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Freedman, Sanford J. "Perceptual changes in sensory deprivation: Suggestions for a conative theory" J. Nerv. & Ment. Dis., 1961, 132, 17-21

This article offers a theoretical explanation for the bizarre distortions of perception characteristic of sensory deprivation experiments. These experiments typically involve the restriction of visual, auditory, kinesthetic, tactile, and interpersonal stimuli by keeping the subject lying down, wearing translucent goggles, earphones, cardboard cuffs, and without interpersonal contact for a given period of time. The author distinguishes between studies that report cognitive changes (ie., hallucinations, depersonalization, etc.) and those reporting perceptual distortions. It is the latter class, specifically the subtype of visual disturbance, with which this article is concerned.

The kinds of visual disturbances reported in the literature are fairly well known. 1) extraneous movement apart from movement of the observer; 2) changes in size and shape of room and people; 3) expansion and contraction of objects, and bulging in and out of the walls, 4) curving of straight lines; 5) negative after-images, and color distortion toward high saturation and luminescence; 6) appearance of color on black figures and white ground; and 7) consistent changes in size constancy.

In seeking an explanation for the breakdown in perception with sensory deprivation, it is hypothesized that the breakdown occurs specifically in the process of stabilizing, structuring and organizing the visual world. Normally, the perceptual field is organized in relation to "an overall spatial schema depending upon basic coordinates such as up-down, and self-other" (18). The term "spatial schema" is defined as a direct analogue to the neurologist Henry Head's definition of body-schema "An integrate of all sensations, perceptions, memories and images continuously being built up and altered by new activity and new stimulation and also being used continually for reference in locating any new sensation and in correctly initiating any new movement" (18).

Visual disturbances are thus attributed to "deterioration or degradation of the spatial schema, resulting from a particular kind of prolonged sensory deprivation, whereas cognitive effects are probably more closely related to social isolation, inability to test reality, personality differences, and the total unstructured situation" (18). The vague notion of 'spatial schemata' can perhaps be better understood by looking at one of its subdivisions. In vision, for example, we see that the "schemata" develops slowly, ontogenetically, from infancy. If a congenitally blind adult is suddenly restored his sight, he perceives only an array of confusing stimuli since he lacks the normal spatial schemata of a human adult. It is suggested that spatial orientation develops with repeated observation and testing of relationships that do not change. ie., up is always up.

The normal organism not only learns a continually more complex spatial schemata as he grows, but his spatial schemata can be changed by new learning. Through 'disarrangement experiments' (such as the tilting room) it is demonstrated that the organism adapts itself to the new environment by systematically shifting certain sets of cues. The key difference between disarranging experiments and sensory deprivation experiments is that in the former, a reversal in one sub-schemata (such as providing the subject with inverting prisms so that he sees up as down) only necessitates the learning of a new (but predictable) set of relationships. "In sensory deprivation, rather than a systematically transformed environment, the subject is presented with an undifferentiated homogeneous sensory

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environment which provides no useful information for spatial orientation." (19)

It is postulated that the process which degrades, or disorients the existing spatial schema in sensory deprivation is an active, 'conative' process. This hypothesis rests on the observation that 'sensory deprivation' during sleep is not degrading. Further, if the organism strives to continuously and automatically find ordered relationships (the conative process) and if he is instead dominated by spontaneous, random, non-ordered inputs (as in sensory deprivation) then the non-ordered inputs -- eg. noise -- must be the disorienting factor. This hypothesis was tested by the author. (Perceptual Motor Skills, 11 277-280, 1960) and found to hold true. "...It is the absence of order and/or meaning, the lack of usable information that tends to degrade the spatial schemata" (20). In a situation of sensory deprivation, there is no chance for adaptation to occur since the organism cannot extract any amount of useful information whatsoever. That adaptation does occur in situations such as the disarranging experiments discussed earlier, is taken as proof that spatial orientation is vital to the organism. (Otherwise, there would be no need for adaptation.)

The perceptual distortions that occur as a result of sensory deprivation can thus be explained as an unconscious, continuing process of seeking orderly relationships where none exist, and attempting to incorporate non-order into previously existing schemata. Normal vision is restored only after a renewed exposure to a patterned environment.

