A HOLOGRAPHIC MODEL OF TRANSPERSONAL CONSCIOUSNESS

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There are, at least, two kinds of consciousness-personal or individual consciousness, and transpersonal or unitive consciousness. *Personal consciousness* is the human experience of multiplicity, of things being discrete and separate, For example, we experience ourselves as separate from the rest of the world, from objects and other organisms. Personal consciousness filters data relevant to our personal survival from the immense amount of information that is available, It scans the environment and our internal states in a sequential manner, focusing first on one item, then shifting to another in a manner similar to the way in which our eyes saccade from one object to another (Ornstein, 1972). Some instances of personal consciousness are, for example, the pattern of light (phosphenes) seen when the closed eyes are pressed, the experience I have while gazing upon the players arrayed over the field at a cricket match or baseball game, and the prickles of pain I feel in my foot when it falls asleep. Western psychology with its cognitive models of thought processes, theories of motivation and personality, etc" has provided us with many characterizations of personal and individual consciousness.

personal consciousness

In contrast to personal consciousness, *transpersonal consciousness* is characterized by the experience of unity, the absence of all multiplicity and the *complete oneness* of everything (Deikman, 1966; Tart, 1972; Wilber, (975), In this state of consciousness, the boundaries between objects dissolve and apparently separate elements merge into one another. The boundary between the personal self and the external world fades, and one experiences an all-encompassing unity. Although there has been little laboratory study of transpersonal

transpersonal consciousness

consciousness, transpersonal states have been described by Eastern philosophers and spiritual leaders (Tart, *et al.,* 1975; Green & Green, 1977).

the schism of understanding

Though we are beginning to gain an understanding of both personal and transpersonal consciousness, it is hard for most Western investigators to see how these two concepts, which are often defined in terms of each other's negation, could be anything but mutually exclusive. The problem is further exacerbated by a schism which exists between Western psychologists who dismiss transpersonal, cosmic consciousness as a nonveridical, hallucinatory experience due to electro-chemical aberrations in the brain (LeShan, 1974; Tart, 1975), and those in the Eastern tradition who look on personal consciousness as mere illusion.

bridging the gulf

Although the situation may appear to be unresolvable, the recently developed idea of the hologram provides a concept which can help us bridge the gulf between personal and transpersonal consciousness. In what follows we shall explore the science of holography and examine applications that have been made in physics and psychobiology. These studies will lead us to see how the hologram provides a model that can serve as a link between the two kinds of consciousness.

HOLOGRAPHY

Holography is a method of photography *(see* Figure 1) in which a laser beam of coherent light (limited to a specific wavelength) is aimed at a half-silvered mirror which splits the beam so that part of the beam (the part called the reference beam) passes through and impinges directly on a photographic plate (Leith & Upatnicks, 1965). The other part is reflected

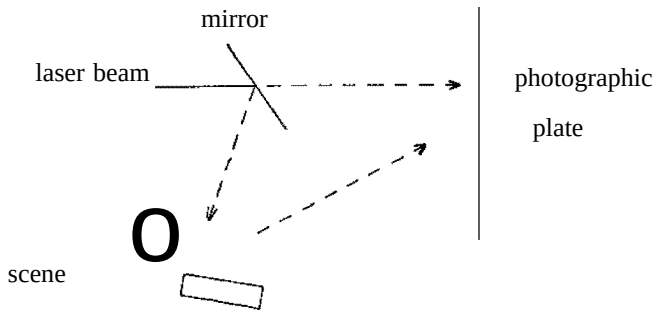

FIGURE 1. MAKING A HOLOGRAM

from the silvered portion of the mirror and illuminates an object or objects. Light reflected from the object also strikes the photographic plate and combines with the part of the laser beam passing directly through the mirror. Since light is wave-like in nature, the two partial beams come together to form an interference pattern. The pattern thus recorded on the photographic plate is called a *hologram.* Although the pattern recorded on the plate bears no resemblance to the original scene, when a laser beam of the same wavelength as the original is passed through the developed holographic transparency (photographic plate) in the direction of an observer, an image of the original scene is perceived (Figure 2).

