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Experiments in Solitude, in Maximum Achievable Physical Isolation with Water Suspension, of Intact Healthy Persons

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Originally, one of the aims of this investigation was to test the neurophysiological hypothesis that, in the drastic attenuation of physical stimuli below the usual level, the activity of the brain and its contained mind would be that of sleep. Findings in our experiments (1, 2) and in those of other groups (3, 4) in this field demonstrate that sleep is not necessarily the outcome over a short time period. A parallel, though not identical, aim was to observe what, if any, effect such experimental conditions might have in altering ego function both in the present moment and over the longer time period; i.e., ego choices and ego structure. A more specific aim has been to establish methods of self-observation by finding, defining, and setting limits for the subject's psychological sets for these experiments and by seeking those sets which would give the maximum of information from the subjective sphere. The collection of data has been mainly by notes and recordings by the subject alone.

At the outset two conditions seemed essential, and these have been maintained throughout. All observers first prepare themselves by participating as subjects; those who participate in this experimentation first do so in the role of subject, then in the role of "safety man" (observer), and, finally, in the role of self-observer in solitude. The second crucial condition is that of the restrained and minimal participation of the "safety man"; his role is to stay out of and not interfere with the phenomena which occur in the self-observer.

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TECHNIQUE

A systematic consideration of the technique illustrates how these aims are carried out in this particular set of experiments.

The Physical-Physiological Level

1. The simultaneous attenuation of all known external physical stimuli to the lowest possible level (including light, sound, odor, taste, light pressure, deep pressure, and other gravity-opposition forces, vibration, heat, cold, etc.). These characteristics of the experimental environment were achieved with relative success by use of a water immersion tank in a soundproofed chamber.

2. The maximum simultaneous attenuation of intra-integumentary sources of stimuli which, in the order of importance in our experiments, have included low-level pain and discomfort because of an unsatisfactory position in the tank; muscle stretch; slow motions of limbs moving through the water; internal sources such as hunger; full bladder; full rectum; gas in the GI tract; unusually active cardiovascular system; local pressure ischemia leading to pain; irregular changes in respiratory rhythm, rate, or depth; accumulating carbon dioxide; reduction in oxygen.

3. The maintenance of a constrained and restrained situation voluntarily: Obviously in a system such as the human body, efferent activity leads to afferent activity in a continuous and circular fashion; therefore in suspension in a liquid the subject is instructed to voluntarily inhibit movement, including vocalizations, to his maximum possible ability.

4. Special case of skin temperature: We have found that thermal differences over the skin of the body are intensely stimulating when the other sources of stimuli have been attenuated. The use of water suspension (in which the water is slowly flowing by the body) allows an isothermicity of the unclothed skin surface which is difficult to achieve by other methods. At 34.5° C. (94.1° F.) the water seems to disappear in the thermal sense; i.e., the subject feels neither hot nor cold, and this temperature allows a steady state of heat exchange at a constant normal body temperature at the reduced level of metabolism that can be achieved under these conditions. In addition, the slowly flowing water allows continuous removal of waste products of the body.

5. The position and suspension of the body in water: Because the body parts are not of uniform density it is necessary to add weight to certain parts and to add buoyancy or support to certain other parts. These additions are done in such a way as to avoid chronic low-level discomfort and pain caused by unusual degrees of angulation of spinal or other joints and that caused by pressure ischemia.

We found that the position of the body of each subject must be very carefully worked out in order to avoid low-level discomfort and pain. Unless this is done we found that we were studying the effects of a chronic low-level pain on our subjects in a relative absence of other sources of stimulation. If a given subject is exposed to too much pain for too long a period, the experiment becomes extremely distasteful to him. We do not feel that we have found the ideal method of buoyancy adjustment, and that a good deal more work could be done on this phase of the experiments, possibly by using liquids of two densities, one for the limbs and one for the chest and head, or, possibly, by using a liquid of greater density than the fresh water which we have been using. In summary, water suspension allows most of the gravity-opposing forces to be distributed evenly over the whole surface of the body; thus the unit pressure is greatly decreased over any one area. Because fresh water of the proper temperature was available, we used this liquid.

6. The mask: Since the subject is suspended in the liquid, breathing requires a mask with certain characteristics; (a) minimum inward pressures over the surfaces of the skin, (b) maximum sealing without undue local pressure, (c) minimum flow resistance, (d) minimum dead space, (e) minimum back- or fore-pressure during the respiratory cycle, and (f) as great a degree of equalization of the pressure in the mask with that over the chest as can be achieved. An approximation to the last requirement can be reached if the subject is suspended just below the surface of the liquid with his chest parallel to that surface so as to minimize pressure difference across the thoracic and abdominal walls while breathing air at one atmosphere from the room. Such an apparatus has the virtue of extreme simplicity and maximum control by the subject. We have employed a through-and-through breathing system with an inspiratory valve and an expiratory valve with two different tubes (Figure 4) leading to the small space (approximately 100 cc) in the mask immediately

Figure 1. Underwater Mask Manufacture I

Positive plaster cast of one subject's head and neck (J.S.), with spaces over eyes, nose and mouth, and ears filled in, and (bakelite) tubing in place. Note smooth surface from which later casts in plaster or latex may easily be separated.

