

# THE MAJOR HALLUCINOGENS

- Hallucinogens: a chemically heterogeneous group of drugs that are capable of inducing hallucinations at normal dose levels.
- *True hallucination*: “Any percept-like experience which:
  - occurs in the absence of an appropriate stimulus,
  - has the full force or impact of the corresponding actual (real) perception, and
  - is not amenable to direct and voluntary control by the experimenter.

- The most critical feature of true hallucinations is their apparent reality.
- *Pseudo-hallucination*: a perceptual experience that the individual knows not to be real, though it may be just as vivid and spontaneous as a true hallucination.
- *Illusion*: a misperception or misinterpretation of objective reality.

Three major hallucinogens used in the Americas are:

- Psilocybin mushrooms
- Peyote
- LSD

## Psilocybin

- Psilocybin comes from the several different mushrooms, including *Stropharia cubensis* and *Psilocybe Mexicana*, found mostly in Mexico and southern United States, though some are found in northern forests.

Psilocybin



*Psilocybe cubensis*  
Photo by Fup © 2004 Emerald.org

## Psilocybin



## Peyote

- Peyote is a small spineless cactus (*Lophophora williamsii*) that grows in the Sonoran deserts of Mexico and the southwestern parts of the US.
- Peyote contains over 30 different psychoactive chemicals, of which *mescaline* has been isolated and identified as the one mainly responsible for the vivid colors and other visual hallucination effects.
- Mescaline is chemically similar to the neurotransmitter norepinephrine.

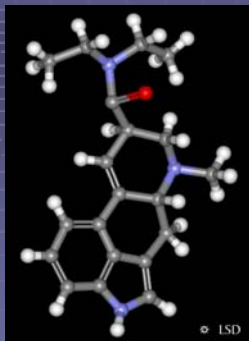
## Peyote



## LSD

- LSD-25 (*d-lysergic acid diethylamide*) was first synthesized in 1938 by Albert Hofmann, working at the Sandoz Laboratories in Basel, Switzerland.
- It was synthesized from ergot alkaloids (taken from a highly toxic mold that sometimes grows on rye grain).
- It wasn't until 1943 that LSD's hallucinogenic effects were discovered, when Dr. Hoffman accidentally absorbed it through his fingers while working in the laboratory.

## LSD



- Like psilocybin, the chemical structure of LSD is similar to the neurotransmitter serotonin. Both share a unique feature of their molecules called an indole ring.
- It is not clear how LSD affects consciousness; however, current theory suggests that it acts as a blocker of activity of serotonergic neurons in the brain, possibly by activating the serotonergic autoreceptors directly on cell bodies.

- It was initially thought that LSD produced psychotic-like symptoms (it was originally called a psychomimetic drug) and that LSD might be useful for producing experimental psychosis for the purpose of understanding natural psychoses.
- However, investigators later came to realize that there are a number of differences between LSD effects and psychosis:
- Primarily, LSD produces mainly visual hallucinations; schizophrenic hallucinations are primarily auditory, consisting of "hearing voices," often accompanied by paranoid reactions.

- Other studies suggested that LSD might be useful for psychotherapy, alcoholism treatment and for reducing pain and depression of patients with terminal cancer.
- These studies, however, were controversial, and in 1974/75 the U.S. National Institute of Mental Health, the National Cancer Institute and the National Institute on Alcohol Abuse and Alcoholism stopped supporting LSD research, and new studies ground to a halt.

## The LSD Trip

- Every LSD trip is different in its details, depending on the interaction of drug factors (dose, time), personal factors (personality, mood, expectations, etc.) and situational factors (physical and social setting).

## LSD



In 1978, Ray described five levels or stages which are commonly experienced after ingestion of LSD.

