FACTORS USED TO INCREASE THE SUSCEPTIBILITY OF INDIVIDUALS TO FORCEFUL INDOCTRINATION: OBSERVATIONS AND EXPERIMENTS

Group for the Advancement of Psychiatry
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OBSERVATIONS AND EXPERIMENTS

The meeting of the Group for the Advancement of Psychiatry, held at the Berkeley-Carteret Hotel, Asbury Park, New Jersey, on Sunday, April 8, 1956.

Presiding: Dr. Sol W. Ginsburg, President
Moderator: Dr. John C. Lilly, National Institute of Mental Health, Bethesda, Maryland

Participants:

PHYSICAL AND SOCIAL ISOLATION
Dr. Jack Vernon, Psychology Department,
Princeton University, Princeton, N.J.

SOLITARY CONFINEMENT
Dr. Milton Meltzer, Bethesda, Md.
(Formerly Chief Medical Officer, Alcatraz)

SLEEP DEPRIVATION
Dr. David Tyler, Department of Pharmacology,
University of Puerto Rico, San Juan, Puerto Rico

BRAIN INJURY (CONFABULATION)
Dr. Edwin A. Weinstein, Walter Reed Army Institute of Research, Washington, D.C.

SEMI-STARVATION
Dr. Joseph Brozek, Laboratory of Physiological Hygiene, University of Minnesota, Minneapolis, Minnesota

PAIN
Dr. Harold Wolff, Professor of Medicine,
Cornell Medical College, New York, N.Y.
Dr. Ginsburg: It is now my pleasure to ask Dr. John Lilly to take over this meeting. I would like at this time to express again our very great indebtedness to him for doing such a splendid job in arranging this program.

Dr. John C. Lilly: In this program we are considering some of the basic background factors in the process of forceful indoctrination. The program for next time will be more directly involved in the psychological processes of so-called forced indoctrination, brain washing or thought reform. However, before such a program can be arranged and carried out, it was felt we should assemble the available, experimental material on some of the factors which tend to weaken personalities and make them more susceptible to such psychological processes.

Originally the program started out to be solely on isolation; we found that isolation is extremely important, especially isolation from one's own culture. However, there are other powerful factors in addition to the isolation itself. There is usually semi-starvation, some pain, usually physical illness and injury. There is restraint in many cases, if not all. There is sleep deprivation.

As is well known from published material, the Russians purposely use restraint, solitary confinement, semi-starvation and sleep-lack in order to break individuals' wills. When they are in a hurry, they make it a very acute process using a period of only weeks. On a longer term basis apparently these background factors are not used so extensively, especially if they have a large population to deal with. As Dr. Litton has observed and reported, schools are set up in which they have no need of most of these factors because they are not in a hurry. They have plenty of time and hence can use psychological pressures and a form of social isolation until full indoctrination is achieved.

We will start today with Dr. Jack Vernon from Princeton University, who has done some experiments in physical and social isolation over short periods of time with normal subjects.

**Dr. J. A. Vernon:** Thank you. The story I bring you today is another in the long list illustrating that there is nothing new under the sun. To be sure the social and physical isolation of humans is an old story. I am sure you are all familiar with the problems of "stir crazy" prisoners. We have all heard of the man who divided his candles into small pieces to serve as rationed food that he might survive his accidental confinement in an abandoned wine cellar. You probably are familiar with the account given by Koffka of a case he called "behavior in the absence of an ego".

This was the story of a mountain climber who fell into a deep crevasse and there lost consciousness. Apparently upon awakening he found himself in a very large gray, nebulous world, and was completely unable to render an ego to the situation until he discovered some discrimination in the environment. So perhaps heterogeneity of environment is a very important aspect of our everyday world.

There certainly has been enough exercise recently in terms of constructing brain models and the theoretical considerations concerning brain function to emphasize the importance of normal everyday sensory input. In a way this is all we are trying to look into, but by the inverse process; what happens when you simply shut down rather markedly on this sensory input?

We have coined a term for this process of sensory shut-down: "sensory deprivation"; a term, you will recognize, which is more convenient than accurate. It is obviously impossible to have complete sensory deprivation for you can never stop all the sensory input and retain a reporting organism. Most of you will recall in a report given at the last meeting by Dr. Lilly that even in a very severe restriction there always remains kinesthetic input. Thus the term sensory deprivation is used simply to emphasize the fact that there is a very drastic reduction in the amount and the variability of the normal sensory stimulation.

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Before the presentation of our data, I would like to emphasize one thing. This is a preliminary study, and I am going to talk very loosely about it. Whether or not these data are to be substantiated is yet to be determined. The data of the pilot study were collected from only four subjects.

The physical description of the confinement cell is as follows: It is a floating room which is light proof and sound proof. It is a room within a room, each of which has 16" concrete walls that are separated by a 5" air gap. The floor of the floating chamber rests on a concrete base which in turn rests on a 5" layer of sand contained in a cement saucer. This rests on another 5" sand bed also contained in a concrete saucer which is supported by a bed of gravel. All of this prevents ambient vibrations from entering the room and hence the room is excellently sound proofed. The room which does not touch the building has roughly an 80 db sound loss through it. In addition to the sound proofing each subject is fitted with sealed ear plugs so as to minimize sounds he may make while in the confinement cell.

The subject receives no light stimulation throughout the period of isolation. The period of confinement was 48 hours which was interrupted for testing, for toilet needs, and for an eating schedule. A safe estimate of the summed interruptions of isolation is 1½ hours out of the total 48 hours.

Each subject was introduced into the chamber with something like the following comment, which we felt was very important: "This is not a study in endurance. This is not an attempt to 'break you down'. We are simply trying to find out what happens to humans under these conditions. If at any time the confinement becomes too difficult, you are free to terminate the experiment, and we insist that you do so rather than trying to be heroic. The ante-chamber to the confinement cell will always be occupied by an experimenter." So far we have had only one subject who could not continue the study.

There is still one final restriction on the confinement subjects. Each is equipped with a pair of cardboard gauntlets which extend from just below the elbows to just beyond the finger tips. In a way this is a bogus confinement gadget, but it serves well the function of reminding the subjects to remain quiet, and also they serve as psychological confiners.

A very similar study to the present work is that conducted by
Bexton, Heron, and Scott at McGill. These investigators confined subjects for various periods of time. Their subjects were placed in a semi-sound proof room containing a constant masking sound (a motor hum). The room was lighted but the subjects wore semi-translucent goggles which permitted brightness discriminations but not form discrimination.

It was found in the McGill study that with continued isolation there was a progressive intellectual deterioration which fortunately repaired after release from confinement.

It was this intellectual deterioration which suggested to us that perhaps some form of simple learning may be effected by isolation. We decided to use a simple rote memory task, a list of 12 adjectives to be learned by anticipation. We predicted that if the McGill confinement conditions produced intellectual deterioration then the Princeton confinement conditions should render learning a difficult task. The data were quite contrary to our expectations; not only did the subjects not perform worse with isolation, they improved markedly. The learning data may be illustrated by the following table:

<table>
<thead>
<tr>
<th>Period</th>
<th>Trials to Criteria</th>
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<tbody>
<tr>
<td>Pre-confinement</td>
<td>20</td>
</tr>
<tr>
<td>After 24 hours of confinement</td>
<td>15</td>
</tr>
<tr>
<td>After 48 hours of confinement</td>
<td>8</td>
</tr>
<tr>
<td>24 hours after release</td>
<td>15</td>
</tr>
<tr>
<td>48 hours after release</td>
<td>22</td>
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From the above table it is clear that the improvement was confined to the isolation period and that once out of confinement the learning rate returned to normal.

In the McGill study all subjects reported some sort of hallucinatory behavior. Usually they experienced visual hallucinations, but there were also auditory hallucinations, and at least one case of kinesthetic hallucination; the subject reported a double, semi-overlapping, body image.

Not one of our four subjects reported any hallucinations. We have suggested that perhaps this difference in data is due to the difference in the confinement conditions. Perhaps the constant hum of the masking noise and the ill-defined brightness discrimination provided material from which one could generate hallucinations.

We have all played at the game of inventing songs or rhymes to the sound of railroad wheels, windshield wipers, etc., which suggests that perhaps when we come to deal with amorphous stimuli we endeavor to make them meaningful. Maybe we attempt to generate hallucinations out of such stimuli. It is also our belief that even under the Princeton confinement conditions perhaps hallucinatory behavior would occur with longer confinements.

Another vast difference that occurs between the McGill and Princeton studies lies in the area of the visual processes. Immediately upon release the McGill people reported a loss of saturation of hues and stated that the world had taken on a rather pastel array of colors. They also reported a loss in tridimensionality—the world had become somewhat bidimensional. None of our subjects reported any of the above phenomena. We have observed in some subjects an insensitivity to pain from bright lights upon release from confinement. The normally dark adapted eye of most people will receive a sudden bright light only with pain. And while there is a great deal of individual difference in this matter of "dazzle pain" it is, nevertheless, of interest that some lose their sensitivity to "dazzle pain" after 48 hours of dark adaptation.

