

Have your perceptions been  
**ALTERED?**

Hallucinogens can change the way you see things. The experience is a little like looking at the optical illusion below.

## The Search Continues

The truth is, there's still a whole lot that scientists don't know about the effects of hallucinogens on the brain. Maybe someday you'll make the next big discovery.

Until then, join me—Sara Bellum—in the other magazines in my series, as we explore how drugs affect the brain and nervous system.



For more information, visit:

[www.teens.drugabuse.gov](http://www.teens.drugabuse.gov)

To learn more about hallucinogens and other drugs of abuse, or to order materials on these topics, free of charge, in English or Spanish, visit the NIDA Web site at [www.drugabuse.gov](http://www.drugabuse.gov) or contact the DrugPubs Research Dissemination Center at 877-NIDA-NIH (877-643-2644; TTY/TDD: 240-645-0228).

Mind Over Matter is produced by the National Institute on Drug Abuse, National Institutes of Health, U.S. Department of Health and Human Services. These materials are in the public domain and may be reproduced without permission. Citation of the source is appreciated. NIH Publication No. 09-3858. Printed 1997. Reprinted 1998, 2000, 2003, 2005, 2006, 2007. Revised 2009.



# The Brain's Response to Hallucinogens

Hi, my name's Sara Bellum. Welcome to my magazine series exploring the brain's response to drugs. In this issue, we'll investigate the fascinating facts about hallucinogens.

Hallucinogens cause people to experience—you guessed it—hallucinations, imagined experiences that seem real.

The word "hallucinate" comes from Latin words meaning "to wander in the mind." No wonder some people refer to hallucinating as "tripping."

The "trips" caused by hallucinogens can last for hours. Parts of these trips can feel really good, and other parts can feel really terrible.

Hallucinogens powerfully affect the brain, distorting the way

our five senses work and changing our impressions of time and space. When people use these drugs a lot they may have a hard time concentrating, communicating, or telling the difference between reality and illusion.



**National Institute on Drug Abuse**

## Where Do Hallucinogens Come From?

Some hallucinogens can be found in plants. Mescaline comes from a cactus called peyote. And certain mushrooms, also known as “magic” mushrooms, are hallucinogens.

But many hallucinogens are chemicals that don't occur in nature. Some examples are:

- LSD, also called acid
- MDA, also called the “love drug,” related to the stimulant amphetamine
- MDMA, known as ecstasy, also related to amphetamine
- PCP, often called angel dust

## How Hallucinogens Affect Your Senses

Your brain controls all of your perceptions—the way you see, hear, smell, taste, and feel. How does your brain communicate with the rest of your body? Chemical messengers transmit information from nerve cell to nerve cell in the body and the brain. Messages are constantly being sent back and forth with amazing speed.

Your nerve cells are called neurons, and their chemical messengers are called neurotransmitters. When neurotransmitters attach to special places on nerve cells (called receptors), they cause changes in the nerve cells.

This communication system can be disrupted by chemicals like hallucinogens, and the results are changes in the way you sense the world around you.

