SUBLIMINAL COMMUNICATION TECHNOLOGY

HEARING

BEFORE THE

SUBCOMMITTEE ON TRANSPORTATION, AVIATION AND MATERIALS

OF THE

COMMITTEE ON SCIENCE AND TECHNOLOGY U.S. HOUSE OF REPRESENTATIVES

NINETY-EIGHTH CONGRESS

SECOND SESSION

AUGUST 6, 1984

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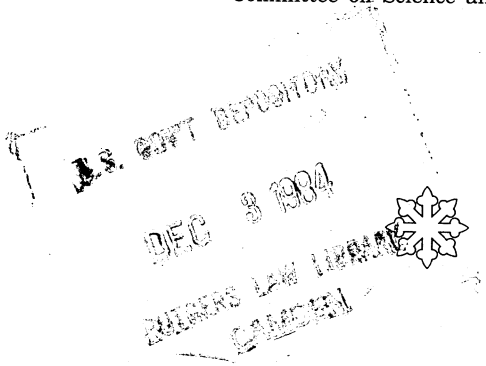

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CONTENTS

WITNESSES

SUBLIMINAL COMMUNICATION TECHNOLOGY

MONDAY AUGUST 6, 1984

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND TECHNOLOGY,
SUBCOMMITTEE ON TRANSPORTATION,
AVIATION AND MATERIALS,
Washington, DC.

The subcommittee met, pursuant to call, at 1:30 p.m., in room 2325, Rayburn House Office Building, Hon. Dan Glickman (chairman of the subcommittee) presiding.

Mr. GLICKMAN. Today the subcommittee will focus its attention on subliminal communication technology. This subcommittee has kind of made it a theme this year to explore in addition to the other areas of our jurisdiction those things which concern the public in a kind of Orwellian sense as a result of the nomenclature of this year 1984.

We held a series of hearings on computer security and privacy. Largely those hearings led to the enactment in the House of legislation which makes it a Federal crime to tap into people's records for the purpose of obtaining financial or privacy information.

But the subject is one that has many different facets to it. This hearing today is concerned with the subject of subliminal communication.

And this, as many in this room are familiar, is a process by which an individual is presented with information without that individual being made aware specifically of that information, but to which they make a selective response.

The message, which is usually in the form of words, pictures or voices, is presented so rapidly or faintly that the person seeing or hearing the message is not consciously aware of seeing or hearing anything.

Although little is known, at least by the general public, about the exact psychological and physiological mechanisms involved in subliminal communication, there have been a number of scientific advances in the area and an increase in its application in recent years.

For example, I understand that the use of subliminal communication is used by a large number of stores throughout the country to discourage shoplifting. Using an audio device, music is combined with a subliminal message such as "I will not steal." These subliminal messages are reported to have reduced shoplifting by as much as 80 percent in some cases.

In addition, I understand that video tapes are now being marketed which use subliminal communication techniques to assist indi-

viduals in losing weight, stopping smoking, enhancing memory, lowering blood pressure, and for other purposes.

If a store is able to reduce shoplifting by up to 80 percent through subliminal communication, several serious questions naturally follow: Are such techniques also being used as successfully in increasing sales? What other uses are being made of this technology? What is the potential outcome of research in this field?

Clearly we need to take a closer look at the use of subliminal communication technology given the serious moral, ethical and legal implications posed by some of these recent innovations.

All of us remember the Vance Packard book, "The Hidden Persuaders," which I think started public attention towards this area.

I, myself, think that subliminal communication clearly has a twilight zone implication to it. And given the rapid advance in computer technology in this country, as well as psychological research, much of which is being done by the Defense Department, I think it is incumbent upon us in Congress to at least explore the issue to see how widespread it is and to see if anything needs to be done about it.

Our first witness today is Dr. John Kamp, Deputy Chief, Mass Media Bureau of the FCC. We are pleased to have you here, Dr. Kamp.

Mr. GLICKMAN. Mr. Kamp, why don't you proceed? You may feel free to read or summarize your statement, because all the statements of the witnesses will appear in the record in their entirety.

STATEMENT OF DR. JOHN KAMP, ASSISTANT TO THE DEPUTY CHIEF, MASS MEDIA BUREAU, FEDERAL COMMUNICATIONS COMMISSION, ACCOMPANIED BY CHARLES KELLEY, ENFORCEMENT DIVISION, MASS MEDIA BUREAU

Dr. KAMP. Thank you, Mr. Chairman. Good afternoon.

On behalf of Chairman Mark Fowler, I wish to thank you for inviting the FCC to participate in your hearing today. I was asked to represent Chairman Fowler on this matter at least partially because of my academic background as a social scientist, as well as my role at the Commission as a legal and policy assistant to the Mass Media Bureau Chief.

I bring with me this afternoon Mr. Charles Kelley, head of our Enforcement Division in the Mass Media Bureau. He will be with me helping answer any questions you may have at the conclusion of my testimony.

Subliminal perception has been a persistent issue at the Commission spanning over 35 years but it has seldom required significant amounts of Commission time and resources. That is largely because the Commission's stand on the issue has been clear and consistent.

The FCC's position is that the use of such techniques involves intentional deception and, thus, is inconsistent with a licensee's obligation to broadcast in the public interest. The Commission defines subliminal projection as a technique of projecting information below the threshold of sensation or awareness.

This is not the subtle but overt message delivered by the attractive model selling toothpaste, this is the message that is so subtle

the person is not intended to be at all aware of the attempt to persuade.

And it is that element—intentional deception—that has been the focus of concern at the FCC. Typical subliminal techniques are projections of visual messages of extremely short duration and transmissions of low volume audio messages that cannot be consciously perceived.

That said, two things are important to state at this juncture. First, as a social scientist I must note that there is considerable doubt in the scientific community that these techniques are very effective.

There is a whole host of problems, stemming from such things as the fact that individuals have highly varying levels of perception, making generalized threshold levels of subliminal perception very complicated. Another such problem is that to the extent that these messages are designed to change people's behavior, scientists as well as advertisers know that subtle appeals are often more interesting than they are effective.

But my second point is of more direct relevance—that the Commission's prohibition against use of this technique by broadcasters is clear regardless of whether the technique is effective or not.

The Commission's authority to regulate subliminal projection techniques when used by broadcasters stems broadly from the public interest provisions of the Communications Act, including, in particular, sections 303 and 317. Section 303 contains the provisions that give the Commission general authority to regulate the industry to further the public interest, convenience or necessity.

More specific authority in this area is contained in section 317 of the act which has been reiterated in section 73.1212 of the FCC's regulations. Essentially, these provisions prohibit covert advertisements.

They require broadcasters to identify on each broadcast any sponsor of any broadcast program or advertisement. By requiring clear identification of sponsors, the Commission seeks to ensure public awareness of the nature of the persuasion and the identity of the persuader. Subliminal projections, which are designed to sidestep conscious awareness of advertisements, have been found to be against the public interest and the spirit and the language of section 317.

The FCC enforces its prohibition on the use of subliminal projections by following up on complaints. Viewers, listeners or members of the industry alert the FCC to possible violations.

If a complaint appears to be valid, the Commission first asks the broadcast licensee for an explanation. If necessary, Commission technicians can review a copy of the programming to check for subliminal messages.

The Commission, however, receives very few complaints in this area. From 1966 to the present, complaints concerning subliminal projections have comprised no more than one-half of 1 percent of all advertising complaints.

