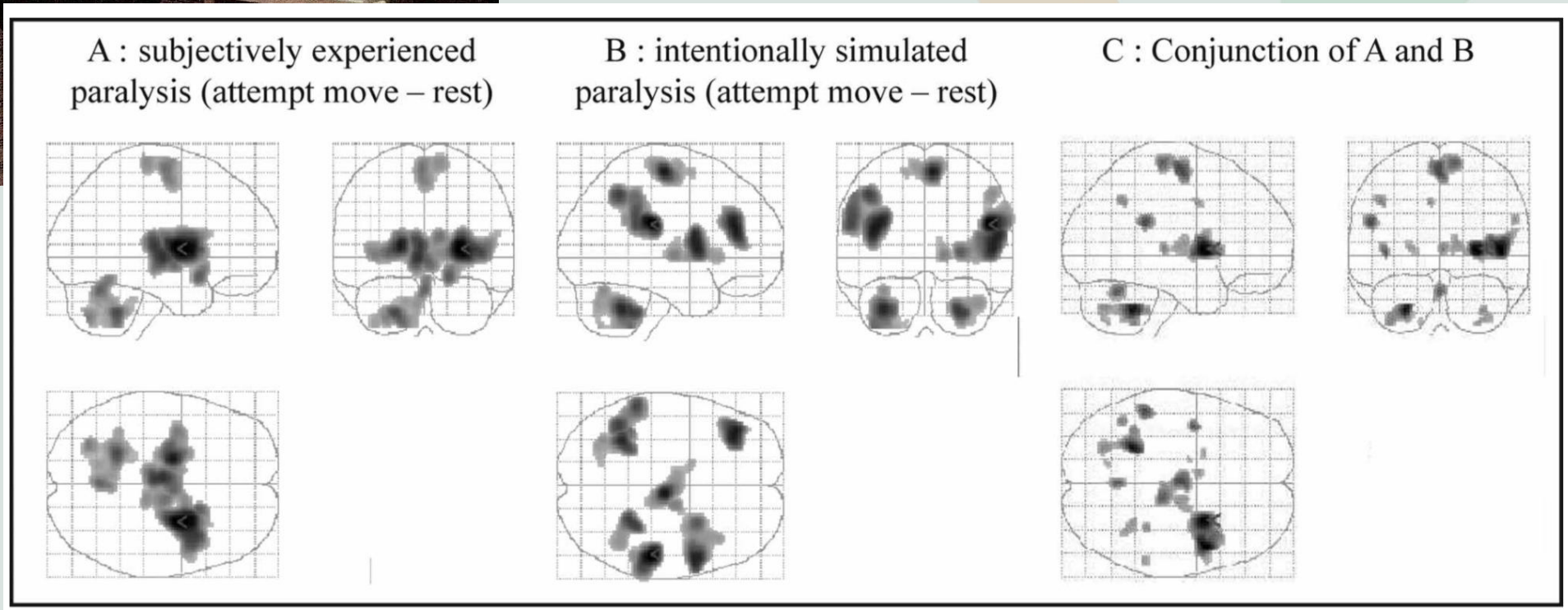

Figure 1. SPM{*Z*}s representing the categorical comparison of brain activations following the instruction to attempt to move the left leg compared to rest during (A) subjectively experienced paralysis (B1-A1), and (B) intentionally simulated paralysis (B2-A2), and (C) the conjunction of the main effects (B1-A1) and (B2-A2). The SPM{*Z*}s are shown as maximum intensity projections. The brain is shown from the right, top, and back. Results for (A) and (B) are shown at cluster level significance (clusters are significant at $p < .05$, corrected for multiple comparisons across whole brain) for display purposes. All voxels in (C) are significant at $p < .05$, corrected for multiple comparisons across whole brain.

It Feel Like it is Happening

- Mental preparation to move involves a residual activation of the motor cortex without movement, consistent with subjective reports of the intent to move being blocked by influences outside conscious control (Cojan et al., 2009; cf. Bell et al., 2011).
- Just as mental health issues feel out of control, hypnotic changes feel unconscious and automatic, like something that is happening, not something you are doing.
- Changes feel like realization not decision.

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Hypnotizability and Diagnosis

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High Hypnotizability

- High hypnotizable individuals exhibit a greater functional connectivity between the left dorsolateral prefrontal cortex, an executive-control region of the brain, and
- the salience network composed of the dorsal anterior cingulate cortex (ACC), anterior insula, amygdala, and ventral striatum, involved in detecting, integrating, and filtering somatic, autonomic, and emotional information (Hoeft, 2012).
- This connectivity is not due to differences in brain anatomy (Spiegel, 2013).