Figure 2. Underwater Mask Manufacture II

Dipping form for one subject (J.L.). A plaster bandage cast (negative) is made from the modified reproduction of the head and neck casting (Figure 1) with a separating agent. Inside this negative mold, fiberglas cloth and resin is inserted to construct the positive reproduction shown in this figure. The two white areas between nose and chin are the bumps for positioning the two tubes shown in Figure 3. The two halves of the fiberglas reproduction are assembled and fastened together with fiberglas tape and resin, and finally sanded. A base with a socket for a 75-watt heating lamp is inserted in this model.

Figure 3. Underwater Mask Manufacture III

The dipping form: mask insert in place on the face. (Heating lamp is lighted.) The mask insert is built of Fiberglas on the dipping form with latex as the separating agent. The inspiratory and expiratory tubes (stainless steel) and the window (Lucite) are inserted and embedded in the Fiberglas at the proper stages; three layers are built up. This form is separately dipped into latex, put on the head-form, and the assembly dipped to generate the head mask (three to five layers of latex suffice). The finished mask is covered with talcum powder and pulled off the form from bottom to top and back to front.

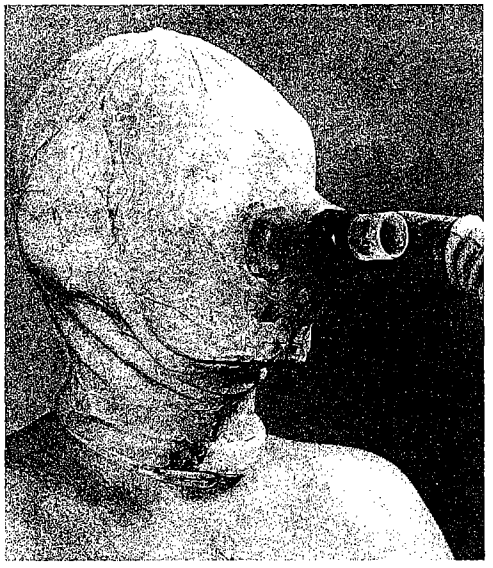

Figure 4. Underwater Mask Manufacture IV

This is a finished mask formed by dipping cast shown in Figure 1, which does not contain a Lucite window before the eyes—note breathing tube connected on one side. Note also the loose folds of latex at the neck which seal out liquid without undue constriction of subject's neck. Mask is donned simply by pulling down over head, much as a stocking would be. In place, it fits face and head closely, is smooth and is completely comfortable, even for long time periods.

in front of the nose and the mouth, breathing air at one atmosphere from the room. This system can be easily repaired by the subject and does not require as much maintenance as a more complicated, continuously flowing gas system at a higher pressure. However, again, we do not consider this ideal, and would prefer a very simple system operating at a higher pressure so that the subject could be less constrained as to depth of immersion.

Environmental Control at the Social and Community Level

1. The maintenance of physical-physiological isolation and solitude in the midst of a community implies barriers to intrusion by persons or sources of physical stimuli; i.e., such isolation implies that eventually one is in solitude (of course solitude per se does not necessarily imply physical isolation). Such consideration requires a building which houses the tank and constructed in such a way as to bar any continuous traffic through its structure and which permits no invasion by people or animals or other objects which may be sensed by the subject; a lock on the door is required but not sufficient. The safety man is instructed to act as a buffer agent for the subject, both before, during, and after the experiments and to maintain privacy. The safety man also must check the in-flowing water temperature, lights, telephone, etc.

2. The issue of privacy seems to us to be so important that we give it separate consideration here. Relevant privacy includes present and future communications including all of those between the subject and the safety man. For optimal conditions privacy requires the firm assurance to the subject of his control of the secrecy of his individual data indefinitely into the future. Maximum ego freedom and voluntariness of the subject in these experiments can be achieved through such kinds of privacy. It also implies that the subject chooses his own times for beginning, ending, and the total duration of exposure as well as the control of whatever restraints, voluntary inhibitions, and supports are needed. Privacy also implies trust and respect for the ego of the subject on the part of the safety man; i.e., the elimination (or at least attenuation) of any observer encroachment, exploitation, or invasion of each experience and of its data indefinitely (even to the extent of avoiding invited, available, encroachment by the subject).

When the safety man and the subject both consider it is safe for the subject to become a self-observer free of the safety man, i.e., to enter solitude, these matters must be considered with great intensity and care. It is at this point in our experience that the subject is likely to use disguised methods of appealing for help from the safety man, or from others, in one form or another. After the first few experiences it may help him as a self-observer to function as a safety man for another subject. The introduction of any new factors into the experiment, (especially variables important to survival, such as changes in the respiratory apparatus) require a self-observer to return to "subject status" temporarily and bring a safety man back into the situation.