We have found that our subjects shortly come to resent us. They adopt many forms of aggression, shortness and ill temper which they display toward the experimenter. However, the moment they are released they seem greatly relieved and no longer hostile. At the point of release we give these people a tape recorder and request that they tell us about their experiences in confinement. They usually have a great deal to tell, most of it worthless and mainly chattery. They go on and on which might suggest that they are compensating for a need to communicate. This need may be reflected in other ways. For example, I am reminded of the subject who made a very obviously abortive attempt to steal a lump of sugar from his food tray. Apparently he wished the experimenter to at least engage him in conversation long enough to say "give it back".

The protocols of our subject were unusual in one other regard. They contained, so it seemed to us, an inordinate amount of four letter language. At the moment we do not wish to emphasize this and we are not prepared to attach any meaning to it.

Another area of human behavior which we felt should be influenced by sensory deprivation is the matter of suggestibility. We
attempted to test suggestibility by the old Hull body sway technique. The data were negative but interesting. The pre- and post-confinement tests were not significantly different but in each case the subjects were more able to resist suggestion to sway after confinement than before—not an anticipated finding.

Well, these are the data of the preliminary study and further studies are now being conducted.

**Moderator Lilly:** Thank you, Dr. Vernon.

We have time for one or two questions of Dr. Vernon before going on to the next paper. Are there any questions?

**Dr. Haun:** Dr. Vernon, did you make any study of the absence of ego in darkness? I was fortunate enough to meet in New York a Dr. Chang who spent a good deal of time in Tibet. He speaks of the Yogi darkness. The conditions are slightly different. After spending a week in a cool, dark room these phenomena begin to occur. At the end of it, I am certain after 50 days of it, you would begin to find most satisfactory results. I was certain too but indicated that I did not have the 50 days available. I can give you Dr. Chang’s address. You will find there is a great deal of data on the phenomenon. I wonder if the 48 hour period is just not enough time. There may be some crucial cutoff point.

**Dr. Vernon:** I am sure this is quite true. Probably the crucial cutoff point will vary from individual to individual. You recall the now very famous tank experiments where in two or three hours similar phenomena are reported. I have the feeling that there is something important between 48 and 72 hours. Under our conditions, in fact, we have people now who generate hallucinations during 72 hours confinement but this is in the very sharply restricted situation.

**Dr. Wolff:** The most telling thing you said had to do with the amount of talk that was observed coming out of the confinement. You suggested that there was a good deal of profanity. Has that to do with the general content of hostility or some other meaning to this?

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**Dr. Vernon:** I wish I could answer this. I suggest that your answer is the proper one, that probably this is an admixture of relief over getting out—emotionality accompanies that—as well as, residual hostility or aggression that they feel as the result of the confinement.

**Dr. Furman:** Do you want to tell us about those not remaining over 48 hours?

**Dr. Vernon:** One man to date has walked out on us, so to speak. We are still in the process of analyzing the man on all the follow-up data that we can get. The interesting thing here is that he quit after 11 hours of confinement and that he was the first man we have ever put in in the morning, which is a situation that Dr. Lilly used. Most of our subjects have gone in at six o’clock in the afternoon so that they have only a short period before they seem to go off and spend about 24 hours in sleep but this individual had just gotten through sleeping and was put into confinement and 11 hours later came out saying that he was afraid he was going blind and he could no longer tolerate staying in there. Apparently he had battled this decision for quite some time. He estimated four hours but his excuse, let us say, for coming out was the fear of going blind. He is the only one.

**Dr. Wolff:** What about time orientation?

**Dr. Vernon:** This is where we disappoint them all. When they come out they are just as apt to say, “It is 11 o’clock!” They are very disappointed when we don’t ask them about time orientation. They have all apparently gotten hold of the Mammoth Cave studies.

**Dr. Neuson:** I am wondering whether this is really confinement. These subjects can leave any time they want to. What is their motivation for staying in the room? Were they paid? They could obviously stop. I wonder if this does not change the conditions of the experiment very much.

**Dr. Vernon:** The preliminary data that I have primarily given you today involved four subjects, four voluntary subjects. Since this time the present studies have involved subjects who are being paid at the rate of $20 a day, a fee established by the McGill study. You are quite right in saying that there is a motivational shift.
These people, by and large, can use the money and I do feel that there is probably a strong motivation for them to stay in there. However, I hasten to add that again we are not trying to break them down or anything like this.

**Moderator Lilly:** Since Dr. Vernon brought up the tank experiments, I want to add one note to his presentation. Apparently this production of hallucinations which excites interest in this type of experimentation is not yet well understood. As you well know, there are probably very great personal variations among the people involved which is one factor that can be controlled only by running many subjects and finding out where the variability is.

If you contrast the amount of output and the amount of input that is allowed the subjects in these three situations (McGill, Princeton, and Bethesda) you will find that the tank experiments have the lowest absolute stimulation level. The amount of confinement in the psychological sphere is minimal; the subject can leave at any time he wishes. This is not quite the same psychological confinement of Dr. Vernon's experiments. In his experiments there is an additional pressure from the observer for the subject to stick it out. Such pressures are not brought to bear in the tank experiments; the observer and the subject are co-existent; it is a perfectly voluntary situation. In addition, I suspect that if you do not allow energy discharge in the biological sphere, hallucinations will occur earlier; however, in any given person the threshold and the time course varies greatly.

We will now go into solitary confinement with Dr. Milton Meltzer of Bethesda, who spent one and a half years as psychiatrist at Alcatraz.

**Dr. Milton Meltzer:** What I have to say this morning is based on my experience and observations as Chief Medical Officer at Alcatraz Federal Penitentiary during 1951 and part of 1952. At that time the institution confined about 230 federal prisoners, one half of whom were serving the equivalent of life sentences. The rest had sentences ranging down to a minimum of five years for auto theft. The inmates had come to this prison from other institutions in which they had proved to be intolerable or incorrigible. There were a few exceptions who were direct commitments because of their extreme notoriety.

The prison was organized to achieve detention and some degree of isolation. Comforts, distractions and rehabilitation programs were secondary. Maximum custody was achieved by a variety of means; isolation, armed supervision, controlled movement of the population, frequent counts during which all activity was suspended, custodial alertness and penological know-how. Discipline was enforced or implemented by combining the difficulty of escape with a reward-punishment orientation predicated on the prisoner's wish to retain his good time and earn a transfer to another institution where comforts and privileges were more abundant.

As chief and only medical officer, I supervised a United States Public Health Service staff of technicians in our daily sick call and hospital service. Psychosomatic reactions were frequent, especially those which seemed to relate to intense oral needs expressed psychophysologically or symbolically in upper gastrointestinal complaints and cutaneous reactions. There was little hypertension but much tension headache. There was a great craving for barbiturates, narcotics or any drug which could actually or by reputation produce some kind of a "kick", which in that context meant any kind of profound physiologic reaction or alteration of consciousness.

My conclusions and impressions stem exclusively from a non-experimental, clinical observation method. Much of what I learned came about through the scrutiny of my own counter transference reactions and anxieties. I was able to observe the recurrent integrations and reactions which were evoked in the fairly stereotyped situations in prison life and prisoner-authority or prisoner-doctor relationships. Little interviewing was possible since it meant a realistic hazard to the prisoner and to myself.

Let me describe for you now the physical setting of the prison. The housing consisted of a cell house of three tiers of cells in two cell blocks facing each other. Each cell had a bunk, toilet, sink and small writing surface. There was one man in each cell. A disciplinary and segregation section was in a separate wing, had slightly larger cells but was in a single unit so that on looking out of his cell an inmate would see a high wall and out into the bay. Here were the solitary cells, regular cells behind an extra partition so that the open grill work at the end of the cell was closed off from contact with the rest of the section. A peep hole was present for observing the inmate from outside and an electric light was controlled from the outside. In several cells the toilet fixture was absent and there was only a hole in the floor connecting to a floor...
A blanket and mattress replaced the bunk. Clothing was sometimes removed from the inmate. Diet was the regular prison fare except for the deletion of premium items and an emphasis on bland and monotonous substitutes which were calorically adequate but not particularly appetizing. The inmate knew that he would be visited and talked to at least once on each shift by a member of the medical staff and by a member of the custodial staff. With ingenuity he could holler into the toilet bowl or rap on the steel bulkheads and communicate with others in the unit. Noise would sooner or later bring the guard to see what was going on. If he had medicine to take this was brought to him. Later, he could write letters to his congressman or others, complaining of cruel and unusual punishment and often enough have his letters produce a temporary diversion while matters were investigated. Prisoners were rarely confined for periods beyond a week. It usually came about, almost by tacit agreement, that there would be an intermission for a day or two in the defiance and then he would reprove and go back in. An indeterminate stay was rare. The inmate knew that he could get out by capitulating or seeming to capitulate if his sojourn was in the service of forcing a change in his attitude. Often enough his stay was for a specified number of days for some infraction.

In describing the more specific effects of solitary, it must be kept in mind that a highly selective process operated. Only certain inmates found themselves in such a situation. I would estimate that two-thirds of the population rarely if ever were in the “hole”. I am not certain as to what factor or factors operated in this selection process but it seems that inmates with acting out tendencies, impulsivity, great preoccupation with power and prestige operations and a more paranoidless depressive makeup were most often confined.