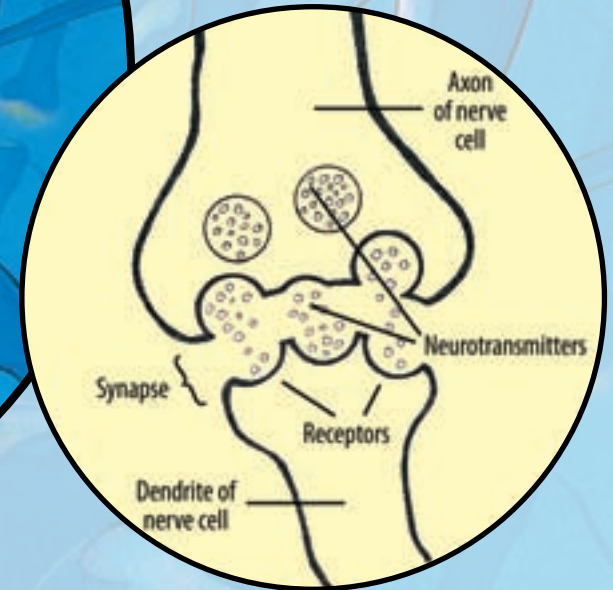
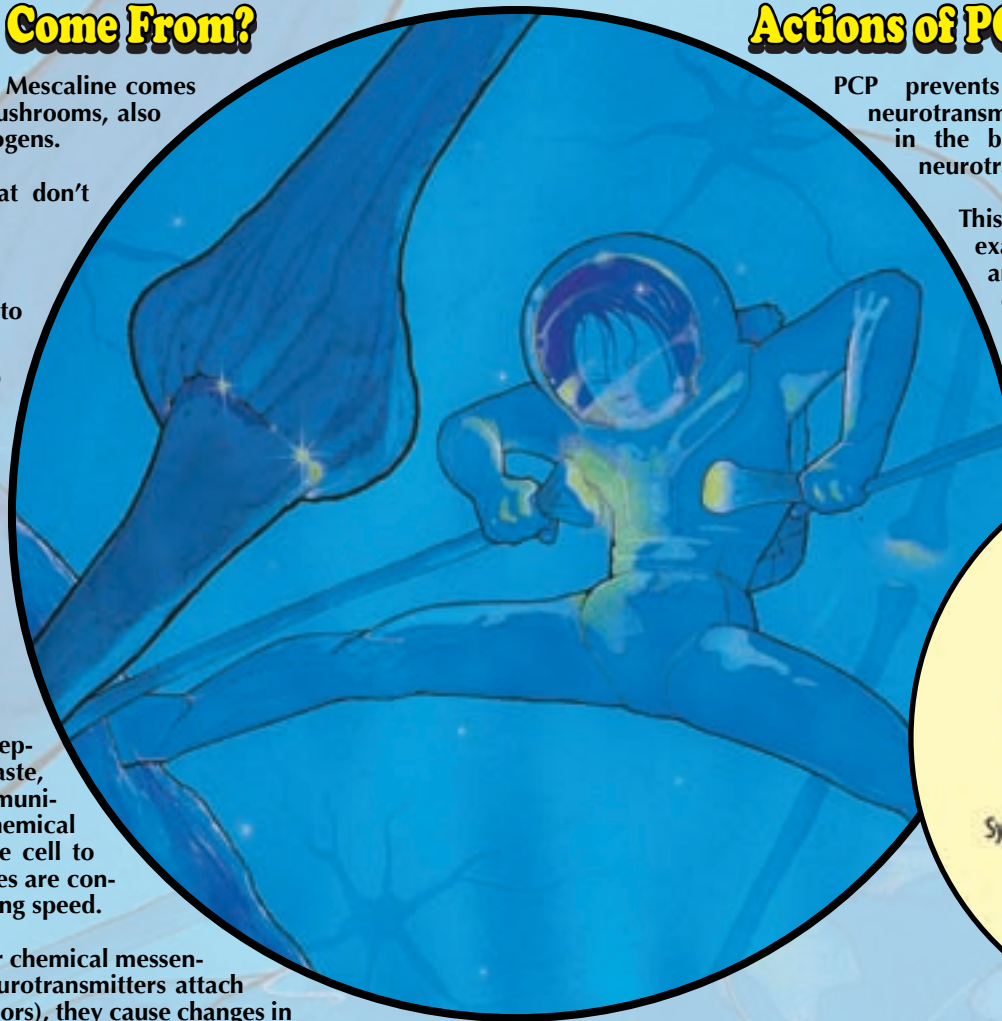
## How MDMA and MDA Affect Your Brain

MDMA and MDA cause neurons to release a neurotransmitter called serotonin, which can overactivate serotonin receptors. Serotonin is important to many types of nerve cells, including cells that receive sensory information and cells that control mood, sleep, and memory. Animal studies have taught us that MDMA and MDA can damage fibers from these nerve cells. And even though some of these fibers grow back, they don't grow back normally. They can wind up in places where they don't belong.

## Actions of PCP in the Brain

PCP prevents the actions normally caused when a neurotransmitter, called glutamate, attaches to its receptor in the brain. It also disrupts the actions of other neurotransmitters.

This drug's effects are very unpredictable. For example, it may make some people hallucinate and become aggressive, while others may become drowsy and passive. It is also addictive.



## LSD: The Most Commonly Used Hallucinogen

LSD causes its effects mainly by activating one type of receptor for serotonin. Because serotonin has a role in many important functions, LSD use can have many effects. These may include sleeplessness, trembling, and raised heart rate and blood pressure.

LSD users may feel several emotions at once (including extreme terror), and their

senses may seem to get crossed—giving the feeling of hearing colors and seeing sounds.

Even a tiny speck of LSD can trigger these effects. And LSD has an unusual “echo”: many users have flashbacks—sudden repetitions of their LSD experiences—days or months after they stop using the drug.