Of course, privacy also implies that the abstraction of, and the distribution of, the results of the experiments are also under his control. In this regard one must consider all media of communication including gossip (professional and otherwise), newspaper accounts, scientific journal accounts, and scientific meetings. One keeps in mind possible future uses of the material by persons other than the subject; the revealed material is carefully scrutinized by the subject in order to contain only those observations and shorthand descriptions which contribute directly to the generalizations which are found. Minimal disguise of data allows maximum transmission of the true pictures of what occurs but are carefully balanced against what Freud called, in his communications of his self-analysis, "the point at which one owes discretion to oneself."

The future research plans are also maintained in privacy and are set up by those who have reached self-observer and safety man status. In functioning as safety man the necessity for certain specific plans and organization becomes apparent and obvious.

3. The process of selection of subjects: Normal, healthy volunteers of equal social and professional status to the previous subject-observers have been the source of our subjects. Neither much younger nor much older, higher or lower, persons are chosen in order to give maximum freedom to the particular person involved. This condition is required for the attenuation to our maximum ability of any factors which might resemble a draft, a persuasion, or coercing of the subject in his or our view. In addition, this process implies that not only each experiment or exposure but each series of

exposures requires that social isolation be maintained. The fact that experiments may be going on is protected in the local community. This technique has been worked out as a result of provocative and disturbing experiences during the course of our experiments.

SCIENTIFIC METHOD AND THE SELF-OBSERVER

Objections can be raised that under these rules an ego observing itself generates only circular data; i.e., that it experiences only what it wishes and allows itself to experience, and that the use of an outside observer can avoid such difficulties. We have found that these objections have a limited validity and for our purposes an outside observer inordinately complicates the situation and the data in which we are interested. Within certain limits yet to be determined experimentally, it seems to us that the mind is the only province of science in which what one believes to be true is, or becomes, true (5). Our experimental task in these studies is to determine what these limits are. However, it is felt that it is important to remember that one must give subjects the permission to experience what *can* be experienced and not make suggestions as to what may or *will* be experienced.

It is our conviction that the range of phenomena available to the normal human mind is much greater than "society" will apparently permit or accept (1, 2, 5); consequently, the safety man becomes the intercessor between the individual and the community. As such, he grants the subject permission to experience whatever he can experience; i.e., the right to exercise any function, strictly leaving open the content of what is experienced. If you will, the individual is "indoctrinated" in the principle of freedom for his own ego with the internal experiential sphere. As is mentioned below, the results of such experiences in a given subject generally turn out to be surprising to that subject; i.e., so far as the subject is consciously aware, new data occur quite spontaneously.

CONCLUSIONS

Detailed results are to be reported in a later paper. However, some general conclusions of these studies may be of interest.

When given freedom from external exchanges and transactions, the isolated-constrained ego (or self or personality) has sources of

new information from within. Such sources can be experienced as if they are outside with greater or lesser degrees of awareness as to where or what these sources are (projected imagery, projected sounds, doubling of body parts, emotional states of euphoria or anxiety, etc.)

Any other person, observer, or safety man can be made to appear as if he is a "source" to which is attributed the origin of the new information.

Transference-related drives may become extremely intense. In a given exposure, such needs increase in intensity with time and may ultimately demand direct release; i.e., such as leaving the tank and participating in one's active life with other persons (2, 5). Multiple exposures lead to better control and increase awareness of these effects.

The relationship of any residual stimulus to these needs is carefully evaluated. "Negative and positive" transference problems arise from extremely small and unlikely kinds of stimuli under these conditions; i.e., a "wrong" word, too many suggestions, implied judgements of accuracy or performance, or their "positive"opposites. The safety man must be, as it were, an ideal and keenly aware diplomat when faced with such problems. It has been found that having once experienced the lowest possible level of stimulation oneself makes it very much easier to function as a "diplomatic," tolerant, and considerate safety man. Hurt feelings, overenthusiastic reactions, and replication of experience reported by others are examples of the kinds of phenomena to be found and dealt with.

The positive, enjoyable results were achieved only at those times when the inner and the outer disturbing stimuli were minimizable. Any residual discomfort made it impossible to achieve the euphoric state; any anxiety induced by faulty apparatus or technique blocked the possibility of enjoying or profiting from the experience. Until we were able to attenuate physical discomfort and fear by better techniques, multiple exposures, and careful training, we saw mostly "negative" phenomona. As the levels of stimuli were lowered closer to zero, the positive, more blissful, enjoyable states and the positive transference phenomona appeared. No addiction to these states has occurred: the internal satisfactions of needs achieved in the tank are limited in the same sense that, say, day-dreaming

is limited. Basic satisfactions of needs felt in the tank require later exchanges with other persons and with physical reality.

As has been published (1, 2), it is felt that such experiences are not necessarily psychotic, or even mentally aberrant, and after training can be constructive and invigorating. Eventually, after many exposures, each subject can learn enough to enjoy and not fear or dislike his own experiences.

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