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# Hallucinations Induced by Sensory Deprivation: Fact or Fiction?

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HALLUCINATIONS INDUCED BY SENSORY DEPRIVATION--  
FACT OR FICTION?

A Paper Presented  
To Fulfill  
The Requirements For  
Honor's Program  
Special Studies Project

by  
Larry M. Latham

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## Hallucinations Induced By Sensory Deprivation-- Fact or Fiction?

Ancient mediators, ascetics, and others on religious quests deliberately withdrew from all sensory experience and even transcended awareness of their own body in order to open up the "inner rooms of the house of mind."<sup>1</sup>

Experimenters of the modern era have attempted to analyze the various forms of hallucinations that have occurred under such "mysterious" circumstances. Contemporary sensory deprivation situations have yielded results which correspond very closely to the transcendentalism of the ancient mystics. However, the scientists of today have various means of complex experimentation available. Thus, hallucinations are no longer the mystical experiences of transcendentalists--hallucinations can be explained through physiological experimentation.

This paper will be concerned with three major aspects of hallucinations: (1) Hallucinations produced by sensory deprivation; (2) The comparison of sensory deprivation hallucinations with psychotic and drug induced hallucinations; and (3) An elementary physiological explanation of sensory deprivational hallucinations.

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<sup>1</sup>Charles A. Brownfield, Isolation; Clinical and Experimental Approaches (New York, 1965), p. v.

## Producing Hallucinations Through Sensory Deprivation

Hallucinations can be produced by sensory deprivation. The problem of most scientists is to find some method of sensory deprivation that consistently produces hallucinatory effects. Actually, there are no sure methods that will produce hallucinations,--but there are a few general guidelines.

Experimental psychology points out that there are basically three things that interfere with experimentation of any kind: (a) individual differences, (b) outside influences, and (c) experimental contamination.<sup>2</sup> All three of these secondary variables have a tremendous effect on any sensory deprivation experiment. A great amount of misunderstanding surrounds sensory deprivation experiments because of the large number of variables present in such experiments.

Subjects are hard to find who are willing to submit to periods of isolation that might last several days. Animals can be used, but most infrahuman experiments require weeks or even months to complete.<sup>3</sup> Human subjects are usually placed in sound-proof, light-proof rooms, and asked to lie down without making any unnecessary movements. Actually

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<sup>2</sup>Richard L. Bruce and others, Introduction to Experimental Psychology (New York, 1970), p. 33.

<sup>3</sup>G. P. Sackett, "Food Versus Perceptual Complexity as Rewards for Rats Previously Subjected to Sensory Deprivation," Science, CXLI (August 9, 1963), 518-520.

there are different types of sensory deprivation equipment-- almost every experimenter uses a different one.<sup>4</sup> It is interesting to note that maximum conditions of sensory deprivation do not elicit hallucinations.<sup>5</sup>

Each subject has an individualized ability to experience hallucinations. One subject can experience hallucinations in a sensory deprivation experiment while another subject in the same experiment does not hallucinate.<sup>6</sup>

Outside influences are often disastrous to sensory deprivational experimentation. They can consist of tiny beams of light entering the experimentation room, auditory leaks in sound-proof rooms, or even tactual stimulation while the subject moves during eating and using the bathroom.

It is impossible to have a sensory deprivation experiment in which no outside influences enter in. Even the best sound-proof room can not do away with the sound that the subject makes by breathing.

Experimental contamination is also a major problem in sensory deprivation experiments. One would find it rather difficult to record hallucinations accurately. Of course,

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<sup>4</sup>John P. Zubek, Sensory Deprivation: Fifteen Years of Research (New York, 1969), pp. 87-92.

<sup>5</sup>J. Vernon, "Sensory Deprivation and Hallucinations," Science, CXXXIII (June 9, 1961), 1808-1812.

<sup>6</sup>"New Breed of Explorer; Isolation Experiment," Science, XCIII (January 27, 1968), 90.

such devices as the electroencephalograph or Galvanic Skin Response may show changes in the basic metabolism of the subject,--but no record can actually be made of the subject's hallucinations. No one can experience or record the hallucinations except the subject himself.

It is quite evident that sensory deprivation experimentation may prove costly in both time and money. Any attempts to produce or record hallucinations require a complete knowledge in experimentation.

Comparing Sensory Deprivation Hallucinations with Psychotic and Drug Induced Hallucinations

There are certain characteristics of hallucinations that are common in drug, psychotic, and sensory deprivation conditions. Several studies have been undertaken in an attempt to understand the relationship between the methods used to elicit hallucinations.

It would appear that most of the visual hallucinations of sensory deprivation are more similar to drug-induced hallucinations than they are to psychotic hallucinations. Unlike the drug-induced hallucinations, schizophrenic hallucinations contain many religious, supernatural figures or symbolic figures and objects. Drugs seem to produce many colored patterns and geometric forms much like the more typical types of visual hallucinations in sensory deprivation.<sup>7</sup>

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<sup>7</sup>Zubek, p. 122.

