

PUTTING THE BUDDHISM/SCIENCE DIALOGUE ON A NEW FOOTING

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NEUROSCIENCE INSIGHTS FROM HYPNOSIS AND MEDITATION



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Neuroscience Insights from Hypnosis and Meditation

Amir Raz, PhD

Raz began by acknowledging the adjustment caused by Laurence Kirmayer's unexpected absence, as they had originally planned together that Raz's talk would build on Kirmayer's. He explained his own background in cognitive neuroscience, computational sciences, psychology, and philosophy of science, but that his talk today on meditation and hypnosis was rooted in his more recent work in clinical neuropsychology.

Like other presenters, he felt personally and professionally hurt by the popularization and false portrayal of the neuroscience of meditation and the repetition of errors in the popular press, even as he could understand the powerful visual appeal of brain imagery, whether it was the volumetric imaging that fascinated him as a young graduate student, or the dynamic patterns of fMRI. In each case, too much is read into data gathered using very constrained techniques, and in particular too much correlation is assumed between structure and function.

Raz compared the illusory nature of neuroscientific interpretation for lay audiences to a magic trick, drawing on his own experience as a professional magician when young. He described setting up a mock neuroimaging device assembled from scrap, including a salon hair dryer, and prerecorded imagery that ostensibly analyzed patterns of brain activity. The setup was run by a white-coated assistant who pretended the device could "mind read" a number thought of by subjects, and was able to fool advanced psychology students and others at a conference in Montreal of the Cognitive Neuroscience Society who were well-positioned to know better. He noted in summary that the social power of neuroscientific imagery is a serious matter that can affect the outcome of studies, and the study of meditation is not free from moneyed interests.

Raz then introduced a number of points from the book *Hypnosis and Meditation* that he edited with Michael Lifshitz, sparked by their discussions on the neuroscience of hypnosis and of meditation.¹ Both are wildly misunderstood in the popular imagination, but beyond what he describes as "this mess" there are "real diamonds and gold" and also pointers to how we form knowledge and understand certain processes through experiment—including how popular impressions of meditation and hypnosis contribute to the power of suggestion operative in their processes.

Raz pointed out that the definition of hypnosis formulated at great effort by John Kihlstrom, one the foremost scholars of hypnosis in the U.S., is so vague as to be meaningless:

Hypnosis is a social interaction in which one person, designated the subject, responds to suggestions offered by another person, designated the hypnotist, for imaginative experiences involving alterations in conscious perceptions and memory, and the voluntary control of action. In the classic instance, these experiences are accompanied by subjective conviction bordering on delusion, and feelings of involuntariness bordering on compulsion.

The lack of specificity is a scientific problem insofar as it becomes impossible to make meaningful predictions.

Raz described his early paper on the effect of hypnotic suggestion on Stroop interference,² showing that an effect that cognitive scientists have long assumed is automatic and unchangeable is in fact malleable and can be modulated. He noted that his

real interest is not hypnosis per se (let alone the Stroop effect) but rather the cognitive psychiatry involved in modulation through suggestion. “Suggestion is a very powerful phenomenon,” he underlined—between peers, between doctor and patient, between government and citizen. He was disappointed that the reception of the paper focused on hypnosis and the Stroop effect rather than on suggestion.

Considering the effect of suggestion when neuro-imaging is used as a feedback mechanism for behavior change, Raz described a review done by his student Robert Thibault that showed similar feedback effects when the brain imagery used was the subject’s, or someone else’s, or was completely fabricated. When the study was published, it received a lot of criticism informally, and so Raz and Thibault responded with a series of increasingly tightly focused articles³ in major journals, all of which received a lot of push-back, but never in peer-reviewed journals. Nevertheless, he emphasized that the fact that neurofeedback is essentially a placebo effect does not diminish its importance: suggestion, including placebo, is an underused and undervalued tool in clinical science.

Inspired by a meta-analysis of morphometric neuroimaging of meditation to do a similar study of hypnosis, Raz discovered “what I can describe in one word as a mess.” The engagement of the visual cortex was the only consistent effect in all the hypnosis studies covered, hardly a surprise given the suggestion of envisioning involved, but the important point to emerge from the meta-analysis was that the ability to regulate is actually dependent on the engagement of the visual cortex and is not effective if the instruction is too abstract to involve visualization. Raz noted the many problems inherent in this kind of study, and that the most relevant points for interdisciplinary work like the present meeting will be overarching issues, not the nitty-gritty that requires specific expertise.

He described a paper he wrote in 2007⁴ that still guides his work today, inspired by his realization that much psychiatric diagnosis was dependent on responses to supposedly specific drugs for which the mechanism was unknown and/or which have no statistical advantage over placebos. Suggestion can influence physiology and produce pharmacological specificity in ways that we do not fully understand, even though we can document them under rigorous experimental conditions, and the lessons learned in studying hypnosis and neurofeedback may have similar relevance in the neuroscientific study of meditation.

Other relevant studies included one by Henry Szechtman et al. using PET imaging⁵ of which Raz replicated variations, that showed apparently similar activity during actual hearing of a voice and hypnotically suggested hallucination of a voice, as compared to a baseline and imagined hearing of a non-existent voice, also both visually similar. An fMRI study showed a similar pattern of activation in response to physical pain and hypnotically suggested pain, differing mainly in intensity, with much less activation in the same areas for imagined pain.⁶ It was these studies and Raz’s concomitant thinking about the possibility that suggestion might modulate processes believed to be automatic that led to his work on modulating the Stroop effect.