The motor effects ranged from occasional tense pacing, restlessness and sense of inner tension with noise making, yelling, banging and assaultiveness at one extreme, to a kind of regressed, dissociated, withdrawn, hypnoid and reverie-like state at the other. Interest seemed to be withdrawn from the usual objects in the surroundings and one would have a feeling on visiting the inmate of having roused him from a state of retreat into inner fantasy.

It appears that the sense of self, the ego and ego boundary phenomena are profoundly affected by the isolation. The body ego prototype re-emerges with an intense investment in various aches and pains, disabilities and body functions. Hypochondriacal states of a transient type are evident. One is told “when you’re in that cell and have a headache, your headache fills up the whole cell”.

The various aspects of regression and ego alteration or disturbance greatly perturb the custodial officers and inmates in the sense that a preconception which exists is not being fulfilled. The basic assumption is of the hypothetically normal prisoner who for disciplinary reasons is placed in seclusion with the attendant loss of comforts and distractions implicit in the isolation. He is to perceive this as punishment for his misdeeds and is to decide to alter his ways or control himself so as to avoid such a state of affairs in the future, for which he will be allowed to have the rewards of more comforts and satisfaction rather than less. All of this is, in essence, predicated upon reward-punishment having influence on hostility and unacceptable aggression. When the experience of seclusion gets used for gratification of unconscious fantasy or for the living through of unconscious infantile dependency needs the system tends to break down. The authorities had a tendency to place in solitary only those who could “take it”. When others who reacted unrealistically had to be punished there was anxiety and ambiguous administrative handling, often with an effort to involve the psychiatrist so as to get around the issue. This often resulted in highly paradoxical situations. There were some inmates who were inclined to use solitary as a retreat and catalyst for a regressive experience of the mystical union type. This was the fellow who instead of being shoved into solitary, would dive into solitary in the way some people dive into bed at the end of a hard day. This was quite outside of the concept of punishment and yet it had to be achieved via the route of misdeed resulting in seclusion. There was the occasional prisoner who would openly ask to be put in solitary, especially when he felt on the verge of panic. When one observed him and saw what went on one had the sense that he had shrouded himself in some of the steel and concrete of his cell and in a few days he would “have control of himself” and be able to go back out into the population.

The dilemma of the prisoner is a difficult one. He has to achieve some kinds of satisfaction and gratification of his primitive and infantile needs, allowing himself to receive from the authorities and yet maintain his malevolent, disjunctive integration with them.
In some prisoners, this character defense of malevolent integration was relatively absent. This man was the older criminal of a previous generation—the “businessman bandit” type. He suffered more pain, had cardiovascular psychosomatic reactions, tended to have a greater struggle with depressive problems and showed historical evidence of a previous heterosexual capacity of relative durability. He had some contempt for the “young punks and hoodlums” who were making up the greater part of the more recent commitments. The staff tended to feel more sympathetic to his plight and it was easier to feel into his personality. This type was a rare exception in the group.

I would like to focus on an idea which gradually evolved as I reflected on what I saw. It has to do with the primitive psychic state of good-bad objects. The prison experience with solitary as a maximum and day to day relative deprivation and restriction as the minimum tends to cause a regression towards this state of development in people who are doubtlessly somewhat fixated there anyway. Other factors and capacities determine whether this state will be largely in fantasy or largely acted out and lived through.

The history of one prisoner may illuminate some of this. This was a middle-aged inmate who had been incarcerated for several years. Prior to his transfer to Alcatraz he had been suspected of being an informer, and his safety was in jeopardy, since the other inmates had threatened to harm him. At Alcatraz he had presumed the same kind of behavior and for a short while had sought to gain favor by informing tactics. He came to grief in this pursuit when it became apparent that his demands were intolerable, and he placed himself in a segregation cell in what was ordinarily the disciplinary unit. He remained in this unit thereafter. The behavior that was so striking had to do with his precipitating a struggle with the institutional administration over the issue of taking baths. I had noticed for several weeks that he was becoming increasingly tense and that he was making extravagant demands for all kinds of medications. Finally it came to my attention that he was refusing to bathe, claiming that a skin condition prevented this. Actually he had a mild case of ichthyosis, and consultants had provided him with suitable ointments for use after bathing. Nonetheless, he refused to take baths for about a month, and it became clear that the welfare of the other inmates demanded some change in his hygiene. The officials informed him that he had to bathe and that there was no medical reason to prevent bathing. He then insisted that if he were going to be bathed “they would have to come in and get him”. Several officers came to escort him from his cell to the shower, and he used this occasion to provoke a fight. He armed himself with a homemade blackjack, a cake of soap in a sock, and when his cell door was opened he seized an officer and started to beat him. The other officers entered to quiet the disturbance, and in the resulting scuffle the inmate managed to hurt several officers, and himself received a laceration of the scalp. There followed a period of about a day during which he attempted to defeat treatment of his minor scalp laceration by tearing off bandages and so on. During this phase of disturbance his behavior was actually psychotic. The next day, however, there was a striking calmness and diminution of tension, and he began an extended course of writing detailed letters to the courts and public officials, describing how he was the victim of willful and malicious assault at the hands of the warden and medical officer and demanding and acting as if he expected to get $100,000 damages.

The episode depicts an instance of maneuvering reality to suit certain needs and of a way of relating to real and illusory persons. This instance serves to delineate some features of the super-ego of the inmate.

There is a wide range of concepts about the psychopathic super-ego. Various students have emphasized the apparent lack of super-ego. Others have emphasized the overdevelopment of super-ego. Another conception describes these people as having an impulse neurosis, in that ordinarily controlled impulses gain free access to behavior. My own impression of the super-ego in one type of criminal psychopath is derived from observation of the kind of relatedness he establishes with other persons. His reprojection of his super-ego figures gives us some idea of the kinds of experiences which brought his conscience into being. Unfortunately, our legal systems, social attitudes, and personal defenses all too often provide confirmatory evidence to the criminal that the projected super-ego figures are real, and he is deprived of the opportunity of having a corrective emotional experience. Efforts to get him to see that he provokes a large part of his difficulties collide with his short-term psychic profit he gets out of feeling persecuted.

The reduction in stimuli and suitable sources of acceptable instinctual gratification evokes a stimulus hunger and deficit which
the prisoner tries to handle in various ways. He seeks "kicks", he somaticizes his needs, he symbolizes his needs, especially oral ones towards food, drugs. His capacities to tolerate ambivalence and to synthesize contradictions disappear. His interpersonal dealings reflect the good-bad dichotomy. He is all one way and you are all the other.

I would imagine that the prisoner of war in the hands of the enemy is in a state similar to the criminal in the hands of the prison officials. I had the suspicion that the rescue and reunion fantasy was pretty universal, the direction of resolution, towards fantasy or towards acting out, was influenced by previous experiences in a familial setting. A fairly frequent family history in those who act out was of the child living with an alcoholic, bad, punishing father who hated him, and hurt him without cause, and a masochistic "good" mother who rewarded, indulged and gratified him more out of her need for vicarious satisfaction than from any more realistic concept of him as a separate person.

It seems to me that the movement towards the regressed state of good-bad objects is what makes a man vulnerable to external indoctrination, especially when the experience is inflicted upon him rather than being the reciprocal role played out in reaction to him.

As deprivation of stimulus and gratification pushes him in the direction of regression, the bad parent image becomes more real—the good image rises also to fulfill the gestalt and the man is ready to perform the integration with the good or illusory good one should he present himself. This good-bad configuration is the prototype of hope, but magical, undifferentiated and oriented toward oral and narcissistic needs rather than more highly evolved ones.

Lack of resistance to this process might depend upon the paucity of intermediate resources, previous experience which would fixate the process at an operating interpersonal level with the good or illusory good one.

I saw some prisoners who, when isolated, would slip into regression with fantasy gratification with such fluidity that they couldn't be "touched" or reached for the reward-punishment bargaining. In this way they defeated the intent of the process in so far as identification with or incorporation of the good one is concerned.

In one way or another the core reaction had to do with this good-bad dichotomy. Some struggled against it, some sought it purposely in order to have the fantasy of union with the good one for a while. Some made the incorporation but in terms of the physical structure of the cell and not the persons involved. I think I saw one or two old timers whose prison history was one of violence and turmoil in the beginning who were now tractable and seemed to have changed genuinely by having taken in a part of a previously hated official. They had spent much time in the hole. They wouldn't admit what had changed them and would speak only of getting out or getting to a more comfortable place.

To summarize, the prison experience in general and solitary confinement in particular, threatens the inmate's integration by depriving him of stimuli and various sets of reaction patterns or things in the environment towards which he can orient himself and constantly redefine himself in the service of knowing who he is. As these are withdrawn he tends to regress towards an infantile ego state of split and paired good-bad objects. He may pursue this as an end in itself as a way of helping the regression to occur. He may resist it and strive to slow down the regression or arrest it at some point short of this. In this sense one sees an evolutionary spectrum of primitive integrative reactions which doubtless recapitulates that person's development.