Bliss and Clark performed an experiment that compared hallucinations produced by LSD, mescaline, alcoholic delirium tremens, schizophrenia, sleep deprivation, and sensory deprivation. Unlike most scientists, they grouped sensory deprivation and psychotic hallucinations in the same category. Here is how Bliss and Clark grouped the types of hallucinations:

- I. sensory deprivation
  - hypnotic
  - psychotic
- II. dreams
  - sleep deprivation
- III. drugs<sup>8</sup>

Other psychologists have also linked the phenomenon of hallucinations to the symptoms of the psychopath. Success in meeting most of life's basic needs involves becoming responsive to appropriate cues from the physical and social environment. This can only be done through the "sensory apparatus--sight, touch, hearing, muscle sense, temperature receptors, occasionally smell and taste--and all combined in the form of complex perceptions."<sup>9</sup> People must maintain a sense of continuity with previous existence.<sup>10</sup>

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<sup>8</sup>Ibid.

<sup>9</sup>Brownfield, p. 9.

<sup>10</sup>George E. Ruff and others, "Studies of Isolation and Confinement," Reprinted from Aerospace Medicine, XXX (August, 1959), 599-604.

Scientists are still seeking the biochemical link between psychotic, drug, and sensory deprivation hallucinations.<sup>11</sup> When such links are found, large gains will be made in helping the mentally ill in the world.

An Elementary Physiological Explanation of Sensory Deprivational Hallucinations

A physiological explanation of hallucinations could be complex, and only a competent physiologist could undertake such an endeavor. One way to approach a simple explanation is to consider the sensory-motor arc.<sup>12</sup>

The neuron receptors receive the stimulation messages of the body, transfer the message to the spinal column, and then relay the message to the muscle fiber. A lack of stimulation leaves the neurons motionless. Even the slightest message becomes "a welcomed sight" for a "bored neuron."

During sensory deprivation, subjects usually experience increased sensitivity. Everyone has heard of the blind man who could hear the slightest sound at a great distance. A smaller stimulus can be noticed more easily by anyone acting as a subject in a sensory deprivation experiment.

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<sup>11</sup>"Study Shows Biochemical Link," Science, XC (November 19, 1966), 425.

<sup>12</sup>Floyd L. Ruch, Psychology and Life (Glenview, Illinois, 1967), p. 45.



Here are a few experiments which have recorded this increased sensitivity:

"Subjects who were placed in darkness for a week but who were otherwise exposed to a normal and varied sensory environment showed an increase in tactual acuity and in sensitivity to heat and pain. This cutaneous supersensitivity was still present several days after the termination of visual deprivation."<sup>13</sup>

"...temporary blindness definitely causes increased sensitivity to touch and pain, with the sensitivity lasting even after sight is restored."<sup>14</sup>

"Four days of sensory deprivation produced an increase in pain sensitivity for electrically induced shock."<sup>15</sup>

When the outside world is cut away completely, the neuron receptors that pick up sensations from the world are closed, and another pathway opens to allow some sort of sensations to still make their way into the brain centers. Thus, the lack of stimulation causes imagined or unreal sensations to be projected into the subject's thoughts and appear as hallucinations.<sup>16</sup>

It is interesting to note, however, that it is not enough for the environment merely to provide physical stimuli. Experiments dealing in isolation have discovered that men must also have information which means something to them, holds their

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<sup>13</sup>J. P. Zubek and others, "Cutaneous Sensitivity After Prolonged Visual Deprivation," Science, CXLIV (June 26, 1964), 1591-1593.

<sup>14</sup>"Sight Loss Heightens Sense of Touch," Science, LXXXVI (July 25, 1964), 56.

<sup>15</sup>J. Vernon and others, "Sensory Deprivation and Pain Thresholds," Science, CXXXIII (February 3, 1961), 330-331.

<sup>16</sup>Brownfield, p. 9.

interest and enables them to maintain a sense of uninterrupted succession with previous existence. Without such information, they have no links to their accustomed world. In this case, the brain may be forced to produce anxiety instead of hallucinations.<sup>17</sup>

When everything is taken into account, it is easy to see that a lack in stimulation--sensory deprivation--will produce increased anxiety or hallucinations.

### Conclusion

Hallucinations can be produced by sensory deprivation. The problems that arise in sensory deprivation experimentation require any experimenter to have a working knowledge with qualified experience in experimentation.

The hallucinations produced by sensory deprivation are similar to drug and psychotic hallucinations.

Idle sensory-motor arcs create an increased sensitivity in human and infrahuman subjects. The lack of stimulation causes imagined or unreal sensations to be projected into the subject's thoughts and appear as hallucinations.

No longer are hallucinatory experiences mystical. Modern experimentation has permitted mankind to understand such phenomenon to some extent. Sensory deprivation hallucinations are sensory deprivation hallucinations now,--not transcendental mysticism.

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<sup>17</sup>George E. Ruff, pp. 599-604.

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