We think this system has worked well to date because broadcasters know the position of the Commission and know its intention to act as necessary to stem any abuse. A quick review of the major cases on this issue is instructive.

The FCC first became concerned with subliminal projection techniques in 1956 after it learned about a New Jersey movie theater which flashed the words "Drink Coca-Cola" and "Hungry? Eat popcorn" every 5 seconds at the subliminal level of one three-thousandths of a second during the film.

Although an increase in sales was reported, the theater refused to release any of the details of the experiment. The first broadcast case came in 1957 when television Station WTWO tested the technique by monitoring the reaction of viewers to flashes that stated "If you have seen this message, write WTWO."

WTWO reported no increase in incoming mail. In 1958, researchers conducted an experiment on Television Station WTTV where viewers were subliminally told to "Watch Frank Edwards," a news analyst featured on the station. The researchers reported that the message had no statistically significant effect. (De Fleur and Petranoff 23 Public Opinion Quarterly 168 (1959).)

In 1957, early in this period of experimentation, the FCC published a public notice expressing its concern and asserting its jurisdiction in this area. At that time the Commission noted that subliminal messages only had been used by broadcasters for experimental purposes and that the broadcast industry trade association had announced its intention to review and consider any subliminal advertising proposals.

The 1957 notice clearly stated that the FCC considered the use of subliminal messages to the inappropriate by broadcasters. No further immediate action was judged necessary because licensees appeared to be behaving responsibly.

In 1958, the National Association of Broadcasters amended its code to bar the use of these messages. Broadcasters interest in subliminal messages appeared to wane in the face of FCC policy statements, industry prohibitions and the lack of persuasive test results.

In 1973, the issue arose briefly when the FCC received complaints that television stations had broadcast an ad which contained a subliminal message to "Get it." An FCC investigation revealed that the advertising agency which produced the advertisement had already dispatched telegrams to the stations informing them of the existence of the subliminal message and authorizing them to delete it.

Some stations, however, continued to broadcast the advertisement containing the "Get it" message. The FCC took the occasion to clarify its position and issued a public notice which stated: "We believe that use of subliminal perception is inconsistent with the obligations of a licensee * * * Broadcasts employing such techniques are contrary to the public interest. Whether effective of not, such broadcasts clearly are intended to be deceptive." (Broadcast of Information by Means of "Subliminal Perception" Techniques at 44 F.C.C. 2d 1016 (1974).)

That statement in 1974 continues to contain the essence of Commission policy on this issue, and it appears to be good law and good social policy. As noted above, our complaint level is now so low as to be only a persistent trace at the agency reflecting, as far as we can tell, more public fascination with this issue and concern over the undesirable manipulative possibilities of the technique than evidence of any actual use.

Nothing in the information flowing into the Commission at this time has suggested the need for any new Commission initiative in this area. However, it is a matter that clearly warrants continuing scrutiny, for were the techiques shown to be effective or new techniques developed and used, the manipulative possibilities would clearly warrant further governmental concern.

In the meantime, we think this is good law because it has consumed a minimum amount of Commission resources. The Commission has established its position, made it clear to the industry, and stood ready to enforce it. Thus, it has been able to concentrate its resources on other major matters.

That concludes my formal remarks. Again, I thank you for this opportunity to appear, and I will be glad to remain to answer any questions you may have. In that regard, Mr. Charles Kelley, Chief of the Enforcement Division of the Mass Media Bureau is also here to help you.

Thank you.

Mr. GLICKMAN. Thank you, Dr. Kamp.

So you have not received any complaints recently regarding the use of subliminal advertising.

Dr. KAMP. We receive complaints from time to time, perhaps one a month or so. But we have not yet, or have not recently, in the last several years, received a complaint that on its face was sufficient for us to warrant a major investigation.

We have in those cases where we received complaints that appear to raise valid problems, we oftentimes first ask the complainant to give us further information, if he has it, and if we do have it, then we go to the station.

But very recently, over the past few years, there has been no major complaint.

Mr. GLICKMAN. But you do investigate each one of these complaints?

Dr. KAMP. It depends. In most cases we ask, we begin by asking the complainant for further information. And if the complainant comes forward with that, then we do a further investigation.

But very seldom do we receive information from the complainant about the matter that causes us to have a further—to ask for further information.

Oftentimes, for example, and one very recent one we received just a few weeks ago, indicated to us that what was happening was that there was a strong image on the TV screen, and that was caused not by an attempt to subliminally send a message, but had to do with some problems with the technical aspects of the sending unit at the station, and when that was pointed out to the technicians at the station, we found that the problem had gone away.

Mr. GLICKMAN. How do you know if subliminal messages are or are not being used during television and radio commercials?

Dr. KAMP. Well, one—the strange parts of this, it is a catch-22, of course. If you know it is there, it is not subliminal.

We don't know unless there is a complaint sent to us. As it turns out, of course, the complaint system at the Commission works very well.

Subliminal perception is such that what is subliminal to one person is not necessarily subliminal to another. And an effective

subliminal technique almost always is perceptible to some people, because their perceptions are much quicker than others.

So it will be seen relatively soon by people in the audience, and there will be a complaint.

What happens usually, however, is that other people in the industry concerned about the industry itself and the effect of what a competitor might be doing, complains to us, and that is where we get most of our complaints.

Mr. GLICKMAN. Do you have a definition of the word "subliminal" in your rulemaking?

Dr. KAMP. We have a definition in our public notice. I paraphrased it in my remarks, but it essentially has to do with a technique that is designed to persuade people that comes below the usual level of awareness.

Mr. GLICKMAN. Now, for example, then, let's say during the broadcasting of a religious program on TV, if the message subliminally was focused across the screen "Honor your father and your mother," which on its face is a fairly benign message, that would violate the Commission's rules; is that correct?

Dr. KAMP. Under the current system, yes. We have not had a case like that of a message that would normally be construed as socially desirable, nor a challenge to our existing rules based on those kinds of facts.

And so I am not sure what the Commission might do in that sort of a situation. The example you give would seem to be one that would be very difficult for us to mount a firm challenge to the person who suggests that one should "honor thy father and mother."

But the Commission for the most part tries to stay out of any content-based decisions because of the sensitive first amendment issues that arise here.

Mr. GLICKMAN. But your basic testimony then—the thrust of your testimony is the Commission rules apply when products are being sold rather than when ideas are being brought across the television screen?

Dr. KAMP. I think what the Commission would do—the Commission under its general public interest standard may look at ideas being sold subliminally in much the same way as it now looks at products.

But your question implies the correct answer. That is the focus of this issue at the Commission to date has been in advertising areas where products are being sold.

Mr. GLICKMAN. Do you know if other Federal agencies have gotten involved in this issue—the FTC, for example?

Dr. KAMP. Yes. The Federal Trade Commission does have some authority under the FTC statute which allows them to regulate unfair or deceptive ads where there is an effect on interstate commerce.

The FTC's authority operates separate from ours, of course, in that the FTC statute that gives the FTC authority to regulate excepts the broadcasting industry. So the Federal Communications Commission has authority where a broadcaster is involved and the FTC has authority where all other advertisers are involved.

But it is interesting to note that the question that you ask me may be answered somewhat differently by the FTC, because the FTC looks at it is somewhat more limited than that of the FCC. The FTC has to have a demonstrated proof that the ad is unfair or deceptive, and then that has a negative effect on interstate commerce. So there could very well be different answers to very similar questions.