To the degree that the basic state is achieved so is the man vulnerable to forceful indoctrination. As his picture of the bad world and bad person mounts, he shows a readiness towards finding the illusory good one and at this point he is capable of massive incorporation, introjections and identifications. In the prison this tends to be forestalled because of his sense of belonging to the prisoner group. He will tell you that he would like to do it "your way" but he has to live with them and handle their retaliation if he deserts them and you cannot provide him with anything to help him escape from that.

Moderator Lilly: We will go on now to "Sleep Deprivation" by Dr. David Tyler, University of Puerto Rico.

Dr. David Tyler: I am very pleased to be with you today and to have this opportunity to talk about a subject I am very much interested in—"The Effects of Prolonged Wakefulness". However, I have many doubts that I can contribute anything to the understanding of the mechanisms that may be involved in the
phenomena called "brain washing" or forceful indoctrination. Frankly, I am not quite certain what is meant by this term. During the past few weeks, in an effort to prepare myself for this occasion, I made a search of the literature on this subject. The results were not rewarding for if there are any factual data on the subject of forceful indoctrination it is unavailable to me in the open literature or has escaped my attention. I did find a number of opinionated reports written by individuals whose qualifications as observers or interpreters of medical, psychological or social phenomena I have not been able to establish. Further, those that I did read contained few first-hand accounts or case reports set down by competent recorders but for the most part dealt with essentially uncritical third or fourth-hand reports of the actions and behaviors of vaguely described individuals.\(^1\) Many of the papers referred to as primary sources of references, novels, motion pictures, newspaper articles or articles in magazines such as Life, Newsweek, Colliers or Time. I would not like these remarks of mine to be interpreted to mean that I hold accounts in such magazines as trustworthy, but merely that such sources are generally not satisfactory as primary references for students seeking factual data, particularly in an area that is so emotionally charged. What facts I did gather from my literature search were the following:

a) There were a number of individuals who reported that when they were prisoners the enemy used rather rigorous tactics to obtain information of military value.\(^2\)

b) In operations "big switch" and "little switch" (terms used to describe the exchange of prisoners in Korea) some difficulty was encountered in organizing and getting together sufficient psy-

1. DR. ROBERT J. LIFTON of the Neuropsychiatry Division of the Walter Reed Army Institute of Research, has kindly given me a copy of his paper "Chinese Communist Thought Reform; 'Confession' and 'Reeducation' in Penal Institution" which is in press. This paper describes the results of his interview with 25 European and American civilians after their expulsion from Red China where they had been imprisoned from 2 to 4 years.


chiatrists to make a thorough evaluation of returning prisoners.\(^3\) This was very unfortunate.

c) Among the returning prisoners it appears there were a few—a very few—who were not sympathetic with our objectives in Korea or elsewhere. There were also some very self-interested and cowardly men.

d) Among these few were some (from the description given) who had personalities that might be called psychopathic. But whether the psychopathic personalities were established before Korea or during their imprisonment is not clearly established from the accounts, although one report\(^4\) claims to rule out the possibility of preservice impairment of personality in three cases.

What is very confusing, at least to me, are the stories of confessions at the famous (or infamous) Moscow trials. I know of no rational mechanism that can explain the behavior of these individuals except theater, or exhibitionism, or plain fraud and collusion.

Therefore, with these qualifying remarks I would like to discuss the effects of sleep loss. I say "qualifying"—as I should not like it to be interpreted that by this talk I am setting myself up as an authority on the effects of sleeplessness on brain washing or that I infer that certain psychological changes that occur from the result of sleep loss, such as hallucinations or delusions, have real significance on what or what may not be forcefully indoctrinated on an individual when he is subjected to such a stressful situation—or in the ease in which an individual may be convinced of another viewpoint.

We have been studying the effects of acute deprivation of sleep in human volunteers. I stress the word volunteers for I am certain that in this audience there are many who are only too sadly aware of the effect of motivation on performance. We made observations on some such 350 male volunteers who remained continuously awake under close supervision for periods up to 112 hours. I am quite certain if these subjects had not been volunteers the results would have been different.


Under such experimental conditions (because of time limit I won't describe in detail these conditions as this has been fully described elsewhere) certain changes occur. However, it appears that those that do occur are confined chiefly to the functioning of the brain and little, if any, significant biochemical, psychomotor or physiological effects are seen.

Let me give you some typical examples of our findings:

First, the biochemical: Blood sugar, adrenalin-like substances in the blood, red blood cells, hemoglobin, white blood cells, basal metabolism, body temperature, urinary nitrogen, creatinine and even the excretion of 17-ketosteroids remain unaffected by prolonged wakefulness. The excretion of 17-ketosteroids has been reported to increase with fatigue of heavy work, but we found no such change during five days of sleeplessness; in fact the results show a slight but statistically insignificant decrease. This appears to me to indicate that the stress of heavy work does not produce identical effects as the stress of sleeplessness.

Second, the psychomotor: We have used a variety of psychomotor performance tests during these studies. For the most part the results reveal that a man without sleep (even after 100 hours) can perform as well, during such test situations, as a normal rested man—provided the test is not made unduly long, tedious or boring. If it is, then we find some deterioration in performance due apparently to his inability to maintain attention which is particularly a result of momentary dozing off during the long test.

Third, the physiological: the only significant finding we noted (other than a slight increase in body sway) was in the character of the EEG. Briefly, with increasing periods of wakefulness, there is a marked depression in the percent time occupied by the 9 and 10/sec. waves and an increase in the faster activity. This may be considered by some to be similar to the desynchronization of the electrical activity of the brain.

**Psychological Changes**

It is the findings in this area that make the study of the effects of prolonged wakefulness particularly interesting. It must be emphasized that for the most part the changes that occur are very mild and vary greatly from individual to individual and from experiment to experiment. They would be of little significance were it not for the fact that there also occurred seven cases that showed more severe reactions—persistent hallucinations and paranoid reactions that, in fact, closely resembled those found in acute schizophrenia. Were it not for these cases the mild transitory wave-like disturbances such as the increased irritability, the tendency to hallucinate, the mildly disturbed thinking, the autistic expressions that occurred in all men in varying degrees, would only be a confirmation of the very common observations of the behavior of otherwise normal men who are extremely sleepy.

For convenience, and for no other reason, we are grouping these psychological changes into three categories: (Probably it would be better if we could forget these categories and simply classify all symptoms as mental aberrations: mild, moderate and severe.)

I. Psychoneurotic:

Twenty-two percent of the men quit of their own accord or were dropped out for reasons that they developed colds or other minor ailments. Those that quit on their own developed vague fears: they were afraid the experiment was harming them, some felt they would not sleep properly again. Most of the individuals quit during the first 24 hours. One can be fairly certain that in the age group we used, and more so since they were Marines, all had stayed up at parties, and dances (sometimes with girls) for periods longer than they went without sleep in this study before they quit. Many of those that quit gave evidence of psychosomatic complaints, such as headache, and gastro-intestinal disturbances, but on examination little or no physical basis could be found for the ailments they described. Some were extremely irritable and quit without reporting to the observer.

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II. Schizophrenia-like reactions:
   A. Illusions, Delusions and Hallucinations:

   Approximately 70 percent of the subjects complained of hallucinations, both auditory and visual types. With the exception of four men, all had insight. They knew they were hearing things or seeing things that did not exist. The most common hallucinations were seeing women or hearing dogs—which should not necessarily surprise one as they are common experiences. Four cases occurred where the subjects insisted that what they thought they heard or what they thought they saw actually was occurring. Since these men persisted in their belief, they were dropped from the experiment and put to sleep. Our experiences prompted us to take no chances in such circumstances.

   B. Disturbances in thinking:

   This was difficult to detect during the test situation as during this period results obtained on a wide variety of examinations indicated normal performance. Among the tests used were: the ability to complete sentences, define and associate words, interpret stories, solve elementary problems in logic and the retention and recall of figures, both forward and reverse. Three cases of repetition were noted. That is, the subjects repeated an answer given to a first question to subsequent but different questions. However, disturbances in the thought processes appeared more frequently outside of the test situation and particularly during the spontaneous conversations of the subjects during the day, at meals or at the periodic rest intervals. Very common was rambling, garrulous speech, with little indication of coherent structure or logical connections among the many ideas that were covered in a few minutes conversation. Some appeared to have some difficulty in answering very ordinary questions concerning everyday occurrences or people. Unreasonable, unrelated or silly laughter was not common. While changes in emotional response were difficult to measure and varied greatly from subject to subject, most observers agreed that the swings from euphoria to depression were more noticeable in subjects who were without sleep.

III. Paranoid Reactions:

In three subjects reactions occurred resembling acute schizophrenia of the paranoid type. These individuals exhibited marked delusions of grandeur (one claimed he was on a secret mission for FDR), persecution and aggressiveness (all three started unprovoked fights with the intent to do bodily harm) and hallucinations.

The three cases of paranoid-like reactions and the four subjects who were hallucinating without insight constituted the seven severe reactions that resulted in these experiments. Whether this number would have been higher if the subjects had not been volunteers or if those that quit during the first 24 hours had been made to stay on is a question that we can't answer.