the pattern called a hologram

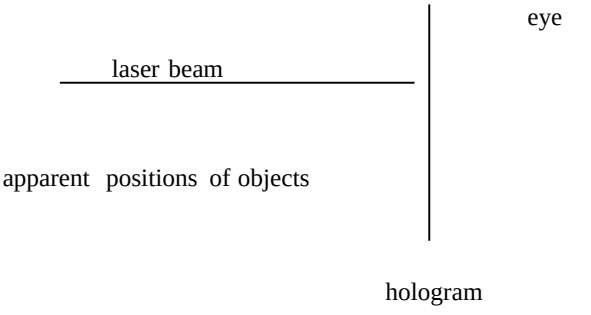

FIGURE 2. VIEWING A HOLOGRAM

On first seeing a hologram, one is usually amazed by the three-dimensional image and by the apparent displacement of the object relative to the observer (parallax) if one moves relative to the hologram. Another interesting feature of the hologram is that different scenes may be stored in the same holographic plate by using beams of different wavelengths. A particular scene, therefore, may be retrieved only by a beam of the appropriate wavelength.

The hologram's most fascinating property, however, is the way in which it stores information about the scene. If a piece is broken off a hologram and illuminated with the appropriate wavelength of'Iaser light, the entire scene is still visible through the piece. This happens because the information of the scene is present in every part of the hologram. If the scene is two objects, as in Figure 1, everything about those objects-their shapes, relative positions, etc.-is encoded everywhere on the holographic plate. It is this ability of the hologram to contain the whole within its parts that has led to its application in theoretical physics.

storing the whole within its parts

classical physics

Classical physics treats the universe as dichotomous and pluralistic, as a multiplicity of disparate entities (Capra, 1975). According to Newtonian physics, the universe is a machine composed of atoms and the void. The machine is such that, given knowledge of all its parts and the relations they bear to one another, one could calculate all its past and future states. Physicist David Bohm refers to this world of multiplicity as the *explicate order* (Bohm, 1971, 1973).

the double-slit experiment

Certain quantum phenomena, Bohm feels, suggest the postulation of another order which he terms *implicate.* Among these phenomena is the well-known double-slit experiment in which a light beam or a shower of electrons is cast against a screen containing a double slit *(see* Figure 3). When a light beam is used, it can be controlled in such a way that photons pass through the slits one at a time so that there can be no obvious interaction between them. After passing through the screen, they are recorded as landing at a particular position on a backdrop. When many photons are recorded, they are not found to land in only the two places corresponding to the two slits, but, instead, are observed to arrive at the backdrop in a distribution pattern extending over the entire backdrop similar to that which would be formed if light were spread-out waves instead of discrete particles. In this experiment, then, each photon seems to contain information about the existence of the slit **it** *doesn't* go through so that its trajectory, taken along with that of the other photons, will make up the appropriate distribution. In Bohm's words:

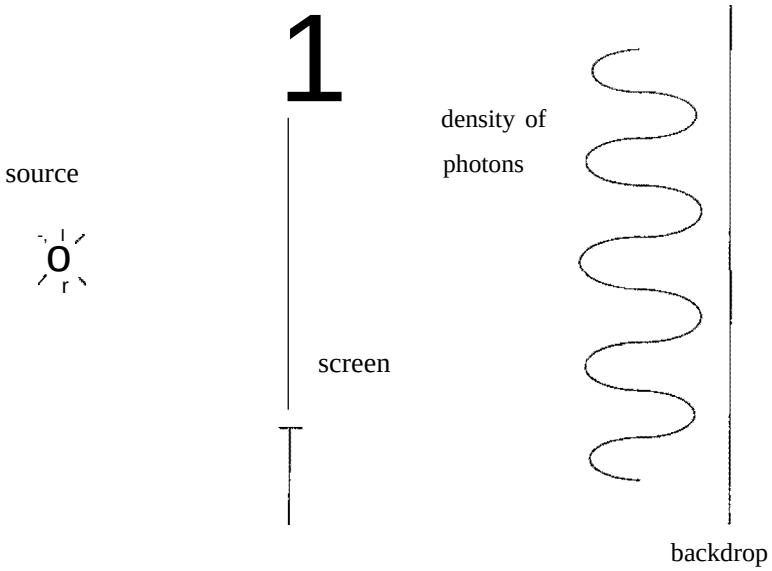

FIGURE 3. DOUBLE-SLIT EXI'ERIMENT

> The "quantum" context thus calls for a new kind of description that does not imply the separability of the "observed object" and "observing instrument." Instead, the form of the experimental conditions and the meaning of the experimental results have now to be one whole, in which analysis into autonomously existent elements is not relevant (Bohm, 1971).

the relationship between particles

This is further illustrated by the Einstein-Podolsky-Rosen paradox (1935) in which it is calculated that two particles first interact, then go their separate ways. After the interaction, the measurement of the momentum of one of the particles will determine a correlated state of momentum for the other particle. Since, by hypothesis, they no longer causally affect one another, a crucial question arises concerning just what kind of relationship exists between them. What kind of acausal connection can account for a change in one of the particles inducing a change in the other?

the holographic structure of the universe

David Bohm attempts to answer this question by postulating that the structure of the universe is holographic, with its entire explicate structure encoded in its every part. Since the whole of the universe is enfolded in every subregion, Bohm claims that there exists a further order. In addition to the explicate order, the order of multiplicity, there exists the *implicate order,* the order of undivided wholeness.