Mr. GLICKMAN. Well, we are going to hear from some witnesses who have more experience in the mechanics of it and the technology of it. Just as one private citizen, I would think the American public would be very, very reluctant under any circumstances, no matter how socially desirable the message is, to know that they are being subliminally interfered with without their permission.

So I would just encourage you to keep a watch fully on this. I think with technology, the ability to modify tape in ways that we never dreamed of before, both video tape as well as audio tape, I think the kind of things that may have not occurred in the past could occur in the future.

Dr. KAMP. I think that you are absolutely right on that. "Honor your father and mother" is something that might be very difficult to disagree with, but you might take a message like "drink more milk" that could be embedded in some communications and although that might seem socially desirable at the first level, you might also note that there could be commercial or industry interest in the commercial aspects of it, and that it also could be exposed to people for whom the drinking of more milk might be undesirable, people that had a propensity for heart trouble or for some reason were allergic to milk products.

So it is not easy in many cases to tell the difference between a socially desirable message and a socially undesirable message. But I will continue to honor my father and mother and the Commission will continue to take a watchful eye on these kinds of matters.

Mr. GLICKMAN. Yes. We would not want to see any message like "reelect your Congressman".

Dr. KAMP. It depends on which Congressman. [Laughter.]

Dr. GLICKMAN. That is right.

Thank you very much for your testimony today. We appreciate it.

Mr. KAMP. Thank you, sir.

[The prepared statement of Dr. Kamp follows:]

STATEMENT

OF

DR. JOHN KAMP

MASS MEDIA BUREAU

Good morning Mr. Chairman and members of the Committee. On behalf of Chairman Mark Fowler I wish to thank you for inviting the Federal Communications Commission to participate in your hearings today. I was asked to represent Chairman Fowler on this matter at least partially because of my academic background as a social scientist as well as my role at the Commission as a legal and policy assistant to the Mass Media Bureau Chief.

Subliminal perception has been a persistent issue at the Commission spanning over 35 years but it has seldom required significant amounts of Commission time and resources. That is largely because the Commission's stand on the issue has been clear and consistent. The Federal Communications Commission's (FCC) position is that the use of such techniques involves intentional deception and, thus, is inconsistent with a licensee's obligation to broadcast in the public interest. The Commission defines subliminal projection as a technique of projecting information below the threshold of sensation or awareness. This is not the subtle but overt message delivered by the attractive model selling toothpaste, this is the message that is so subtle the person is <u>not</u> intended to be <u>at all aware</u> of the attempt to persuade. And it is that element -- intentional deception -- that has been the focus of concern at the F.C.C. Typical subliminal techniques are projections of visual messages of extremely short duration and transmissions of low volume audio messages that cannot be consciously perceived.

That said, two things are important to state at this juncture. First, as a social scientist I must note that there is considerable doubt in the scientific community that these techniques are very effective. There is a whole host of problems, steming from such things as the fact that individuals have highly varying levels of perception, making generalized threshold levels of subliminal perception very complicated. Another such problem is that to the extent that these messages are designed to change people's behavior, scientists as well as advertisers know that subtle appeals are often more interesting than they are effective. But my second point is of more direct relevance -- that the Commission's prohibition against use of this technique by broadcasters is clear regardless of whether the technique is effective or not.

The Commission's authority to regulate subliminal projection techniques when used by broadcasters stems broadly from the public interest provisions of the Communications Act including in particular Sections 303 and 317. Section 303 contains the provisions that give the Commission general authority to regulate the industry to further the public interest, convenience or necessity. More specific authority in this area is contained in Section 317 of the Act which has been reiterated in Section 73.1212 of the FCC's regulations. Essentially, these provisions prohibit "covert advertisements." 47 U.S.C. Section 317 (1981); 47 C.F.R. Section 73.1212 (1983). They require broadcasters to identify on the broadcast any sponsor of any

broadcast program or advertisement. By requiring clear identification of sponsors, the Commission seeks to ensure public awareness of the nature of the persuasion and the identity of the persuader. Subliminal projections, which are designed to sidestep conscious awareness of advertisements, have been found to be against the public interest and the spirit and the language of Section 317.

The FCC enforces its prohibition on the use of subliminal projections by following up on complaints. Viewers, listeners or members of the industry alert the FCC to possible violations. If a complaint appears to be valid, the Commission first asks the licensee for an explanation. If necessary Commission technicians can review a copy of the programming to check for subliminal messages. The Commission, however, receives very few complaints of subliminal messages. From 1966 to the present complaints concerning subliminal projections have comprised no more than one half of one percent of all advertising complaints. We think this system has worked well to date because broadcasters know the position of the Commission and know its intention to act as necessary to stem any abuse. A quick review of the major cases on this issue is instructive.

The FCC first became concerned with subliminal projection in 1956 after it learned about a New Jersey movie theatre which flashed the words "Drink Coca-Cola" and "Hungry? Eat popcorn" every five seconds at the subliminal level of 1/3000th of a second during the film. Although an increase in sales was reported, the theatre refused to release any

of the details of the experiment. The first broadcast case came in 1957 when Television Station WTWO tested the technique by monitoring the reaction of viewers to flashes that stated "If you have seen this message, write WTWO." WTWO reported no increase in incoming mail. In 1958, researchers conducted an experiment on Television Station WTTV where viewers were subliminally told to "Watch Frank Edwards," a news analyst featured on the station. The researchers reported that the message had no statistically significant effect. De Fleur and Petranoff 23 Public Opinion Quarterly 168 (1959).

In 1957, early in this period of experimentation, the FCC published a public notice expressing its concern and asserting its jurisdiction by noting that the use of subliminal projections "vitally concerns the public interest." At that time the Commission noted that subliminal messages only had been used by broadcasters for experimental purposes and that the broadcast industry trade association had announced its intention to review and consider any subliminal advertising proposals. The 1957 notice clearly stated that the FCC considered the use of subliminal messages to be inappropriate. No further immediate action was judged necessary because licensees appeared to be behaving responsibly.

In 1958, the National Association of Broadcasters amended its code to bar the use of subliminal projections. Broadcasters interest in subliminal messages waned in the face of FCC policy statements, industry prohibitions and the lack of persuasive test results.

In 1973, the issue arose briefly when the FCC received complaints that television stations had broadcast an advertisement which contained a subliminal message to "Get it." An FCC investigation revealed that the advertising agency which produced the advertisement had already dispatched telegrams to the stations informing them of the existance of the subliminal message and authorizing them to delete the message. Some stations, however, continued to broadcast the advertisement containing the "Get it" message. The FCC took the occasion to clarify its position and issued a public notice which stated: "We believe that use of subliminal perception is inconsistent with the obligations of a licensee... [B]roadcasts employing such techniques are contrary to the public interest. Whether effective or not, such broadcasts clearly are intended to be deceptive." Broadcast of Information by Means of "Subliminal Perception" Techniques at 44 F.C.C. 2d 1016 (1974).

That statement in 1974 continues to contain the essence of Commission policy on this issue, and it appears to be good law and good social policy. As noted above, our complaint level is now so low as to be only a persistent trace, reflecting, as far as we can tell, more public fascination with this issue and concern over the undesirable manipulation possibilities of the technique than evidence of its actual use. Nothing in the information flowing into the Commission has suggested the need for any new Commission initiative in this area. However, it is a matter that clearly warrants continuing

scrutiny, for were the techniques shown to be effective or new techniques developed, the manipulative possibilities would clearly warrant governmental concern. In the meantime, we also think this is good law because it has consumed a minimum amount of Commission resources. The Commission has established its position, made it clear to the industry, and stood ready to enforce it. Thus, it has been able to concentrate its resources on other matters.

