National Brain Mapping Lab

The 7th Interdisciplinary Seminar of Iran's Brain Mapping

Cognitive Neuroscience Working Group

Neuro-Cognitive Approach to Hypnotic interventions

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History

Franz Anton Mesmer (1734-1815)
Fathers of modern Hypnosis

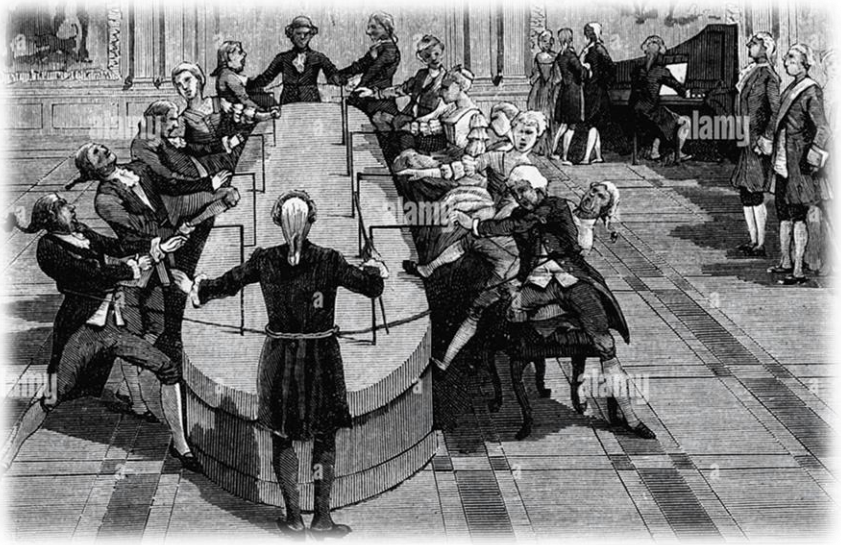
A Brief History of Hypnosis

- It is possible to find descriptions of hypnotic-like phenomenon to treat psychological and medical problems throughout history (dream temples, sleep temples).

- Modern scientific examination of hypnosis began with Anton Mesmer.

Anton Mesmer

- It is possible to find descriptions of hypnotic-like phenomenon (dream temples, sleep temples).
- Modern scientific examination of hypnosis began with Anton Mesmer.
- He believed that bodily tissues held magnetic energy, and that this energy could be directed, using magnets, to ease symptoms and heal disease.



A Clinical Trial for Mesmerism

- King Louis XVI appointed a special commission to investigate both the efficacy of Mesmer's procedures and his theory of animal magnetism.
- They concluded, were "only" due to the engagement of the imagination of his patients.
- Following this, interest in mesmerism declined substantially over the next few decades.

Hypnosis instead Mesmerism

- An English surgeon working in Calcutta, India, used it as an anesthetic for surgery during this period, and reported very positive outcomes.

- Mesmerism came to be called hypnosis (a term coined by an English physician in the 1840s)to separate it from the :

    1. Negative history associated with Mesmer.

    2. His discredited idea that its effects were associated with magnetic currents.

Popularity among Clinicians

- In the 1870s, interest in hypnosis again grew dramatically, in large part due to a number of prominent French neurologists.
- Jean-Martin Charcot (1825–1893) and Hippolyte Bernheim (1840–1919), who became interested in its effects on neurological and psychiatric conditions.

New generation of researches

- The first decade of the 21st century saw a dramatic increase in scientific research on hypnosis, especially on hypnotic analgesia.

- Much of this research focused on hypnosis' neurophysiologic mechanisms and correlates, as well as its clinical efficacy.

Is Hypnosis Really Works?

Hypnotherapy? Or a Tool ?

Does hypnosis work, that is, is it an effective therapy?

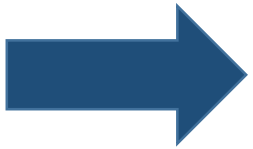
- Unfortunately, though, the issue isn't clear because of one confounding factor:

  The debate still goes on to this day as to whether hypnosis should be considered a therapy, or simply a therapeutic tool but not a therapy in its own right.

- There are prestigious and persuasive advocates for both positions.

Therapy or Therapeutic Tool?

- For those who view hypnosis as a therapy in its own right, any therapy that employs hypnosis is termed “hypnotherapy” and it strongly implies that hypnosis is the principal mechanism of intervention.
- who view hypnosis as a tool of treatment, integrated into a larger conceptual and practical framework that transcends the hypnotic procedures themselves.