> Every kind of "particle" which in current physics is said to be a basic constituent of matter will have to be discussed ... lin such a way that] ... "particles" are no longer considered as autonomous and separately existent. Thus, we come to a new general physical description in which "everything implicates everything" in an order of undivided wholeness (Bohm, 1973).

In reference to the double-slit experiment described earlier, the photon *does* contain information about both slits. The information is enfolded within it as implicate order. More strongly, the photon is what it is and where it is by virtue of its relation to everything else. Similarly, in the case of the Einstein-Podolsky-Rosen example, the momenta of each of the two "particles" are interdependent on the implicate level. Thus, even though the "particles" do not interact causally, a determination of the momentum of one of them limits the possibilities for the other.

personal and transpersonal consciousness

Bohm's distinction between the explicate and implicate orders of the universe corresponds to the previously described distinction between personal and transpersonal consciousness. Correlating with personal consciousness or consciousness as analyzer, we sense the world as an analyzable multiplicity-the explicate order. Bohm's account of the implicate order, because of its reliance on the notion of undivided wholeness,

corresponds to transpersonal consciousness, the experience of an all-encompassing unity. Due to this correspondence a closer examination of the explicate and implicate orders may illuminate the connection between personal and transpersonal consciousness. To this end we shall first investigate an application of holography which is used to understand the functioning of the brain.

HOLOGRAMS IN THE BRAIN

determining the nature a/memory

One of the greatest challenges for physiological psychologists has been that of determining the nature of memory. The question that has proved most difficult to answer has been: "How are memory traces laid down in the brain?" It has long been known from the results of lesion studies that memories are distributed throughout the brain, especially in the cortical layers. **If** one part of the cortex is excised, then the remainder seems to be able to hold the memory trace. The question yet to be answered is: "Just how is memory distributed?" Recently some brain theorists have been hypothesizing that memories are laid down as holograms (van Heerden, 1970; Arbib, 1972; Pribram, 1977). Thus, just as part of a fractured photographic hologram retains the information of the entire original scene, the brain also seems capable of resisting damage to its memory traces.

the holographic nature ofthe brain

Unlike contemporary digital computers, which can only process and store bits of data one after another in a serial fashion, the brain can also process information in a parallel manner so that operations affecting one another are performed simultaneously. An example of this is the neural phenomenon of lateral inhibition which sharpens the visual perception of a contour. Those retinal neurons stimulated by the contour inhibit the firing of their neighboring neurons, thus yielding the perception of a more well-defined edge (Ratliff, 1965). When a sensory receptor area, such as the retina, is stimulated, parallel wave fronts of neural pulses are passed to, through, and about the brain. These wave fronts combine with each other as slow potentials in dendritic networks to produce an interference pattern which may be holographic in structure (Pribram, 1971).

The holographic nature of the brain is further evidenced by the fact that the visual system is sensitive to spatial frequency patterns (that is, coarseness or fineness of texture) in the environment (Campbell, 1974). In addition, the holographic view of memory and perception accounts for the brain's seemingly limitless capacity to store information. The holograph also

provides a means by which associative memory might occur (Pribram, Nuwer, & Baron, 1974). The light from one object may be used as the reference beam for a second object and thus may be used to obtain the second object's image. Since more than one such "association" may be stored on a single plate, the similarities between the hologram and the operations of the brain seem quite striking. For example, a thought of a certain place may remind you of someone you knew there, and more than one such association may be stored in the brain.

If these considerations and data are studied thoroughly, the hologram hypothesis can seem quite enticing. It must be borne in mind, however, that it is an extremely controversial hypothesis. For our present purposes, we will accept it as a working assumption.

THE HOLOGRAPHIC RESONANCE MODEL

So far we have attempted to show that the brain is holographic in nature in both the implicate and explicate orders. It is this conceptualization that provides a key to the nature of transpersonal consciousness and its relation to personal consciousness.