That concludes my formal remarks. Again, I thank you for this opportunity to appear, and I will be glad to remain to answer any questions you may have. In that regard, Mr. Charles Kelley, Chief of the Enforcement Division of the Mass Media Bureau is also here to help you.

Thank you.

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January 24, 1974 - B

BROADCAST OF INFORMATION BY MEANS OF "SUBLIMINAL PERCEPTION" TECHNIQUES

Shortly before Christmas 1973 the Commission received a few complaints that some television stations had broadcast an advertisement which contained a statement of such short duration that most viewers were unaware of it -- at least, consciously unaware of it. The message broadcast in this manner was "Get It," referring to the product advertised in the commercial. Since this statement could not be consciously perceived by most persons, it involved use of the "subliminal perception" technique which was the subject of Commission inquiry years ago.

In a Public Notice dated November 27, 1957, the Commission noted that the Television Code Board of the NAB (then the NARTB) had asked its subscribers to refer any proposals for television use of subliminal perception to the Board. In that Notice, the Commission stated in part:

> Deep concern has been expressed by members of the public, the broadcast industry and leaders in public life with respect to the use of "subliminal perception" advertising by television stations. That this concern has a firm basis is evidenced by the action of the NARTB and the caution with which television licensees have approached the technique. Obviously, it is a matter which vitally concerns the public interest. Accordingly, the Commission's study is being directed toward determining what appropriate steps, if any, should be taken by the Commission with respect to the possible use of the above technique by the television licensees. The posture of the problem is such that the public interest is not in immediate danger of being adversely affected. Ample proof has been given of the recognition by television licensees of their responsibilities and obligation to operate their stations in the public interest.

At that time the Commission had no information that any television station had made use of subliminal perception techniques, except on an experimental basis and for scientific purposes, and after 1957 no instance of telecasting

of such messages came to the attention of the Commission until the 1973 pre-Christmas advertising campaign, in which an advertising agency distributed spots involving the "Get It" statement.

Commission inquiry revealed that the NAB TV Code Authority had learned of the use of the subliminal messages in late November and had received a statement from the advertising agency that it was dispatching telegrams to all stations to which the advertisements had been sent, informing them of the subliminal statements, authorizing the stations to delete the statements from the spots and informing the stations that film prints which did not contain the "Get It" flashes would be sent to them. (The Television Code now prohibits use of "Any technique whereby an attempt is made to convey information to the viewer by transmitting messages below the threshold of normal awareness . . .")

Despite the Code Authority's action, some stations apparently continued to broadcast spots containing the "Get It" statement, and some state they have no record of having received the telegram from the agency.

We believe that use of subliminal perception is inconsistent with the obligations of a licensee, and therefore we take this occasion to make clear that broadcasts employing such techniques are contrary to the public interest. Whether effective or not, such broadcasts clearly are intended to be deceptive.

In closing, we note that the Federal Trade Commission also received a complaint about the pre-Christmas announcements, and that it is making inquiry into the matter in light of the laws that it administers.

Action by the Commission January 23, 1974. Commissioners Burch (Chairman), Lee, Reid, Wiley and Hooks.

Sent to all broadcast licensees.

- FCC -

SUBLIMINAL PROJECTION

11/77

INFORMATION BULLETIN

Definition

"Subliminal projection" is a technique of projecting information below the viewing audience's threshold of sensation or awareness. It involves flashing a message lasting only a fraction of a second on the television screen. Theoretically, a viewer could receive such a message without realizing he or she had observed it.

On-The-Air Trials

The Commission is aware of only a few cases of television stations' engaging in on-the-air experiments using "subliminal projection" as an advertising technique.

Maine Tests

During a two-week period in September 1957, WTWO, Bangor, Maine, tested subliminal messages in station promotional announcements. The words "if you have seen this message, write WTWO" were flashed every 11 seconds for 1/80th of a second, on alternate days. The station said there was no noticeable increase in WTWO's mail, so the experiment was abandoned.

Indiana Study

During a five-week period in the Spring of 1958, two members of the Indiana University faculty, Melvin L. DeFleur, Assistant Professor in the Department of Sociology, and Robert M. Petranoff, Lecturer in the Department of Radio and Television, conducted a combined closed-circuit and on-the-air subliminal projection experiment over WTTV, Bloomington, Indiana. The Summer 1959 edition of the Public Opinion Quarterly (Vol. 23, No. 2, pp. 168-180) contains a report on their "Televised Test of Subliminal Persuasion."

Subliminal Projection - 2

Experiments

The first known experiment with subliminal projection occurred in 1956, when a special projector was installed in a Fort Lee, N.J., movie theater by a New York City firm, Subliminal Projection Co., Inc. During a six-week period, patrons reportedly were exposed to two advertising messages projected subliminally on the screen during the regular presentation of the motion picture "Picnic."

The words "Drink Coca-Cola" and "Hungry? Eat Popcorn" were flashed on the screen every five seconds at the subliminal level of 1/3000th of a second. Although the Subliminal Projection Co. reported that the sale of popcorn and Coca-Cola increased as a result of this stimulation, it refused to release either its statistical data or the details of the experimental study.

The first television experiment with subliminal projection also occurred in 1956 in England. The BBC-TV, on a regular broadcast, transmitted a message at a speed assumed to be subliminal. At the end of the program, viewers were asked to report whether they had noticed anything unusual. Of the relatively few responding, only a small percentage correctly identified the message. Considering the few responses, it was suggested that some of the viewers possessed thresholds sufficiently low that, for them, the message was supraliminal.

On January 19, 1958, during a half-hour CBC-TV network program carried on 27 Canadian stations, an undisclosed subliminal message was flashed on the screen 352 times, alternately 1/5 and 1/2 of a second in duration. Viewers were asked to report their reactions. The CBC said the experiment proved inconclusive as to the effectiveness of the technique.

Audio Tests

Early in 1958, some radio licensees reported experiments with an audio version of subliminal perception. Short, barely audible phrases designated "phantom spots" were pre-recorded by disc jockeys and faded in under musical recordings or dropped into pauses in their dialogue in quick low voices.

Stations WAAF, Chicago; WCCO, Minneapolis; KLTI, Longview, Texas; KOL, Seattle; and KYA, San Francisco, reportedly experimented with these so-called "added recall devices." However, it should be noted that these whispered quickie announcements were in fact consciously audible to the listening audience, and accordingly could not truly be termed subaudible messages.

Public Concern

From the Fall of 1957 through the Spring of 1958, subliminal advertising received extensive coverage in the news media. As a result, the Commission received numerous inquiries about the new technique.

The questioners complained that the technique was being used as an advertising medium for the invisible transmission of messages on television as well as on movie screens. Widely publicized opinions contended the technique was a "sneaky" advertising device used to influence audiences to react, in a manner contrary to their normal likes and dislikes, to information they could not "see" or "hear". The inquiries expressed alarm at the enormous political possibilities in a technique that they alleged could be used to brainwash Americans with foreign ideologies.

Questions were raised about the ethics of televising concealed information because of the possible effects on audiences.