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Hypnotizability & Diagnosis

- Hypnotic Induction Profile (HIP) scores are significantly higher among individuals with posttraumatic stress disorder and functional neurological and anxiety-related disorders but significantly lower among those with schizophrenia (Hoeft et al., 2012).
- The DSM-5-TR notes that “Individuals with schizophrenia have low hypnotic capacity, whereas individuals with dissociative identity disorder have the highest hypnotic capacity among all clinical groups” (American Psychiatric Association [APA], 2022, p. 336).

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- This suggests that hypnotherapy may be effective for traumatic, anxiety, and functional neurological and related disorders, as well as dissociative disorders, but not effective for disorders correlated with low hypnotizability, such as schizophrenia.
- This further suggests that the same brain functionality underlying high hypnotizability contributes to the etiology of correlated disorders and that hypnotherapy takes advantage of this functionality to facilitate healing.

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Diagnosis & Treatment

“The most important factor in deciding treatment is the patient’s diagnosis. Other factors—psychological, medical, sociocultural, ethical, intellectual, financial—influence the choice and conduct of treatment, but except for emergency interventions, no treatment should begin without a diagnosis. Conversely, although diagnosis may serve other ends, its chief purpose is to help determine treatment. Therefore, when clinicians debate a patient’s diagnosis, it is important to know how a change in diagnosis will alter the patient’s treatment” (Kilgus et al., 2016).

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What Might We Treat With Hypnotherapy?

- Anxiety Disorders
- Trauma- and Stressor-Related Disorders
- Depressive Disorders
- Dissociative Disorders
- Somatic Symptom and Related Disorders
- Personality Disorders
- Obsessive-Compulsive Related Disorders
- Feeding and Eating Disorders
- Elimination Disorders
- Sleep-Wake Disorders
- Sexual Dysfunctions

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Non-State Therapies: Cognitive Therapy and Mindfulness

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Hypnosis vs. Cognitive Therapy

- Cognitive therapists teach patients to recognize their distressing emotions, the situations that produce them, and their usual patterns of automatic thoughts, and to evaluate these emotions and consciously respond differently. The goal is symptom management.
- The goal of hypnotherapy is not cognitive symptom management but rather the resolution of symptoms.
- Hypnotic changes feel automatic or even involuntary, like experience rather than action, like realization rather than decision. It is something you notice, not something you do.

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Hypnosis & Mindfulness

There is a significant negative correlation between high mindfulness as measured by the Five Facet Mindfulness Questionnaire and high hypnotizability measured on the Stanford Hypnotic Clinical Scale. “Not only are the mindfulness and hypnotizability constructs unique, but when significantly associated, hypnotic suggestibility corresponds with a tendency to be *less* mindful” (emphasis in the original; Grover et al. 2018).

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Neurology of Mindfulness

- Mindfulness is a cognitive process that does not involve a hypnotic condition: “decentering, or a detached, nonreactive monitoring of changing internal states during mindfulness…is a deliberate cognitive process and differs from hypnotic dissociation.”
- Otani (2016) notes: “Mindfulness and hypnosis seem to exhibit an opposite pattern in regard to functional connectivity in the brain” and “Imaging studies reveal opposite functional connectivity patterns between mindfulness and hypnosis (i.e., coupling versus decoupling of ACC with PFC).”

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Mindfulness vs. Hypnosis

Mindfulness

- A cognitive process
- Involves anterior cingulate and prefrontal cortex coupling
- Involves low suggestibility
- Is about acceptance of emotional and body experience

Hypnosis

- A dissociative process
- Involves ACC and PFC decoupling
- Involves high suggestibility
- Is about changing emotional and body experience

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Sarbin's Role Theory of Hypnosis (1950, Non-State)

- Theodore Roy Sarbin (1911–2005) was an American psychologist and professor of psychology and criminology at the University of California, Santa Cruz. He was known as "Mr. Role Theory" because of his contributions to the social psychology of role-taking.
- Friedlander-Sarbin Scale (1938) was the precursor to the Stanford Hypnotic Susceptibility Scales (SHSS) Hypnotic Induction Profile (HIP)
- "Hypnotic behavior is meaningful, goal-directed striving, its most general goal being to behave like a hypnotized person as this is continuously defined by the operator and understood by the client" (White, 1941).

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The Non-State Theory of Hypnosis

- Differences in response to hypnotic suggestions are not due to any special state of consciousness, but rather to the individual's attitudes, motivations and expectations, or to the level of which the imagination is involved in the process.
- All the phenomena associated with hypnotic suggestions are within usual human abilities. That is, that things that are done in hypnosis that seem amazing can be done without the aid of hypnosis.
- The apparent involuntary behaviors of subjects can be explained otherwise, without bringing in a special hypnotic trance.
- The idea of trance or dissociation comes from abnormal psychology and is misleading because responsiveness to suggestion is a usual psychological response.
- Non-state theorists predicted that no such physiological proof would ever be found, because there is no such state.