What matters more is the growing body of objective evidence that when hypnosis is part of the treatment process, it generally increases the benefits of treatment.

Why Hypnosis?

- Renewed research interest from the cognitive neurosciences can be divided into two basic groups:

In the first, which is best described as ‘intrinsic’, the primary interest lies in acquiring a better understanding of the nature of hypnosis and hypnotically suggested phenomena.

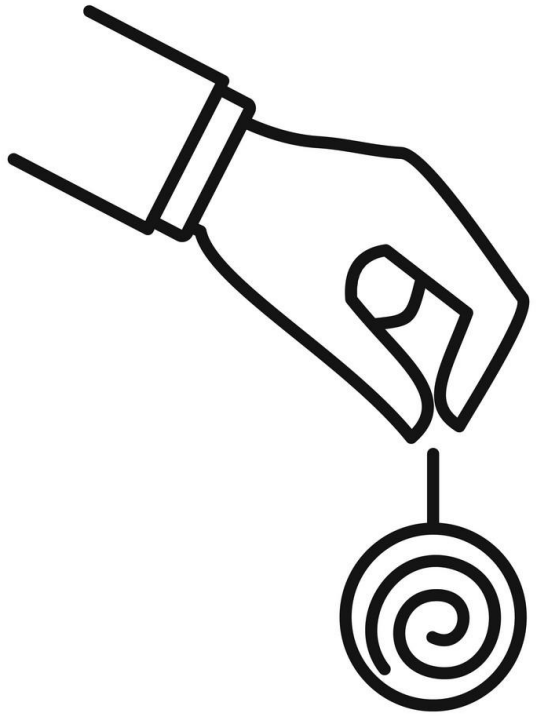
A second, more ‘instrumentally focused’ group of studies involves the selective use of experimentally and, increasingly, clinically informed suggestions to investigate aspects of normal and abnormal psychological functioning.

Why Hypnosis?

- Some of the best-known applications are in the:

  treatment of pain, anxiety, post-traumatic stress disorder, depression, phobias, irritable bowel syndrome and etc .

Hypnosis Explanation



Definitions and Theories

Hypnosis Definitions

- hypnosis can be defined as a procedure in which:

"one person (the subject) is guided by another person (the hypnotist) to respond to suggestions for changes in subjective experience, alterations in perception, sensation, emotion, thought or behavior."

- Hypnosis can also be defined in terms of its effects:

A group of individuals may be given a hypnotic induction or treatment, but not all will respond to the hypnotic suggestions or become hypnotized. Even among those who do, each individual will respond somewhat differently.

Hypnosis Theories

- Dissociation Theories
- Trait Theory
- Psychoanalytic Theory
- Sociocognitive Views
- Neurophysiologic Views

Neurophysiologic Views

- If a hypnotic state or if states exist, many argue, hypnosis and responses to hypnotic suggestions should have neurophysiologic correlates consistent with this state.

- Researchers have used three primary measures of neurophysiologic activity and function to identify neurophysiologic correlates of hypnosis:

    a. Response to neuropsychological tests
    b. Neuroimaging (e.g., PET, fMRI)
    c. Electroencephalographic (EEG)

Neuroimaging Studies

- When responding to hypnotic inductions and suggestions, the measured brain activity in individuals who score high on hypnotizability scales is qualitatively different than that in individuals who score low on these measures.

- Individuals in the latter group (“lows”) show little neurophysiologic change when given hypnotic inductions or suggestions.

- On the other hand, high hypnotizables (“highs”) show consistent and reliable differences in measures of brain processes and activity.