It is of interest that all these psychological changes reported here: the mild, the moderate and the severe, disappeared completely after the equivalent of a night's sleep. This rapid disappearance of mental symptoms resembles the state found in the toxic type of psychosis, particularly those reactions coincident to certain illnesses or overdoses of drugs. This toxic-like character of the reactions resulting from sleeplessness suggests the possibility that some substance accumulates in the brain during prolonged wakefulness which may be the cause of the psychotic-like symptoms that are observed.

Thank you very much.

Moderator Lilly: Thank you, Dr. Tyler. Are there any questions?

Dr. Ostow: I want to ask Dr. Tyler, if he saw depression and apathy?

Dr. Tyler: Yes.

Dr. Ostow: Could they be distinguished from the rest of the syndrome?

Dr. Tyler: We saw it. I cannot tell you how accurately it was measured as this is difficult to observe objectively. Depression and apathy were not noticeable during the test situation (the test situation is the period beginning at eight o'clock at night and lasting two and one-half hours) but during the rest periods when the men were permitted to sit down for five or ten minutes under supervision. We found indications of euphoria with subsequent depression but the euphoria in experiments of this sort is a difficult thing to control and I cannot tell you how valuable our observations
are in this area. One gets the impression that there are wider swings in mood in sleepless men.

**Question:** What was the difference between the two groups, the Marines and the conscientious objectors?

**Dr. Tyler:** With the conscientious objectors there were no "casualties" to speak about. Nobody dropped out. With the Marines we lost 22 percent of which more than half dropped out on their own accord.

**Question:** Do you have any comments on the possible usefulness of experiments of sleep deprivation as a possible screening procedure for individuals who might be selected for especially hazardous missions?

**Dr. Tyler:** We did use it for that. At least it was suggested. I don't know whether it worked. One of the reasons we were able to get the cooperation we got from the Marine Corps was because of the friendliness of one of the generals to that idea. We had no trouble getting any number of volunteers during the war because of this excellent cooperation.

**Dr. Osmond:** What adrenalin derivatives did you test for?

**Dr. Tyler:** Just total adrenalin-like substances in the blood. I may add that there is a difference of opinion between two of us. I looked over the data and I didn't think there were any significant differences. On the other hand, Dr. Tietz did think the differences were significant and those who know her will agree she is quite competent to judge matters of this sort.

**Dr. Osmond:** When was that done?

**Dr. Tyler:** The adrenalin-like substances, in '44.

**Dr. Osmond:** When techniques were different?

**Dr. Tyler:** That is exactly true.

**Dr. Osmond:** The second one, am I right in supposing that among the psychological tests you used you could find very little difference but in observational work you found there were certain differences?

**Dr. Tyler:** That is right.

**Dr. Osmond:** Our own work, using other substances suggests exactly this, that these tests are extremely disappointing. Yet, on the other hand, observation is extremely useful.

**Dr. Tyler:** May I point out that we were not concerned at first with the psychological changes. These became apparent as we were going along. In fact there were a large number of subjects used on experiments of this type, until one of the medical corpsmen who was permanently assigned to our group said, "You know these men act crazy?"

**Dr. Osmond:** The last one, what is the longest period of time over which the psychological changes persisted? Did they (the men) go immediately to sleep, require more than one sleep or an extra long sleep?

**Dr. Tyler:** That is a question we have not been able to answer. First, there is the motivation factor. The men got 72 hours' leave if they completed an experiment and you know what a Marine will do for a 72 hour leave. Some of them went into town right after the experiment was over. These were picked up in the streets of San Diego, sometimes asleep. Others, in fact most, on awakening in the morning would go right off on their leave. So we could not evaluate too well the amount of sleep needed for full recovery. Some reported that they required the same amount of sleep; others said it took a few nights to get over the "hangover".

**Dr. Wolf:** On the method of maintaining, keeping people awake, is there any comment?

**Dr. Tyler:** We have to keep them active, almost constantly on the move. We tried one "sedentary" experiment where the men sat around the table. We were forced to stop at about 30 hours because of lack of cooperation. You have to keep men moving to keep them awake for prolonged periods. I admire any efforts to run experiments without constant activity. In some experiments the men went on forced marches, totaling around 60-70 miles in the first 48 hours with full equipment.

**Dr. Wolf:** Sleep loss mixed with physical activity?

**Dr. Tyler:** That is true, and with muscular fatigue.

**Moderator Lilly:** Dr. Weinstein will probably have something
to say about these matters also. I wish to call on Dr. Weinstein now
to talk about “Confabulation with Brain Injury and Sleep Loss”.

Dr. Edwin A. Weinstein: The data to be presented were
obtained in studies of certain of the behavioral changes which
follow brain injury. Such phenomena as confabulation, denial of
illness (anosognosia), disorientation for place and time, redupli-
cation for place, time, person and parts of the body and paraphasia
have been shown to be not simply manifestations of specific psycho-
logical or physiological defects but rather alterations in symbolic
organization or language. It is because such forms of language
function as modes of adaptation to stress that the observations
may be germane to the understanding of “brainwashing”. While
this presentation is confined to confabulation, it should be pointed
out that the same principles apply to the other phenomena as well.

Confabulation may be defined as the narrating of a false version
of a particular experience or event. In 100 consecutive cases of
the types of brain injury to be described, confabulation occurred
in 28 under conditions of routine hospital observation. It is difficult
to give statistics because the method of interviewing, the social
milieu as well as the type of brain injury and the nature of the
disability all affect the incidence. We interviewed patients on an
average of twice a week in a structured fashion, using the ordinary
questions of the clinical history. We soon recognized that the
hospital milieu involved stressful features apart from the patient’s
disability itself. In cases of head injury, there is a long waiting
period often lasting many months before disposition is made. Many
of the staff wonder if the patient is psychotic and his symptoms are
not exclusively in the sphere of either neurosurgeon, neurologist
or psychiatrist. Frequently confabulation does not develop until
the patient has been in the hospital for several months and brain
function has actually improved. Also patients are more apt to
confabulate in formal interviews than they are in conversation
with other patients. In our experience, confabulation appeared
only in subjects with fairly rapidly developing brain pathology as
in tumors, ruptured aneurysm and lacerating brain injuries. The
tumors were deep-seated, involving particularly the diencephalon.
EEG records indicated involvement of no discrete cortical area
but rather showed diffuse, usually bilateral slow wave activity. It
should be pointed out that these conditions of altered brain
function, while apparently necessary for the enduring existence of
the behavior to be described, also are present in many persons
who do not confabulate.

The content of the confabulations dealt mainly with the manner
in which the patient had sustained his disability. Patients injured
in automobile wrecks told of having been in parachute and airplane
accidents, or of having been hurt in a football game or of having
been wounded in combat. A soldier who had sustained a brain
injury in combat said he had been hit on the head by his wife.
A soldier who had been struck in the head by a piece of exploding
pipe stated that he had fallen off a truck. A patient who had fallen
down a flight of stairs confabulated that he had been in a fight at
a country club. A man who had sustained a sub-arachnoid hemor-
rhage said he had been hit on the head while “waiting for a street
car”. Several women confabulated that they had come to the
hospital to have a baby.

Almost all of these confabulations are quite plausible. Patients
who give stories of having been in parachute accidents have actually
been paratroopers. The confabulation is generally related in a
matter of fact, bland fashion and often escapes detection by those
unfamiliar with the facts. The story is often told in a rambling
circumstantial way, using many apparently irrelevant details, stereo-
types and cliches.

It became evident that the confabulation, although ostensibly
an account of some past event, was in some degree the representa-
tion of some contemporary problem. This relationship is exem-
plified in the case of a supply officer who sustained a brain injury
when his jeep overturned in Korea and confabulated that he had
been struck by an enemy shell. He was left with a weakness of his
right hand, an inability to write and a mild dysphasia and dyslexia.
After having been hospitalized for several months, he would give
the following confabulation when asked about his injury, “I had
a big job overseas. I was an intelligence officer. There were two
men working with me, and I was sent to check on their security.
They were as commy as if they had been painted with a red brush.
I had to write out everything so it could be read at the court
martial for those men some day. I wrote it out and turned it in to
headquarters. I had enough written so any jury in its right senses
would give those men 40 years without any question. Those two
were riding with me the day the enemy shell came over and killed
both of them." In interview after interview this account would be repeated in identical fashion. When asked what the security offense had been, he replied that "they were selling groceries at a fraction of their value to make some money." After the disappearance of the confabulation and with the presentation of the man's problems in more referential fashion, his concern with his intelligence, his ability to read and write and the matter of making a living were expressed with considerable anxiety.

The clearing up of a confabulation indicated either that a problem had been solved or that the patient was expressing it in another pattern of language. Thus while a patient might no longer confabulate as such, he might give the content in the form of a rumor or a "confession", stating in effect what was not true. What was significant though was the apparent need to continue to express the confabulatory material in some fashion. There is commonly a stage where the patient gives the true and false version of his accident side by side. Some patients introduce the true content in terms of the accident having happened to some one else, for example that a brother was in an automobile accident. Similarly he may displace the accident to a time in the past before he tells when and how it actually happened.