A Commission investigation made the following contacts:

1. In October 1957, with the two major companies known to be promoting "subliminal projection" for information concerning their work in this new technique.

2. With Experimental Films, Inc., a company said to have a patent application then pending in the United States Patent Office for a process of subliminal communications that would compete with Subliminal Projection Co., Inc. The FCC asked whether the facilities of any network or television station had been used for application of the techniques.

3. With the major television networks as to whether they had engaged in "subliminal perception" advertising. Each network stated it had not, and the Columbia Broadcasting System said it had no intention of using the technique in the immediate future.

4. With WTWO, the television station in Bangor, Maine, concerning reports that it had experimented with on-the-air tests of subliminal advertising. WTWO reported on its September 1957 experiment and the consequent negative reaction.

5. With the Television Code Board of the then-named National Association of Radio and Television Broadcasters (NARTB) (now the National Association of Broadcasters) which had issued a news release on "Subliminal Projection", stating that it had recommended to its subscribers that "any proposals to use the television medium in the process called subliminal perception be referred to the board immediately for review and consideration," and that "experimentation or use of the process should not be permitted on the television broadcast medium pending such review and consideration."

Congressional Request

A letter from then U. S. Representative William L. Dawson of Illinois urged the FCC to request that networks and all television stations "forego" subliminal advertising pending a Commission study. On November 27, 1957, the Commission wrote to Representative Dawson stating that since the FCC's consideration of the issue must be governed by the Commission's authority under law, a warning to licensees was inappropriate at the time.

FCC Public Notice

On November 27, 1957, the Commission issued a Public Notice (FCC 57-1289) entitled Use of Subliminal Perception Advertising by Television Stations, noting that the FCC recognized subliminal perception was a matter vitally concerning the public interest and pointing out that the cautious approach of television licensees in use of the technique offered ample proof of their recognition of the public interest.

Public Safeguards

On October 24, 1957, then Senator Charles E. Potter of Michigan wrote to the Commission asking: "Does the [Communications] Act cover the use of this technique; if so, what section? Is it covered under 'public interest' section? How can a Federal Communications Commission ruling be obtained on this technique?"

In its reply, the Commission pointed out the general applicability of the Communications Act. It noted that there was no specific language in the Act anticipating subliminal projection but said reasonable public protection was available under the general provisions of the Act.

For instance, through the Commission's licensing procedures, the United States maintains control of and regulates radio transmissions in interstate commerce. Various sections of the Act, including Section 303, make it clear that in exercising control and regulation the Commission must be guided by public interest, convenience, or necessity.

In addition, the FCC said "subliminal perception" techniques might be subject to the Commission's rulemaking authority under Section 303 subparagraph (b) on the nature of the service to be rendered by each station; subparagraph (a) on the types of apparatus to be used; subparagraph (g) authorizing studies of new and experimental uses; and subparagraphs (f) and (r) as well as Section 4, subparagraph (i) giving the Commission wide authority to make rules and regulations in carrying out its functions and the provisions of the Act.

Under existing law, the Commission does not determine the particular programs or types of programs to be presented over the air, the contents of advertising copy, or its method of presentation. Moreover, Section 326 prohibits the FCC from censoring broadcast material, including advertising. However, regulation of "subliminal perception" would not necessarily constitute censorship.

Ever since it became apparent that broadcasting was developing along commercial lines, Government regulation has upheld the principle that listeners and viewers are entitled to know who is trying to persuade them. As far back as the Radio Act of 1927 and continuing with Section 317 of the Communications Act of 1934, there has been an unvarying requirement that all matter broadcast by any station for a valuable consideration is to be announced as paid for or furnished, and by whom.

During the 1957-1958 period of Congressional and public concern over subliminal advertising, Section 317 of the Communications Act read as follows:

> All matter broadcast by any radio station for which service, money, or any other valuable consideration is directly or indirectly paid, or promised to or charged or accepted by, the station so broadcasting, from any person, shall, at the time the same is broadcast, be announced as paid for or furnished, as the case may be, by such person.

Undoubtedly Section 317, then and now, would prohibit broadcasters from subjecting audiences to messages received from undisclosed sources.

Application of Section 317 to sponsored subliminal program material presented, for example, at five-second intervals, would, in practical effect, ban unrestricted use of the technique. In addition, Sections 73.1212 and 76.221 (applicable to broadcasting and cable television, respectively) of the Commission's Rules require that sponsored program matter be announced as such. Therefore, it appears that sponsored telecast or cable-originated material that is subliminally projected falls within these rules.

Demonstration of Techniques

On January 13, 1958, the Commission, certain members of Congress and the news media witnessed a demonstration of subliminal projection on closed-circuit television facilities provided by WTOP-TV, Washington. The Subliminal Projection Co., Inc., conducted the demonstration.

Short messages were flashed subliminally (1/20 of a second) at five-second intervals during a showing of "The Gray Ghost." The messages were made visible to the audience later.

The company explained that the key elements of subliminal perception are speed and intensity of image. If intensity of the image (brightness) is decreased as length of viewing period is increased, the message presented can be kept below the threshold of conscious perception. The company's technique used low contrast and brightness.

The company offered the Commission assurances that this type of communication could not persuade or influence -- it could only remind; that an individual's perceptual defenses subconsciously rejected an unwanted message. In other words, a subliminal message cannot make a person do something he really does not want to do. The company argued the two-fold advantages of subliminal advertising were that the audience could enjoy television programs without interruptions and the advertiser could present his sales message when viewing attention was at its highest.

On February 13, 1958, representatives of the Precon Process and Equipment Co. of New Orleans addressed the Commission and members of the National Association of Broadcasters (NAB) in Washington, presenting a demonstration of its process and equipment.

At the May 1958 convention of the NAB, its TV Code Review Board amended the NAB Television Code and banned subliminal perception. Current editions of the NAB's radio and television codes state: "Any technique whereby an attempt is made to convey information to the listener [TV code says "viewer"] by transmitting messages below the threshold of normal awareness is not permitted."

On February 8 and March 12, 1958, Representatives Wright and Hosmer introduced Bills H. R. 10802 and 11363, "to make unlawful the use of subliminal advertising on television and prescribing penalties." Both bills were referred to the House Committee on Interstate and Foreign Commerce, but no hearings were held. Mr. Wright reintroduced his bill January 9, 1959, H. R. 1998. Again, the bill was referred to but never reported out of the committee.

Complaints Received

In November 1962, complaints were received that an announcer on the CBS program "To Tell the Truth" had told the audience it was seeing a subliminal advertisement during the program credits. The announcement proved to be false and CBS took steps to ensure the hoax would not be repeated.

Shortly before Christmas 1973, the Commission received complaints that some television stations had broadcast an advertisement containing a statement of such short duration that most viewers were unaware of it -- or at least consciously unaware of it. The message was "Get It", urging purchase of the produce advertised in the commercial.

An FCC inquiry disclosed that the NAB TV Code Authority had learned of the use of the subliminal message in late November and had received a statement from the advertising agency that it was sending telegrams to all stations to which the advertisements had been sent.

The agency told the Code Authority it was informing the stations of the subliminal statements, authorizing them to delete the statements from the spots, and telling them that film prints that did not contain the "Get It" flashes would be sent to them. Despite the Code Authority's action, some stations apparently continued to broadcast the subliminal spots, and some said they had no record of having received the telegram from the agency.