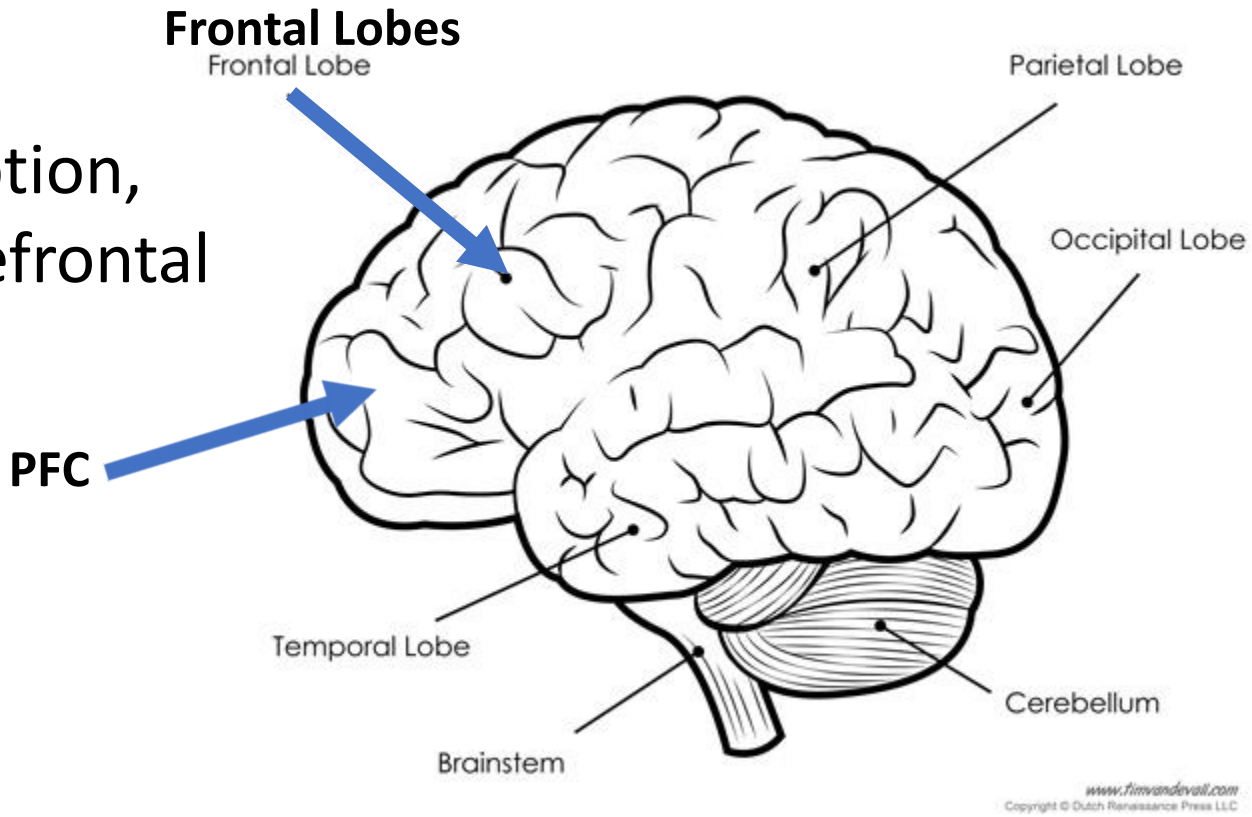
Neuropsychological tests

- The research findings from imaging studies and studies using neuropsychological tests have identified brain regions consistently influenced by hypnosis in highs:

- specifically, frontal brain regions (frontal lobes),parietal lobes, and anterior cingulate cortex (ACC).