The introduction of a new confabulation about past events, or a change in the original confabulation, usually parallels the occurrence of some stressful incident. One soldier, receiving news that his wife was divorcing him, charged that an old scar had been caused by her having tried to shoot him in the back. The man who told of apprehending the "spies" stated that he had "threatened to shoot them" after his ward officer had refused him leave to visit his wife. Throughout the period of confabulation the patient, despite his disabilities and problems, is generally quite free of anxiety. Anxiety in the form of a "catastrophic reaction" appears only when confabulation ceases abruptly and is not succeeded by other alterations in language pattern. In addition to those cliches described, humor, slang, profanity, vows and threats may appear at this stage and serve a similar adaptive function. Often there is an initial euphoric state, followed by a paranoid attitude before the patient expresses realistic concern over his problems.

In about half of these cases, there is denial of illness, particularly in regard to the brain injury. In general, explicit denial of illness is not accompanied by much confabulation and the more florid confabulations occur in patients who admit the injury. Confabulation, like denial, does not appear alone though it may outlast other changes in behavior such as paraphasia, disorientation and reduplication. Just as confabulation involves a symbolic representation in terms of an event, paraphasia does so in terms of misnaming objects and the various forms of reduplication and disorientation do so in terms of misidentification of places, persons and dates.

Why do people confabulate and present their problems in such a metaphorical fashion? A study of the background of these patients indicates that only one of them could be considered an habitual liar. The others had been very conventional people with a great deal of conformity to family standards. The histories given by families stressed such qualities as goodness, obedience and devotion. In comparison with patients with other forms of adaptation following similar types of brain injury, it seemed as if the patient had formed a self-concept and felt himself most meaningfully related to people in terms of such qualities. In the confabulation the patient similarly uses those symbolic values which had constituted the most significant aspects of their experience, such as those concerning flying, country clubs, driving a truck, etc. These were the roles from which they derived the most prestige and in the fulfillment of which they had felt themselves most significantly related in their environment.

Confabulation is thus a means whereby the patient overcomes isolation and identifies himself with the most meaningful and powerful aspects of his environment. By this he seems to avoid nothingness and to establish a feeling of existing or "reality". This may seem paradoxical in that the confabulation is actually a distortion of reality but the feeling of truth or reality may be more closely related to the degree of identification in a culture than to any more logical cognitive process. Following certain types of brain injury the patient seems to be in a state of social isolation or anomy. Many of the alterations in behavior are to be interpreted not as an escape from "reality" but as an attempt to attain it.

**DISCUSSION OF DR. TYLER'S PAPER**

We were greatly stimulated by Dr. Tyler's work and ran a similar experiment on 26 subjects at the Walter Reed Army Institute of Research. The subjects were studied in groups of
five or six, a man serving as a control one week and being sleep deprived for the following week, during which period the various test procedures were repeated.

We found much less disturbance in behavior than was recorded by Dr. Tyler. What changes did occur were mild and transitory and in any group were reported by only one or two men. Several, after the first 24 hours without sleep, described a disorientation for time of day in which they felt that it should be much later than it actually was. Perceptual distortions were also described. One man, looking at a row of circles during a test, saw them as doughnuts. Others saw distortions of the dimensions of the room. One man had the feeling that he was sitting behind himself. In all of these instances the subject was quite aware of the distortion.

The degree to which the overt signs of sleepiness were manifested was very variable. Some men appeared profoundly drowsy after 24 hours, while others at 90 hours seemed only slightly sleepy. Yawning was only rarely seen. Many of the subjects seemed more anxious and irritable after they had awakened from post-deprivation sleep than they had been during deprivation itself. There were somatic complaints, expressions of concern about the subject’s family and whether deprivation might have been harmful. During deprivation on the whole, patients did well on psychological tests. Errors occurred mainly in tasks involving prolonged visual and auditory attention.

The subjects were conscientious objectors, members of a religious sect. They were highly motivated and had a strong group organization. Thus they would help to keep one awake with emphasis on “beating the record”. I mention this to stress the point that one cannot consider the effects of physical stress apart from the social milieu.

**Moderator Lilly:** We will go on with Dr. Joseph Brozek from the University of Minnesota, who will talk on semistarvation.

**Dr. Josef Brozek:** This conference is concerned with the effect of various kinds of stresses and deprivations on personality and behavior, with special reference to the process of forceful indoctrination. I wish to make it clear at the outset that our presentation, confined to experimental work on semistarvation carried out in the Laboratory of Physiological Hygiene, can be of only limited value in clarifying the basic psychological processes or in quantifying some of the parameters of what has been termed “brainwashing”.

The intensity of the stress, judged from the loss of weight per unit of time, is one parameter about which we would like to know more than we do at present. As things stand now, we are not able to predict with desirable precision what would be the results—psychological or physiological—of losing a quarter of one’s weight in, say, six weeks rather than six months.

Our ability to estimate effects of combined physical stresses is also very limited. In some situations the interaction between the stress factors may yield surprising results and may facilitate rather than impair the chance of adjustment and survival. Let me illustrate this in reference to sweat losses in a combined water (900 cc. per day) and caloric restriction (1,000 Cal. from carbohydrate per day) in the presence of moderately severe physical work (daily total expenditure of about 3,000 Cal.). The sweat rates, determined as the weight loss during a one-hour walk on a motor-driven treadmill, were highly predictable, practically constant during the control period. During the experimental period there was a marked decrease in the sweat rates which were reduced, on the average to about 50 per cent of the control value on the sixth day. Substantial water conservation was achieved also by a reduction in the insensible water loss. Rehydration, with continued caloric restriction, resulted in an increase of the sweat rates but by the 10th day the sweat losses reached only 70 per cent of the control level. The sweat rates increased more rapidly and promptly as soon as food restriction was lifted. The values returned to the pre-restriction levels within a week. Clearly, food restriction, affecting importantly the sweating, would be beneficial rather than a detrimental factor in situations where water deficiency was present (1).

There are several other limitations concerning specifically the psychological impact of prolonged caloric restriction. Firstly, and perhaps most importantly, we have always used volunteers as subjects. This is crucial to the perception of situations as threatening or non-threatening, to the arousal of conflicts and frustrations, to the very definition of “deprivation”.

Secondly, the men were treated firmly but with respect. They

were made to feel, as strongly and as clearly as possible, that the study in which they participated was a cooperative enterprise. They had the role of a partner in an important scientific pursuit and they were given to know it.

Thirdly, we were concerned primarily with the physiological—psychophysiological, if you wish—effects of a variety of stresses that we investigated, whether this was total or partial starvation (semistarvation), high environmental temperature, or restriction of the water intake, excessive physical work, experimentally induced malaria or lack of sleep. The principal criterion of "fitness" was the subject's performance. As performance represents a product of capacity and motivation, concerted effort was made to maintain morale high, in spite of the developing signs of physical incapacity. Only under these conditions could actual performance (especially all facets of "psychomotor" performance—strength, speed, coordination, endurance) be interpreted as a measure of performance capacity. We were interested in "somatopsychics" (to reverse the order in which these terms are usually put together), specifically in the impact of dietary restrictions and the resulting somatic alterations in behavior. Other environmental stresses, physical and social, were minimized or eliminated.

A part and parcel of the conscious effort on the part of the experimenters to maintain high morale was the provision of adequate sleeping quarters—not very fancy or airconditioned, but livable, clean, with adequate toilet facilities and plenty of soap and hot water. There were reasonably adequate recreation facilities. Positive newspaper and magazine publicity, visits of individuals ranking high in pacifist circles, and contacts with local churches were all important as morale builders.

One feature of the experiment that made it definitely easier to withstand the stress of semistarvation was the fixed schedule. The duration of the individual periods of the experiment—control, restriction, refeeding—was largely determined in advance and was strictly adhered to. No developments took place that would necessitate shortening of the experimental period. The subjects knew that in no case would they be required to starve for more than six months. The presence of a definite "end point" was a factor to which they clung when the going got tough. The thought "Well—it's only 13 weeks to go" was a definite morale booster. By contrast, the very uncertainty about everything, including the length of stay, would constitute a severe stress in the prison or concentration camp situations.

In the personality area we have used a variety of techniques, from standardized complaint inventories to Rorschach ink-bLOTS and sociometric analysis. The focus was descriptive, rather than dynamic and interpretative. The problems of psychopathogenesis presented themselves in spite of, not because of, the goals and design of the experiment.

There are 3 things I should like to do:
1) To present the general features of the study and the average changes in the major physiological and psychological variables;
2) To describe the different types of reaction patterns noted in the subjects during maintenance on the severely reduced food intake; and
3) To discuss a small number of individuals with more frankly psychopathologic responses.

This is, clearly, too heavy a menu for 20 minutes. As a workable alternative, I propose to go very briefly over the psychometric picture, point out the increasing docility of the subjects during semistarvation, and indicate the types of the more severe behavioral deviations in a few subjects who had great difficulty or were unable to adhere to the dietary regimen. The details may be found in the literature (2; cf. also 3 to 7).