On January 23, 1974, the FCC adopted a Public Notice which it sent to all its broadcast licensees and which stated, in part:

> We believe that use of subliminal perception is inconsistent with the obligations of a licensee, and therefore we take this occasion to make clear that broadcasts employing such techniques are contrary to the public interest. Whether effective or not, such broadcasts clearly are intended to be deceptive.

Mr. GLICKMAN. Our next witnesses are a panel of Dr. Hal Becker, president of Behavioral Engineering Corp.; Mr. David Tyler of Proactive Systems. Both of these businesses, I believe, are engaged in either manufacturing or selling subliminally related techniques that are sold to private concerns.

Why don't we have you both up here.

Dr. Becker, why don't we start with you since you are listed first on the witness list. As I said before, your statements will appear in the record in their entirety so you may proceed as you wish.

Try to keep your remarks limited to 10 minutes.

STATEMENTS OF DR. HAL C. BECKER, PRESIDENT, BEHAVIORAL ENGINEERING CORP.; AND DAVID TYLER, PRESIDENT, PROACTIVE SYSTEMS

Dr. BECKER. I was going to have a tough time with 20 minutes. But I will do what you say.

Mr. GLICKMAN. Let's compromise on that, then.

Dr. BECKER. In order not to ramble, I am simply going to read some excerpts from the copy that I have already provided the committee.

I have sent the committee seven documents and a set of pictures from slides that I intend to present, four slides, if there should be time, of the new programmable subliminal audio——

Mr. GLICKMAN. We would like to see those slides, whenever you are ready to show them.

Dr. BECKER. Audio and video processors. OK. Fine. And in this connection, it is important to state that these subliminal processors are made available only to qualified professionals for therapeutic, educational and training purposes through a set of restrictive use covenants that specifically exclude their use in advertising, politics, religion, or any area other than therapy, education and training.

I intend to recommend that the Congress and the FCC carefully reevaluate the FCC's public notice pronouncements over the last 30 years with a progressive view towards the possible use of subliminal audio and video messages focus on, for example, courteous and defensive driving, crime and loss prevention, and possibly even substance abuse.

I believe that subliminal communication properly carried out just might be the only immediately available way to bring motor vehicle accidents, crime, and substance abuse back into manageable status.

All three currently seem to be escalating, while not really responding to conventional time honored methods of treatment. And regarding Dr. Kamp's presentation, in which he said that the FCC still considers the use of subliminals deceptive, I, of course, agree with that.

However, I should like to point out that if a crawler were placed on the screen saying you are receiving subliminal messages, video and audio messages, for substance abuse, courteous and defensive driving, crime prevention, that that might make it more acceptable to the FCC and to Congress.

Both subliminal perception and hypnosis address non-conscious portions of the mind. Work by Corrigan and Becker in 1954 and

1965, 1966, 1977, 1978, Dixon, Silverman & Shevrin, have presented evidence—and many others—have presented evidence to indicate that nonconscious perception of stimuli can result in behavior change.

In extensive research, Silverman has demonstrated that verbal stimuli associated with conflictual wishes have brought about behavior change. Silverman also in a comprehensive report of studies using a method that he calls subliminal psychodynamic activation designed to study the impact of Freudian motives in the laboratory listed three types of studies—and I am not going to go into those, since Dr. Silverman is here and on the panel with Dr. Shevrin, and as I understand the intent of the committee, they are going to handle that, I am sure, very adequately.

So I would like to get back to the technology involved. In that same year, 1954, Corrigan and Becker provided what appears to be the first sound evidence that new and useful information can be subliminally communicated to the unconscious and then used successfully at a later time at the conscious level in a problem solving situation, a significant reduction in the solution time of anagrams, after tachistocopic subliminal presentation of the unscrambled words.

That is what led Becker into the technology of instrumentation for Dr. Corrigan's doctoral program at Tulane University, Department of Psychiatry and Neurology in New Orleans, and also led Becker ultimately, after having an engineering degree and a masters in physics and biophysics, into the softer sciences, and I apologize to my softer science comrades here.

But as opposed to the hard sciences of physics and engineering—into much later securing a doctorate in behavioral science and psychology in an interdisciplinary Ph.D. program from the Department of Psychology at Tulane.

Several subliminal processes resulted from my work and my interest with Dr. Corrigan's project. It became pretty obvious to all of us at Tulane, after the dramatic results we got with tachistocopic visual presentation of the solution of anagram problems, that somewhere down the line we were going to see at least the possibility for the use of subliminals properly designed and properly presented, video and audio, in education, therapy, training, and in commerce, and industry in the form of crime prevention, shop lifting prevention, loss prevention in general, increase in safety procedures, and we have been able to demonstrate that over the years in reduction in workmen's compensation claims, in reduction of apprehensions by security officers in supermarkets and department stores, and also by a reduction of 60 percent in the annual turnover of employees in a chain of over a hundred supermarkets in which we had nine stores equipped with our experimental equipment.

Several subliminal processors are now being produced by my company and the two—because of trying to conserve time here—the two that are most relevant, I suppose, to discuss, and I won't go into the technical functioning of these at this moment—if anyone is interested later, I would be happy to go into that—are what we call the Mark III-B programmable subliminal audio processor, and the Mark III programmable color video subliminal processor, both of which I will show you pictures of in a few minutes.

Now, I would like to just quote a few paragraphs from a letter I wrote to Senator Paul Tsongas in February of 1981 at his request. I said:

Dear Senator, I am happy to respond to your request for information on my company's activities in the beneficial applications of subliminal communications.

I wish to assure you that I intend to cooperate in every reasonable way with you and other responsible officials. In this vein, I have enclosed curriculum vitae and so on; also selected photocopies of media publications which represent my selection of a minimal number of related items in both the "for" and the "against" categories, some in my opinion are clearly irresponsible and inflammatory.

I won't go into that either, since that is now already in your hands in the material I sent you.

Some public officials have operated with open minds in bringing the latest information on crime prevention to the attention of those who are in a position to use it. For example, Attorney General Billy Guste, State of Louisiana, has been conducting seminars on shop lifting.

Remember this was written in 1981.

On shop lifting in various cities over the last few months, and it has been my honor to participate in two of those seminars recently in Louisiana, in Shreveport, and in Lake Charles.

Attorney General Guste and certain other responsible officials realized that crime, juvenile crime and adult crime, are no longer responding effectively to conventional methods. They also seem willing to consider the possibility that subliminal techniques just might be one of the most effective and economical methods of crime prevention ever discovered.

All seem to agree that prevention is a strategem for success in future handling of crime. It is clear to all of us that prevention is enormously better than detection and apprehension, both for the private individuals involved and the authorities, and obviously also the taxpayers.

Once again, I repeat: "Neither my company nor I have ever used subliminals in any advertising."

Mr. GLICKMAN. Have you been contacted by politicians or religious fanatics seeking your help in perhaps subliminally converting people?

Dr. BECKER. Many times. And I have always declined.

Mr. GLICKMAN. So you don't go ahead and make every installation of those black boxes that people want, then, right?

Dr. BECKER. Absolutely not, correct.

Mr. GLICKMAN. Have you limited yourself? I am going to start asking you questions now, if I might, because I know you are basically known as the king of subliminal entrepreneurs.

Dr. BECKER. Thank you, sir—I think.

Mr. GLICKMAN. To whom do you limit your sales of this device—to groups that are engaged in retail operations?

Dr. BECKER. I have phased out of the retail and commercial and industrial applications and am now limiting myself to applications in therapy, education, and training, and a witness to that fact, Dr. Buddy McPhilamy from Roanoke, VA, and his people, are here.