First let us ask: "What state of mind and brain often precedes and accompanies insights and glimpses of unitive consciousness?" Almost invariably there is a stilling or emptying (Kapleau, 1965) of the mind and an accompanying regularity and slowing of the brain wave in which alpha or theta is produced (Green & Green, 1977). Normally our attention hops from one thought or event to another, and the brain displays rapid, irregular beta waves (Kasamatsu & Hirai, 1973). As one develops meditation, however, the mind is no longer distracted by the flow of images and becomes quiet, When this occurs, the brain seems to be less active. It is at this point that *resonance* can take place between the brain's explicate holographic structure and the implicate holographic structure. This resonance is analogous to the resonance occurring between two tuning forks. If the molecular structure, shape, and size of the tuning forks is such that they produce the same frequency of sound when struck, then, if the forks are placed near one another and one of them is struck, a similar vibration will be elicited from the other fork. This resonance is made possible by the structural similarity between the two forks. Similarly, in the case of personal and transpersonal consciousness, the resonance between the holographic structure of the brain and that of the universe is due, in part, to the structural similarity. The resonance allows for the transference of information from the

the holographic resonance between similar structures

implicate order to the explicate order. Since the entirety of the explicate order is encoded throughout the implicate order, the resonance provides personal consciousness with access to all knowledge.

some limitations of personal consciousness

This, however, is not wholly true. If it were entirely true, then one would expect various highly enlightened individuals to have written out in all its rigor Einstein's theory of relativity, and the DNA code, centuries ago. The access personal consciousness has to the implicate order is limited by a residue of memories, both recent and long term, that remain encoded in the cortex. This residue of memories has a particular configuration which, like a "reference beam," allows the explicate holographic structure of the brain to resonate with only a small subset of the information in the implicate structure, that is, only that information which is directly relevant to the memories. Due to personal resonance, relatively few of the almost infinite variety of "images" in the implicate holographic structure of the universe are available to an individual's personal consciousness. Thus, when enlightened persons glimpsed this unitive consciousness centuries ago, they did not write out relativity theory because they were not studying physics in a context similar to that in which Einstein studied physics. Einstein may have formulated his theory, however, partly due to a "unitive glimpse" of his own (Einstein, 1973).

the holographic consciousness of the universe

Our model can also provide us with insight into why an expanded state of consciousness is one of the more profound experiences an individual may have. For this we must first consider what it is about an entity that prompts us to believe that it is conscious. Generally, being conscious seems to have something to do with the complexity of the entity. We do not normally consider rocks to be conscious because they do not seem to respond intentionally or purposefully to their environment, and because they do not have a nervous system. On the other hand, humans seem to have a higher level of consciousness than lizards. The rule we are using here is: "the more complex the nervous system, the higher the level of consciousness." Moreover, it appears that human consciousness requires a holographically organized sheet of neural fibers (Pribram, 1971; Anderson & Leong, 1977). The argument for this claim, which is far too intricate to outline here, involves showing that personal consciousness is localized in the cerebral cortex of the brain. We will simply assume that holographic complexity is required for consciousness. If this is so, since the universe is holographically complex, the universe may be conscious on the implicate level. It would then be conscious to a far higher degree than any human being is on the level of personal consciousness. The universe at the implicate level is

almost infinitely more complex than the brain; it enfolds the explicate order throughout its structure.

consciousness at the implicate level

When a person stills the mind and comes into touch with consciousness at the implicate level, a consciousness he always has subliminally but of which he is not usually immediately aware, it is not *he* that experiences the cosmic consciousness. This personal "he" or self-conception is a modulation of the explicate holographic structure of the brain, a mere part of the memory residue. The *he* is certain feelings of his body, expectations that people will address him with his proper name, etc. When transpersonal consciousness is experienced, the individual self "falls away" as personal consciousness resonates to and merges with the universe and the implicate order.

language at the implicate level

When people report transpersonal experiences, they frequently insist that they cannot do proper justice to the experience with words. According to our model, this is easily explained by reference to the fact that the nearly infinite complexity in the implicate order cannot possibly be encoded in the explicate order. Since language is an explicate phenomenon, for something to be sayable it must be capable of being coded into the brain as explicate. Thus, on the level of personal consciousness, one is reduced to saying that something profound occurred or that one had an experience of wholeness with everything.

OUf account of the holographic resonance model has combined Bohm's version of the "new" physics, the hologram theory of the brain, and an account of the relation between personal and transpersonal consciousness. Though this approach is highly speculative, it does pull together some new and seemingly disparate realms of knowledge and experience.

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