Design of the Experiment

PSYCHOMETRIC DATA

Thirty-six young men, free of physical or mental disease, served as volunteer subjects. Following 12 weeks of the control period with an average intake of about 3,500 Cal., the food intake was abruptly

decreased to less than half this value, with a 24-week average of 1,570 Cal. In the 32 men about whose adherence to the diet there was no question, body weight dropped from 69.4 kg. to 52.6 kg. ($\Delta=16.8 \text{ kg.}, \text{24\% of the control value}$). Time of runs to exhaustion on the treadmill decreased from 242 sec. to 50 sec. ($\Delta=192 \text{ sec.}, \text{79\% of the control value}$). Speed of hand and arm movements decreased minimally. There was a larger deterioration in the precision of coordinated movements and a substantial loss in strength. In brief tests of intellectual functions no change was noted. In complex prolonged tests of intelligence the changes in the total score were consistent, and, consequently, statistically significant. Biologically, in terms of the importance of the impairment, the changes were negligible.

Self ratings stressed apathy and irritability, moodiness and depression, decreased ambition and mental adequacy. Sex and activity drive decreased while concern with food grew throughout the semistarvation period. In the Minnesota Multiphasic Personality Inventory there was a characteristic elevation on the scales of the "psychoneurotic triad" — Hypochondriasis, Depression, and Hysteria. In rehabilitation, which is of no concern to us in this context, the mean scores returned to the pre-starvation levels.

COMMON REACTION PATTERNS OF SEMISTARVATION

The subjects' changes in outward behavior, their reduced energy output, eating habits, subjective symptoms, emotions and attitudes were described in detail elsewhere (8).

For the purposes of this conference, perhaps the most relevant phenomenon was a distinct trend from a critical appraisal of events during the control period and an emphasis on sharing with the staff in the making of decisions affecting the group, to a definite docility as the semistarvation progressed in time and in the magnitude of its impact on the organism. I believe that this was not simply another manifestation of the overall apathy. During the starvation phase, the men were quite willing to trust the judgment of the staff of the Laboratory. In the rehabilitation period this confidence and ready reliance on authority definitely decreased. In fact, the men elected a committee to represent their voice in making decisions on various matters concerning their welfare.

SEVERE PERSONALITY DISTURBANCES

All subjects exhibited, to a varying degree, symptoms of what was labelled "semistarvation neurosis". In a few men the neuro-psychiatric disturbances were more severe. In four of the subjects a character neurosis was manifested in their inability to adhere rigorously and consistently to the dietary regimen. It should be noted that, legally, the subjects were free to quit but the moral and social pressures against such an action were strong. In no case were the subjects able, psychologically, simply to quit. One of the four men developed a reaction pattern bordering on psychosis and had to be briefly hospitalized. When the disturbance was relieved, he was released from the experiment. In one subject a psychogenic accident served as means for solving the intense conflict between the impulse to leave and the desire to carry out the original moral commitment.

Perhaps the very fact that such personality disturbances did develop under conditions of uncomplicated semistarvation is more important for our considerations than the details of symptomatology and etiology (cf. 9). At the same time, I believe that we do not deal here with personality alterations resulting from profound physiological changes. The stress probably simply revealed weaknesses present in the pre-starvation period, just as physical exercise brings out electrocardiographic evidence of coronary insufficiency, not manifest in the electrocardiogram of the resting patient.

To some, such a simile may appear tenuous, even questionable. Nevertheless, it is probably useful to differentiate between the reaction patterns that are common to a group of starving individuals and thus, in a real sense, "normal", and those reactions that deviate substantially from this norm.

SUMMARY AND CONCLUSIONS

Thirty-six men, recruited from Civilian Public Service Camps for conscientious objectors, volunteered for an experiment on semistarvation and nutritional rehabilitation. On the average, the men lost one-fourth of their body weight within six months and exhibited profound changes in body composition and physical fitness. In the overwhelming majority of cases they adhered rigor-
ously to the dietary regimen. Depression and apathy, curiously interlaced with irritability, rather than intense frustration constituted the characteristic mood. In contrast to the control period and, in particular, to the period of nutritional rehabilitation, in semistarvation the group was easy to manage. Such a docility would favor submission to forceful indoctrination.

One subject developed personality disturbance bordering on psychosis and was removed after a brief hospitalization, from the experiment. Three other men were unable to adhere consistently to the rigorous dietary regimen. One subject, in spite of a psychogenic accident, completed successfully the experiment.

A situation in which food would be offered on certain occasions and would be withdrawn on other occasions would constitute a more intensive psychological stress than food restriction alone. It would result in severe frustration, and would more readily break a man's moral fiber. By combining such a treatment with other forms of deprivation and insult, one could expect eventually to induce a "breakdown" in the majority of adult human beings.

The ethical and legal judgment concerning the responsibility of an individual for his actions under conditions of prolonged, systematic, severe maltreatment appears to lack, at present, a valid scientific basis. We do not have adequate information concerning the critical levels of the parameters (duration, severity, combination of stresses) of the "softening" process, basic to forceful indoctrination. Specifically, the amount of weight loss alone is not an adequate criterion of the magnitude and the biological impact of the stress of semistarvation.

**Moderator Lilly:** We have time for one or two questions.

**Dr. Hamburger:** I would like to ask Dr. Brozek if he made any attempt to study the dreams of his experimental subjects and if so, would he comment on particular dreams concerned with food and eating?

**Dr. Brozek:** I am glad that you brought up this question. The results are confusing. We obtained the evidence in two or three different ways. The men kept diaries and in these diaries they quite frequently spoke of food dreams. They reported such experiences in their interviews. However, in addition to this information, at definite periods during the experiment, at times unan-

ounced to the subjects, we asked them systematically, "What did you dream about?" When we used this systematic sample we did not get the kind of differences that you would expect. These are the facts. How you will interpret them I am not quite sure.

**Dr. Osmond:** There is one point I am not clear on, Sir. The diet is roughly a thousand calories?

**Dr. Brozek:** 1600.

**Dr. Osmond:** Vitamins?

**Dr. Brozek:** Adequate.

**Dr. Osmond:** Minerals? Was any work done particularly about vitamins being deliberately reduced?

**Dr. Brozek:** Yes. We have done extensive work in this field but not in combination with caloric restriction. Actually, with developing thiamine deficiency you do have a loss of appetite and finally vomiting so that you come really to a combination of vitamin and caloric deficiency, but not by design.

**Dr. Osmond:** Did you do any work on niacin deficiency?

**Dr. Brozek:** No. On thiamine and riboflavin. Most of the work was concerned with thiamine. There the changes were quite marked and pronounced changes would be obtained within a period of 10 to 14 days.

**Moderator Lilly:** We will go on now with Dr. Wolff on the effects of noxious stimuli in man.

**Dr. Wolff:** Among the host of effects of noxious stimulation in man is the experience of the sensation of pain. Pain sensation is not essential to a good adjustment, for man is quite capable of making all the basic and many of the complicated adjustments that his life calls for in the absence of pain sensation. This has been demonstrated by carefully studied individuals who have been without pain sensation since birth, and by those who have had pain sensation surgically eliminated. Secondly, pain is a very poor indicator of the degree of damage that a man has sustained, and the intensity or amount of pain is no indicator at all as to whether he will survive a given tissue damaging experience. All of the afferent impulses involved in pain sensation enter through the
dorsal roots and ascend the spinothalamic columns or ventrolateral portions of the cord. As yet no one has been able to elicit or evoke the experience of pain by stimulation of the cerebral cortex.

Pain as a sensation can be studied by methods which permit both qualitative and quantitative generalizations. One method consists of measuring the pain threshold by means of thermal radiation from a 1000 watt electric bulb focused on the blackened skin of the subject to be examined. The intensity of radiation just evoking a report of pain at the end of a 3 second exposure is taken as the pain threshold and is expressed in millicalories/cm²/second. Using this method for measuring pain threshold in many hundreds of people, it became apparent that, by and large, mankind has a pain threshold which is about the same, say plus or minus 16 per cent, from person to person, and in the same person from time to time. Man, woman or child feels pain with about the same amount of thermal radiation regardless of color, race, or political persuasion.

Also, there are a limited number of discernible steps in pain sensation from a threshold to a point beyond which discriminations of more intensity cannot be made. There are approximately 20 such steps indicating that the neural apparatus involved in pain sensation affords a crude kind of perception apparatus. It has been possible to build a pain scale in terms of the intensity of stimulation and the intensity of experience of pain. The pain unit has been defined as two of these discriminable steps, and called a dol.

On the other hand, let us consider the reaction threshold. Individuals vary enormously in how they react to sensations of pain. Although the pain threshold for a given individual on different occasions will remain quite uniform, his reaction threshold or responses to the experience of threshold pain, let us say, in terms of a sweat reaction of the skin (so called psychogalvanic response) varies from day to day, from hour to hour and from moment to moment according to the meaning of pain at the moment and based on his previous experience. This enormous variation in reaction threshold, in the same individual, and from individual to individual explains the confusion about apparent differences in the amount of pain that can be tolerated.