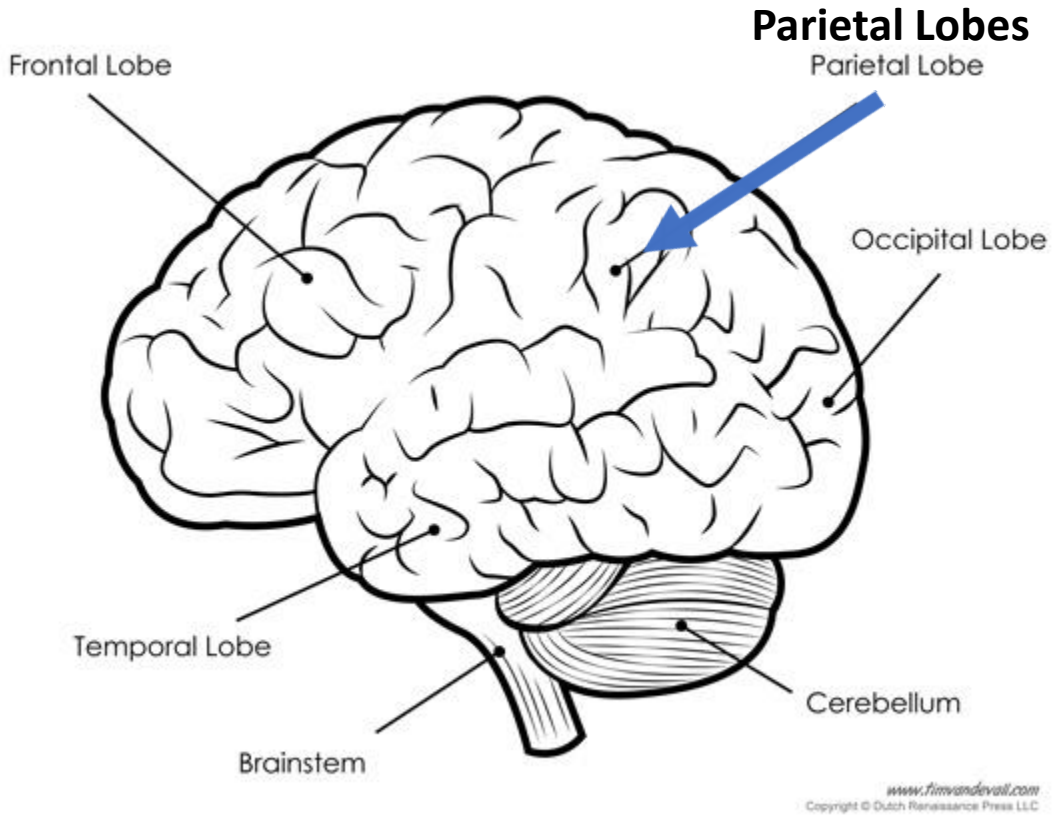
Brain regions: Frontal Area

- Responsible for attention, absorption, and conceptual thought (e.g., prefrontal cortex)



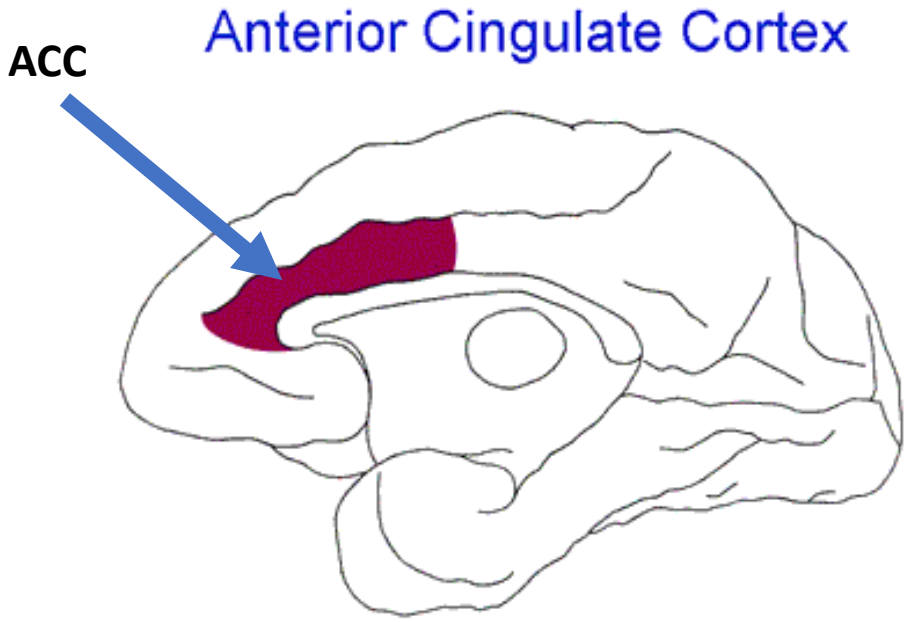
Brain regions: Parietal Lobes

- Attention to external and bodily stimuli (parietal lobes).



Brain regions: Anterior Cingulate Cortex

- The ACC is a structure of the limbic system that plays a role in many activities and responses, including emotional reactions to pain.



- It is therefore not clear at this time whether the consistent changes in ACC activity in highs occur <u>because of the specific effects of hypnosis</u>, or <u>because responses to suggestions,</u> whether the subject was hypnotized or not, might require ACC involvement.

Electroencephalographic Studies

- Various studies using EEG measures of brain activity have shown fairly consistent results:

    1. First, during hypnosis among highs but not lows, there is a general shift in activity from the left hemisphere to the right hemisphere.

    2. Second, highs evidence higher baseline levels of both theta and alpha bandwidth activity than lows. When hypnotized, highs show greater increases in alpha activity than lows do.

Key Points

- Whether one concludes from this body of research that the findings support the existence of a hypnotic “state” appears to depend more on one’s theoretical orientation than on the findings themselves.