Dr. McPhilamy is currently producing a series of therapeutic substance abuse color video cassettes and is using my color video process, subliminal process, and audio processor, to provide video and audio for this service.

Mr. GLICKMAN. Have you used this on people who have been convicted on drug offenses?

Dr. BECKER. I would have to ask him to answer that question. I don't know the answer to it. My consulting activities with him

have been principally in the applications of the technology which I and my engineers developed.

Mr. GLICKMAN. Now, I am reading from OMNI magazine, February of 1981. They are talking about one of your boxes. It says here, "Another box whispers encouragement in a New York real estate office," I quote: "My time is valuable, dollars now, reward is coming, I feel good." Is this the kind of therapeutic activity that you are more involved in right now?

Dr. BECKER. I am not involved in any of that right now, as I attempted to state. I phased out of that activity more than a year ago.

And I don't know of anyone I could recommend who is currently doing that kind of thing. It is entirely probable that Proactive Systems, from what I understand in reading Mr. David Tyler's statement a few minutes ago is not involved in that kind of subliminal communication or as they call it subliminal messaging, although they are involved heavily in theft deterrent and loss prevention, as I understand it.

And I might add this, for whatever it is worth, that my patents expired in 1983, the year before 1984, and apparently from what I understand, although I have not firsthand seen the patents that Proactive Systems has, they have proceeded right down this same research and development and application line that I was proceeding on when I decided to semi-retire, and phase out of the retail marketing of subliminal devices.

Mr. GLICKMAN. When you talk about therapeutic, you mentioned, of course, drug and alcohol use. In this OMNI magazine, it says the Administrator of a hospital in Gladstone, MO, said: "Since we started using the relaxation tape, fainting in our intravenous clinic is no longer a serious problem."

Is this the kind of thing we mean when we are talking about therapeutic activity?

Dr. BECKER. Yes. We have done systems like that for various medical and dental clinics, and with about the same results that we got at the McDonagh Medical Center, which were hard numbers. Most of the other results are anecdotal.

Mr. GLICKMAN. Why don't you go ahead? I am sorry to interrupt you.

Dr. BECKER. That is OK. I wanted to add, regarding the question you asked earlier, about the use of what I call human resource potentiation, subliminal affirmations, and veridicals.

Mr. GLICKMAN. Explain that.

Dr. BECKER. OK. An affirmation I define as something like "I am honest, I will not steal."

A veridical is a universal truth like "My job is important. We are a team."

OK. I call both of those addresses to the unconscious human resource potentiation—We are making more powerful the God-given, innate congenital abilities and talents that a person possesses and it helps that person work and play more adequetly at the highest level that the creator intended for him to do.

Mr. GLICKMAN. Do you find anything offensive about—even though these are God-given or natural kind of messages, do you

find anything offensive about playing those to an audience that is not explicitly aware of those things happening?

Dr. BECKER. I have not found anything—remember, I am not doing this anymore—but I have never found any of that offensive. Otherwise, I certainly would not have gotten into it. I admit that it is not an on/off digital A or B issue, one or zero.

It is a big—there is no quick fix to this in my opinion. And that is why I suggest in the letter—suggested in the letter to Senator Tsongas that it was my recommendation that Congress appoint a blue ribbon kind of committee or commission to look into it very carefully, with representatives from maybe 15 or 20 of the specialties ranging all the way from philosophy through technology and engineering to look at the question and see whether or not such an invasion of privacy, and there is no question in my mind but that it is some kind of invasion of privacy, but so is a police siren in the middle of the night that wakes me up.

But we excuse that invasion of privacy, because of the greater good that it does for society. And in the same vein, it is my strong feeling that the FCC and Congress itself might excuse the invasion of privacy of a small voice on a background music system in a retail department store, for example, that says "I am honest, I will not steal."

Because remember that private property owners have the right by law to use reasonable means or even reasonable force in the protection of their property. And my question to the media people, when I am interviewed always it is can you think of any more reasonable force or means than a simple inaudible voice that says "I am honest, I will not steal."

Mr. GLICKMAN. Do you want to show your devices now? Would you like to do that? Because I want to get to Mr. Tyler.

Mr. BECKER. Let me make just one more statement. I have here somewhere, it says:

> It is important however, to realize that even though professionals and amateurs as well have experimented with subliminals over the last 100 years, there has been no proven case of significant harm having come to anyone from the use of subliminals, and even aspirin does not have that good a record.

Mr. GLICKMAN. OK.

Dr. BECKER. That is the forerunner of the Mark III color video processor. That is the Mark II. [Slide 1.]

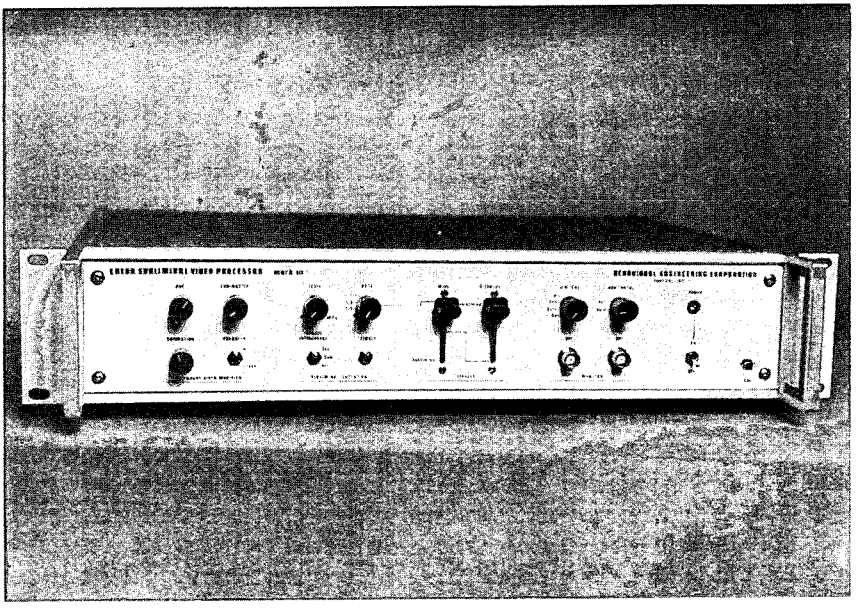
If I could have the next slide, please. That is a schematic block diagram of how these processors fit into a standard television production system.

May I have the next slide?

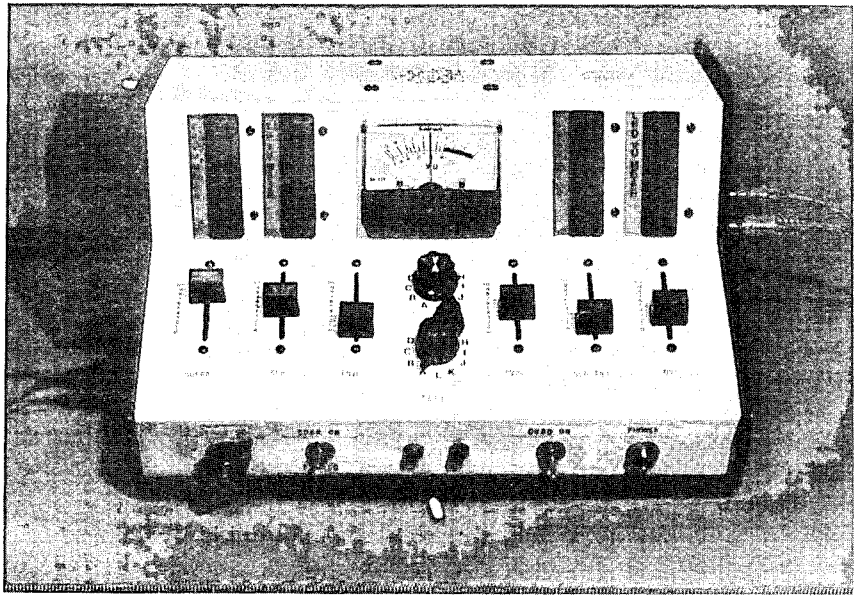
That is the forerunner of the Mark III-B audio processor. That is a laboratory broadcast standard subliminal audio processor. [Slide 2.]