- *Autonomic Level*
- *Sensory Level*
- *Recollective-Analytical Level*
- *Symbolic Level*
- *Integral Level*

- *Autonomic Level:* Autonomic reactions develop gradually over the first 20 minutes.
- *Sensory Level:* Sensory effects develop over the next 20 to 50 minutes, including altered body sensations, altered color, and/or space and time perception, sensory synesthesias, and visual hallucinations. Cognitive changes also occur in this stage.

- **Recollective-Analytical Level:** The individual's own personality and life history are the center of focus, and aspects of the self may be re-categorized and reevaluated. The result may be increased self-understanding and a positive attitude - or anxiety and panic.

- **Symbolic Level:** an appreciation of the oneness with the universal concepts expressed in myths and in the archetypes of Jungian psychology.
- **Integral Level:** Mystical experiences occur, and the individual has a feeling of unity with God or the universe. At the higher levels, users have the feeling that their thoughts are profound and valuable.

## Hallucinations

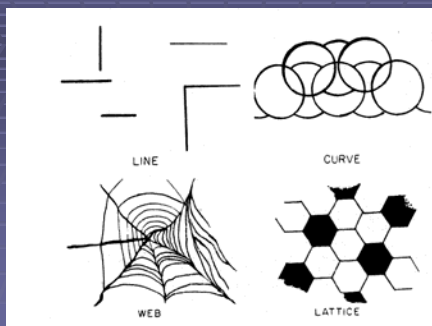
Research has identified three stages of hallucinogen-induced imagery:

- **Simple Form Constants**
- **Complex Combined Images**
- **Complex Memory Images**

## Simple Form Constants

- Lattice
- Cobweb-like
- Tunnel
- Spiral

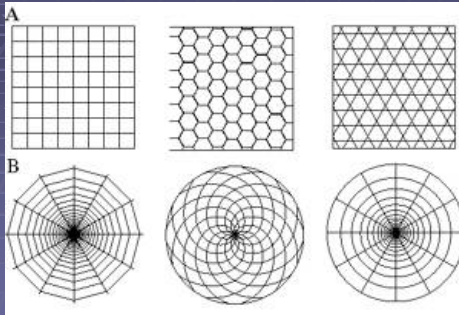
Simple Form Constants Ex. 1



Simple Form Constants Ex. 2



## Simple Form Constants Ex. 3

**Complex Combined Images**

- Meaningful symbols and forms are combined with Form Constants (such as spirals and lattices) by superimposing or incorporating them together.

**Complex Memory Images**

- The Form Constants disappear and meaningful dream-like scenes appear, with people, landscapes, animals, faces, etc. During this stage a shift from pseudo-hallucination to true hallucination may occur.

- Ronald Siegel (1975) did a systematic analysis and comparison of visual hallucinations produced by a variety of psychoactive drugs.
- Reports for the major hallucinogens were largely similar to each other, and different from placebo and baseline sessions.

**Forms:**

- About 90 to 120 minutes after ingestion subjects started perceiving mostly lattice and tunnel forms. In some cases a bright central spot produced a tunnel-like effect.
- The lattice and tunnel forms were often combined in the same image, such as a tunnel with lattice-patterned walls.

**Colors:**

- Mescaline, LSD and psilocybin induced predominantly red, orange and yellow patterns. THC produced a higher proportion of blue reports.

### Movement Patterns:

- Most patterns were explosive (outward from the center) and rotational. Subjects noted that all images tended to pulsate or flicker, no matter what other motions they showed.

- Siegel and Jarvik (1975) suggested that the form, color, and movement constants produced by hallucinations are a result of drug-induced increases in activity in the visual pathway of the central nervous system, particularly in the visual cortex.

- More complex images, with meaningful forms and scenes, are constructed from information stored in the individual's memory. Like night dreams, they are original, dynamic and organized constructions. Increased arousal produced by hallucinogenic drugs may activate memory-storage systems.

For any psychedelic drug the possibility of bad trips – characterized by depression, anxiety, and possibly panic – is greater for people who are emotionally unstable, depressed, or undergoing great stress in their lives.

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