The effects of suggestion operating on physiological processes have also been shown in the influence of symbolic thinking about culturally significant dates on death statistics.⁷ Laurence Kirmayer’s work in transcultural psychiatry was a significant influence on Raz’s thinking in this direction. Raz noted that his interest in the power of

suggestion to modulate physiology focuses on top-down processing, counter to the reductionist, bottom-up processing that interests most neuroscientists today. Both approaches share some principles and methodology, but ask different questions.

Fascinated by the Think-Drink effect, where subjects given non-alcoholic drinks described as alcoholic show physical signs of intoxication, Raz wanted to explore how suggestion might override increasingly automatic tasks such as aural comprehension. Using a paradigm similar to the Stroop effect, he chose to examine cross-modal perceptual integration in the McGurk effect, which shows the influence of visual perception on auditory perception in the understanding of speech. It is assumed to be difficult to modulate because it begins very early, being present in infants and in non-human primates. Raz showed it could in fact be modulated, with highly suggestible people improving performance when told that they could.

Individual differences in suggestibility are significant in many studies of the effects on automatic processes, and Raz mentioned a variety of methods for rating individuals' suggestibility. In our culture, he noted, being highly suggestible is construed as weakness: as being easily manipulated or controlled. But in fact, being highly suggestible means you can change your reality and your physiology through suggestion, and raises the important question of whether suggestibility is trainable. Raz noted that attitudes around suggestibility are highly culturally and contextually determined, which implies they may indeed be trainable under the right circumstances. In general, suggestion as a topic is understudied and under-appreciated, and can open core questions about how humans behave, think, and change.

In the discussion that followed Raz's presentation, Kalina Christoff observed that science doesn't have a problem with top-down processes per se, but rather a discomfort with belief as a top-down influence. She raised the possibility of capturing scientifically how the certainty of belief (as in the placebo effect) exceeds the influence of normal thinking, and likewise how projecting belief onto the actions of an external agent increases the effect. She questioned whether this is actually a top-down process or some deeper middle level at work. Raz suggested the involvement of a loop that is neither strictly top-down nor bottom-up, based on his experience with Tourette's patients' semi-voluntary tics. When they were offered rewards as inducements to control their tics, control remained extremely difficult and resource-intensive until they were led to believe that random sounds from an external machine indicated that imminent tics were being detected and melted away.

Jack Petranker asked whether meditation increases suggestibility. Michael Lifshitz responded that the data are mixed, aside from consistent evidence that people who think positively about having mind-altering experiences tend to gravitate to meditation. Francisca Cho questioned whether unconscious suggestibility from external sources operated differently from the deliberate self-suggestion of meditation, hoping for a more nuanced definition of "suggestible." Raz offered that such questions are experimental in nature, and outlined an idea for an experiment where the researcher sets up a suggestion and then absents themselves, to examine whether suggestion is effective without the social pressure of the researcher's presence.

Shaun Gallagher expanded on this theme by observing that in top-down processing, the social setting and environmental context is a more strongly influential "top" than the frontal cortex. He referenced a paper on this conception of top-down

processing by Chris Firth and Andres Rogensgard.⁸ Raz noted the similarity with Laurence Kirmayer's position—as social creatures our minds are more than our brains—but as a neuroscientist he construes this to mean that the social/cultural influences operate on our brain. He expanded on the difference between approaching this as an experimental question as opposed to a philosophy of science question, viewing the Firth and Rogensgard paper as a philosophical essay on experimental constructions.

The relevance of suggestion as a mechanism in meditation was explored further, and how we might study it scientifically, including the possibility of controlling for individuals' suggestibility. Traditional meditation instructions often explicitly include suggestion, such as setting motivation, but symbolic cues and cognitive priming also play an important role. Linda Heuman concluded that this approach restores a place for the efficacy of story, symbol, and ritual in the scientific study of meditation, factors that have been minimized in Buddhist modernism.

¹ Raz, A., and Lifshitz, M. (2016) *Hypnosis and Meditation: Towards an Integrative Science of Conscious Planes*, (New York, NY: Oxford University Press)

² Raz, A., Shapiro, T., Fan J., Posner, M.I. (2002). Hypnotic suggestion and the modulation of Stroop interference. *Archives of General Psychiatry*. 59(12):1155-61.

³ Thibault, R.T. & Raz, A. (2016) Should neurofeedback join the clinical armamentarium? *Lancet Psychiatry*.

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⁴ Raz A. & Michels R. (2007) Contextualizing specificity: specific and non-specific effects of treatment. *American Journal of Clinical Hypnosis*. 50(2):177-82.

⁵ Szechtman et al. (1998)

Henry Szechtman, Erik Woody, Kenneth S. Bowers and Claude Nahmias
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⁶ Derbyshire et al. (2004)

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Derbyshire SW¹, Whalley MG, Stenger VA, Oakley DA.

⁷ Phillips, David P (22 December 2001). "The Hound of the Baskervilles effect: natural experiment on the influence of psychological stress on timing of death". *BMJ*. Retrieved 5 January 2018.

⁸ DC-M2010.pdf 668k - 31 Aug 2010, 06:19 by Chris Frith (v2)

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