- There is no doubt that hypnosis alters brain activity in reliable ways.

- Thus, hypnosis can be seen as a form of “neuromodulation” that allows subjects to alter their brain activity in ways that can provide them with more comfort.

The hallmark of hypnosis: altered sense of agency

- When producing hypnotic responses, HHSIs usually report feeling that their behaviors occur in an involuntary and effortless manner. Many theorists consider this altered sense of agency to be the defining feature of hypnosis and even refer to it as the “classic” suggestion effect.

- (neo)dissociation theorists propose that alterations in agency follow from a disconnection between executive and supervisory processes.

The hallmark of hypnosis: altered sense of agency

- Dissociation theorists posit that hypnosis weakens these retroactive connections, thereby allowing suggestions to bypass monitoring processes and act directly on executive systems.

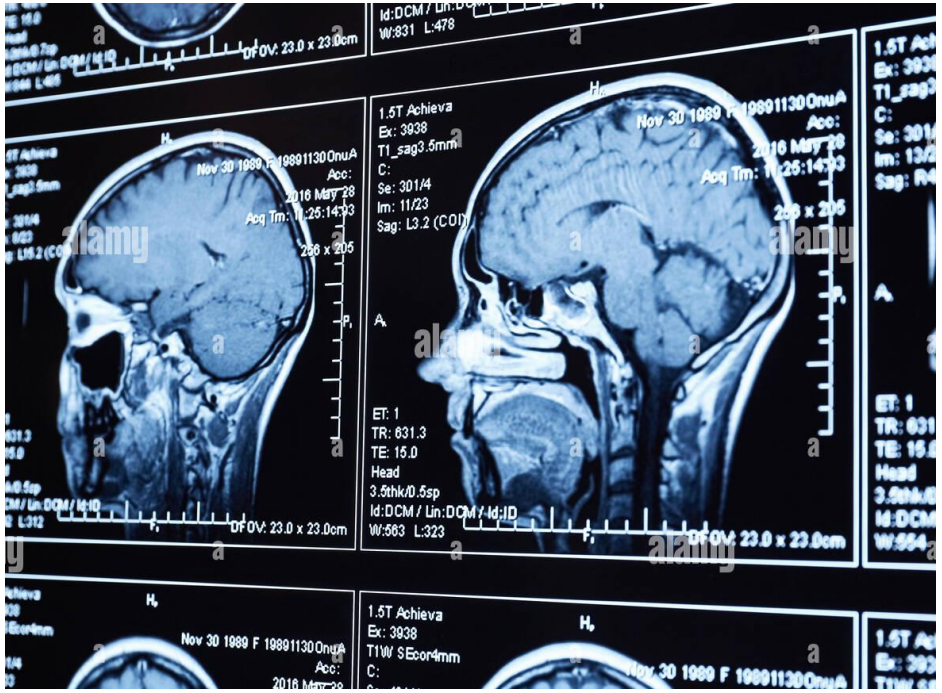
- In the absence of supervision, the control of movements and perceptions may well feel involuntary and effortless.

Stroop Task Studies

- Incongruent Stroop trials require executive and monitoring processes to inhibit the automatic reading response and name the appropriate ink color.

- In particular, they reasoned that increased ACC/monitoring activity in the absence of corresponding DLPFC/control activity for HHSIs under hypnosis indexes a breakdown of communication between executive and monitoring systems.

Challenges in Neuroscience Studies



Exactly which neural mechanism? Its not simple to say.

There is not same neural signature !

- Rather than converge towards a common neural signature, neuroimaging accounts of hypnosis have reported an extensive variety of brain patterns *The current body of findings concerning the neural correlates of hypnosis is marked by inconsistency.*

- For example, whereas some studies of hypnosis report increased activity in the ACC, other studies show the opposite effect.

- This trend holds true for many other brain regions implicated in hypnosis

Inconsistency Factors

- Several factors may account for the discrepancies across neuroimaging investigations of hypnosis:
  - ✓ methodological differences stemming from both experimental and hypnotic techniques.
  - ✓ Differences across experimental contexts also impede our ability to generalize findings.
  - ✓ Furthermore, the tendency for researchers to hone in on specific brain regions, rather than look at activity across the whole brain, narrows possible comparisons across studies.

New Insights in hypnosis

Combination of technology and Hypnosis

rTMS and Vritual reality

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Thanks for your attention

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