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State Hypnosis

- Non-State theories have collapsed since the introduction of fMRI in 1990. Hypnosis clearly involves changes in brain state which are obviously distinct from normal cognition.
- Hypnosis clearly involves dissociation, which also has a neurological and physiological basis.
- Hypnotic changes are produced by the subject, but not via cognition – and they feel involuntary and automatic.
- Non-State theories erroneously reduce hypnosis to a cognitive process, which it is not. But mindfulness is. There is no special neurological state of mindfulness.

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Genetics of Hypnotizability also: Hypnotic Pain Relief

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Genetics of High Hypnotizability

- Highly hypnotizable subjects have a more effective fronto-limbic attentional system, which suggests the involvement of the dopamine system in hypnotizability. This is related to the catechol-O-methyltransferase (COMT) gene.
- Possible links have also been found indicating that the serotonin transporter (SERT) gene and oxytocin receptor gene (OXTR) are involved in high hypnotizability. (Császár et al., 2021).

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Genetics of High Hypnotizability & Pain

- Cortade et al. (2023) used DNA Genotek's Oragene Discover 500 collection kit (Ottawa, ON, Canada) to genotype four single-nucleotide polymorphisms in the COMT gene to identify patients for hypnosis referrals for treatment of postoperative pain.
- The same COMT single-nucleotide polymorphisms relating to high hypnotizability are also associated with individuals at risk for higher clinical pain. These patients
  - exhibit more negative affective components of pain
  - and experience less efficacy from opioid treatment.

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- Given that both hypnotizability and the effectiveness of pain management with opioids may vary based on COMT genotypes, Cortade and colleagues propose that hypnotic pain relief will be more effective for patients who are both highly hypnotizable and less likely to experience relief from opioids.

Psychophysiological Pain Relief

The U.S. Department of Health and Human Services (HHS) Best Practices Inter-Agency Task Force Report (2019) found that while most psychotherapeutic treatments enabled patients to cope with pain more effectively, a small group of psychophysiological approaches enabled patients to alter their physiologic and psychological responses to pain. These recommended *best practice* approaches are hypnotherapy, biofeedback, and relaxation training.

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Neurological Operation of Hypnotic Pain Relief

Hypnosis can alter the experience of pain itself by preventing nociceptive pain inputs from reaching the higher cortical structures responsible for pain perception (Schulz-Stübner et al., 2004; cf. De Pascalis et al, 2015; Del Casale et al., 2015a, 2015b).

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Trauma and Pain Resilience

A growing body of research indicates that trauma and stress – especially in early childhood – is an important factor in pain resilience.

- Normally the brain dials down intensity after experiencing pain, however significant stress in childhood may disrupt brain development and create lifelong changes in the brain's to regulate pain signals. (Smith, 2018; cf. Pierce, et al., 2018; Pierce and Christianson, 2015)
- A history of trauma contributes to increasing sensitivity to psychological or physical distress, and is a predictor for the more likely *co-prescription of opioids and benzodiazepines* for chronic pain patients. This co-use of benzodiazepines *is an important predictor of opioid overdose*. (Pierce, et al., 2018)

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The Recipe for Therapeutic Change

Lane (2015) notes that recalling past experiences is not as therapeutically important as changing the current narratives about those happenings, and provides the recipe for creating change via psychotherapy:

1. Reactivate old memories

2. Engage in new emotional experiences that are incorporated into these reactivated memories via the process of reconsolidation.

3. Reinforce the integrated memory structure by practicing a new way of behaving and experiencing the world in a variety of contexts.

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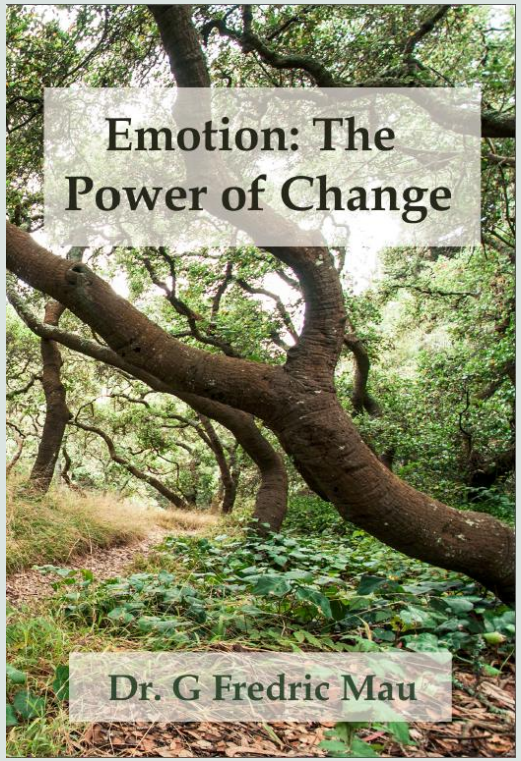

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