Wherever pain has been perceived it is likely that there is tissue damage, be it ever so slight and reversible. If the skin temperature is varied by one means or another, the amount of energy required to evoke the sensation of pain on the skin will be that which will raise the skin temperature to about 44°C to 45°C. It has been shown that at this temperature certain protein inactivation or break-down occurs, perhaps with the liberation of polypeptides or other breakdown products. It is suggested that pain sensation may be evoked by some of these agents, accumulating at a given rate.

When tissue is damaged the pain threshold is lowered. Let us take a person who has had a sunburn: the pain threshold in the erythematous skin is very much reduced and a stimulus intensity which is barely threshold for the average intact individual causes the sunburned person to have a moderately severe pain. With the pain threshold so much lowered and a threshold stimulus able to induce a high intensity of pain, indeed anyone who has had a sunburn realizes what a friendly clap on the shoulder means in the way of pain.

Another device which has been used to measure pain threshold pulls upon a hair in the skin. A hair of the skin is attached to a thread and a rubber band with an indicator running along a scale. When the pull of the hair just begins to hurt one makes a reading on the scale. Again, this pain threshold varies but little from person to person.

The pain threshold was sharply reduced in an area of erythema around an injured site in the flared area described by Lewis as part of the triple response to injury. Also, wherever vasodilatation occurred and especially during the process of vasodilatation, there was a lowered threshold. Such an area with lowered pain threshold may be said to have become more vulnerable to other noxious forces.

A third way of measuring pain threshold in sub-surface structures, consists of a simple spring arrangement for pressing against bony surfaces, such as the forehead or the top of the head or the tibia, and measuring the amount of pressure necessary when the subject first reports pain. This method of measuring deep pain thresholds has been useful in studying vascular headaches, including those of the migraine type. A person, for example, who has a migraine headache has a low threshold as compared to the threshold at headache-free periods. Therefore, the hypothesis can be advanced that a "pain substance" or "headache substance" is present when tissues are damaged, temporarily, as during a migraine state. Such local tenderness, regardless of how induced, is called primary hyperalgesia.
Thus, primary hyperalgesia occurs in damaged or injured tissue and is followed by a lowered pain threshold and increased pain sensibility and probably results from a local elaboration or accumulation of agents which excite terminal nerve endings subserving pain sensation. To be distinguished from primary hyperalgesia, is secondary hyperalgesia, this occurring in undamaged tissue and not associated with a lowered pain threshold. However, there may be increased pain sensibility due to an alteration in the central excitatory state so that impulses that enter the nervous system at the usual threshold are perceived as more painful. Such an augmented central excitatory state may arise from and be continued by a site of noxious stimulation adjacent to or remote from the area of noxious stimulation. Thus, noxious stimulation of a small site which may not be perceived as painful can cause a buildup and spread of a central excitatory state which may affect the pain sensibility (not the pain threshold) of adjacent or distant areas.

This was demonstrated experimentally in an individual who had tissue injured locally in the subsurface structures of his back by the injection of hypertonic salt solution, an injury which was completely reversible. As part of the reaction there developed an area of secondary hyperalgesia of the skin, in which pain threshold as measured by thermal radiation remained unchanged from that of the opposite control side of the back, but in which a stimulus of the same intensity as on the control side now evoked a much more intense pain. Therefore the bombardment of afferent impulses arising from a damaged site may or alter the central state of excitation as to alter perception from widely scattered tissue. On the other hand, a central inhibitory as well as a central excitatory state can be demonstrated. For example, take an individual with a damaged hemisphere. If we stimulate first one leg and then the other with a thermal stimulus it is apparent that it takes a greater intensity of stimulus to induce pain on the affected side than on the intact side. If we stimulate both legs simultaneously, then the stimulus intensity necessary to elicit pain on the affected side is greatly increased. Indeed not only is the pain threshold of the affected side raised by noxious stimulation of the opposite side, but the stimulus intensity necessary for motor response to occur is also increased. There is thus a central inhibitory as well as a central excitatory state relevant to pain sensation.

A step further can be taken by asking the question what is the effect of suggestion upon pain perception and upon reactions to noxious stimulation? There can be noxious stimulation without pain and noxious stimulation with pain; also pain as a sensation is to be distinguished from the adaptive, protective reactions that occur with it. Thus, when the left arm of a laboratory subject was struck with a ferrule, there occurred a lowering of capillary tone, not only in the part thus noxiously stimulated and the site of pain, but also in the other arm as well; gradually the capillary tone returned toward the initial control level. Now, without warning, a "sham blow" was introduced in the direction of the left forearm, and the left capillary tone was lowered as it was when the tissue was actually damaged. Subsequently, when a "sham blow" was expected and understood by the subject to be forthcoming, there was no capillary response.

Another experiment carries us a step further in the exploration of the effects of suggestion. The two arms of a subject were immersed in warm water at 37°C. In one set of experiments there was no suggestion made, and the subject experienced the usual warmth of the water. In the next series of trials, it was suggested that one arm would be anesthetic. It was then suggested that the water (still 37°C) in which the arms were immersed, first one and then the other, would "scald the skin" of the arm not suggested as anesthetic. During the latter experiment the individual suffered pain, showed many outward signs of discomfort with flushing and sweating of the face. The skin of the arm supposedly injured became red, and after the skin was dried the pain threshold was found to be lowered. A noxious thermal stimulation of known intensity was applied in comparable spots on both arms. In the arms in which anesthesia had been suggested there was relatively little damage noted during the subsequent days as a result of the burn as compared to the damage in the arm that had been previously suggested as being scalded when immersed in the water at 37°C. It was thus apparent that the attitude or feeling or the individual's concern or conception of the sensation that he was to feel not only played a part in the intensity of the pain experience but also in the intensity of his tissue reaction and in the vulnerability of this tissue to further assault.

In another series of experiments it was demonstrated that an individual who is highly motivated can withstand a good deal of pain, and indeed, while experiencing such pain can perform well
on tasks requiring considerable mental effort. Three subjects were used; one woman, who was experienced with high intensity pain during experiments from time to time for many years, and two men less experienced in such pain. The experiment consisted of putting a tight blood pressure cuff around the upper arm, raising the pressure to 230 mm. of mercury and holding the cuff in place at this pressure for a half hour. During this period the subjects repeatedly opened and closed their fists. Within a few minutes they were experiencing a moderate to a high intensity pain and complained bitterly. At this time mentation tests, consisting of learning procedures (digit symbol), mental arithmetic tests, and block design tests were given. In the woman long experienced in pain relatively little change in mentation was seen even when the experiment was repeated after sleep loss of 24 hours. In the two less experienced men the mentation tests were performed well during the pain. They performed the tests slightly less well when pain was experienced during excessive fatigue and following sleep loss.

Another body of information which I am not going to detail at this time because it is not relevant to this discussion concerns the outcome of an opportunity to interview a number of people who were exposed to the duress of prison circumstances and who were exposed to what was called indoctrination procedures. Pain was one of the factors in their experience but the pain played a more indirect role. The pain along with other experiences was instrumental in altering the attitudes of these individuals when it succeeded in convincing them of their isolation and the hostile attitude of their captors and sometimes other prisoners. Such individuals felt humiliated, degraded, cut off or despised. They ultimately became disorganized by the asocial, unfriendly and unsympathetic attitude of their jailers, which was coupled with their isolation, pain and other bodily discomfort. These individuals then became especially susceptible to the contact of a friendly person who might approach them. The pain then in a sense had become one of the several ways of humiliating and disorganizing the individual so that he became dependent or especially related himself to any other human being who would approach him in a friendly way. This injured subject was then more readily manipulated by the latter who could often make him accept or rationalize views which formerly were unacceptable. By threatening to withdraw his support or by assuming an unfriendly attitude he could usually bring the subject to heel. In other words, the experience of pain was only one of the means of so altering the individual as to make him dependent upon the friendly approach of another human being, whose friendly approach could then be exploited to change attitudes and value systems.

In summary, the human subject can be affected by afferent impulses from noxious stimulation which do not give rise to sensations of pain. There are a host of skeletal, vasomotor, gastrointestinal and neurohumoral changes which occur independently of sensation. Then there is a second category of effects which are linked with pain sensation which has its dimensions, as do other sensations. These dimensions have to do with site, quality, intensity, and temporal aspects, all highly definable. The pain experience is modified by a number of factors; i.e. concurrent other sensations, giving it special quality (distension in the gut or tightness in the head or rhythmic movement in the case of intestinal activity). A vastly more important category has to do with feeling, mood, attitude, bodily behavior, and adaptive reactions to pain sensation in which cultural factors are pertinent. We know all painful stimuli are not avoided. Many people enjoy pepper, snuff, needle baths, and similar experiences. We find that analgesics modify attitudes perhaps more than they do the pain threshold. Also, damaging the brain affects the significance of pain. We also have reason to believe that the painful experience is one that has a highly symbolic significance and is closely linked with feelings of isolation and rejection, especially when imposed by other human beings under hostile circumstances.

These elaborate reactions are implicated in the effects of noxious stimulation in man and involve far more than sensation of pain per se.
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