May I have the next one?

And this is the Mark III-B audio processor now available, built to broadcast standards. It is the kind that Dr. McPhilamy is acquiring today, and Dr. Tom Budzynski in Denver, at Behavioral Medicine Associates has used. [Slide 3.]



SLIDE 1



SLIDE 2

SLIDE 3

M. GLICKMAN. How much of these are out in the public domain?

Dr. BECKER. Of these units?

Mr. GLICKMAN. Yes.

Dr. BECKER. About 8 or 10. And all of them were supplied with a signed statement of restrictive use covenants as I described earlier.

May I have the next slide, please?

And this is our little gem that just 3 months ago we completed three preproduction units. Dr. McPhilamy is getting one in the next couple of weeks. Dr. Budzynski already has one, and has prepared his first therapeutic stress management self-esteem video cassette using stereophonic audio subliminals addressing the right hemisphere and the left hemisphere independently through stereophones or speakers and color subliminals.

The tape is designed principally for these highly overpaid and highly overworked corporate executive type A types for relaxation and self esteem.

I guess I could conclude my summary of the material that I sent you at this point if that is OK.

[The prepared statement of Dr. Becker follows:]

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SUBLIMINAL COMMUNICATION: ADVANCES IN AUDIOVISUAL ENGINEERING APPLICATIONS FOR BEHAVIOR THERAPY AND EDUCATION

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Abstract

Subliminal Communication involves the presentation of useful information in one or more sense modalities at intensity levels below those of verbally reportable awareness. Its practical use in behavior therapy (weight control) is described, and instrumentation for properly imbedding subliminal stimuli in video- and audiotapes is disclosed. It is suggested that recently introduced advances in economy of color videotape technology for the individual consumer brings into focus the possibility of introducing behavioral techniques on a grand scale to generate a "...program large enough to affect the health of the Nation," in which there are 60 to 80 million overweight people.

INTRODUCTION

At Southeastcon 1977 in Williamsburg, Va., one of the authors presented a paper "Weight Control Through Behavior Modification: Applied Communications Technology" [1] which described the use of audio and video *subliminal perception* in an instructional color videotape library employed in a *group counseling* program for *weight control through behavior modification* [2]. The following excerpts are paraphrased from the 1977 Southeastcon paper to serve as background for the reader.

Overview

Current communications technology including videotape feedback of one's own image and an instructional color videotape library using *subliminal perception* [3] are employed in a group counseling program of weight control through behavior modification. Participants re-structure eating habits through television conditioning to achieve weight loss and maintenance. Supraliminal signals provide substantive information while subliminal signals are designed to provide affect. As high-protein, nutritious foods are displayed supraliminally, reinforcers such as attractive people appear subliminally. When inappropriate "junk foods" and other high carbohydrate caloric foods are supraliminal, mildly aversive (yet friendly) childish demons and creatures are presented subliminally. This is called *discrimination training*. Participants report that the subliminal messages do engender *stop, think,* and *discriminate* behavior, causing them to face a decision instead of eating automatically out of habit.

Credibility of Television

Data in the literature reveal that information gleaned via the medium of television is interpreted by viewers as significantly more credible than information received through any other medium including in-person communication [4]. Experience with videotaped continuing education programs [5] and with the present weight control program confirms this.

Behavior Modification Programs 1 and 2

In Program 1 participants meet for 12 or more weeks in one and one-half hour sessions of 8 to 10 people. Their weight loss averages 1.5 pounds per week. Participants are heterogeneously grouped, with the exception of special teenage classes. Through the application of well-known behavior modification techniques including shaping, fading, and differential reinforcement of other behavior, participants learn to change their old eating, drinking, exercising, and relaxation habits to more adaptive ones in step-by-step successive approximations. This is achieved through group counseling and display of color videotapes. The tapes contain substantive and instructional information on metabolism, nutrition, relaxation, and mild exercise -- reinforced with *subliminal stimuli* (subliminal communication) to strengthen the impact of the videotaped conscious level (supraliminal) messages. This videotape library has been made available to Medical Doctors and other qualified Allied Health Professionals.

Program 2 is an Accelerated Weight Loss Diet Option that combines Program 1 (for behavior modification, nutritional information, assertiveness and relaxation training) with a carefully structured,

high-protein, low-carbohydrate, low-fat diet that provides all essential nutrients including minerals. It is designed for persons who are more than 40-50 pounds overweight, and who need a stronger Reinforcement/Reward schedule. Average weight loss is approximately 5 pounds per week. Clinical Lab. monitoring is required.

Brief History of Subliminal Communication

Earlier use of subliminal communication has been controversial because it influences a person's behavior without his conscious awareness. In the last 50 years several hundred papers have dealt with subliminal stimuli and devices in various fields. In 1964-65 Becker *et al* [3,6] reported definitive results from experiments in which geometric symbols and trade names were displayed subliminally [7,8], concurrently with a supraliminal color, sound motion picture cartoon.

Some controversy remains regarding the use of subliminal stimuli, and questions have been raised concerning its ethics and its efficacy [9]. However, the use of subliminal communication in the way it is employed in this weight control program appears justified even though efficacy of subliminal communication has not yet specifically been evaluated statistically in the field of weight control. Since the authors do not know of any adverse results from the many uses of subliminal stimuli, and since subliminal communication appears an ideal technique for their behavior modification programs, they have adopted it, and have employed it successfully over the past three years.

SUBLIMINAL COMMUNICATION
AND TWILIGHT LEARNING

There are several interesting similarities between the use of *subliminal communication* in this program and the *twilight learning* described by Budzynski [10]. The videotapes of this program that employ subliminal stimuli also employ relaxing, lilting background music to lull the viewer into a relaxed, almost trance-like state. It now appears that such an altered state of consciousness is precisely what Budzynski and others have found conducive to "...a loosening of the reality-oriented frame of reference and a suspension of the critical cognitive faculties. Moreover, evidence from several areas of research, including sleep, sleeplearning, arousal level, sensory deprivation, hypnosis, attitude change, altered states, and psychotherapy supports the concept of twilight-state hypersuggestibility." For example, Barber [11] was able to show that subjects were just as suggestible when in a light sleep or in a drowsy condition as when hypnotized.

THE DIET DILEMMA

In this section the authors wish to provide a practical account of certain real and common problems that must be faced, and solved, by any person who intends to lose weight *and keep it off*. The remaining sections contain strategies and tactics, some tested and some suggested, that should facilitate the solutions.

Most diets depend upon the ability of the dieter to count the calories in his intake up to a prescribed limit. In order to do this, he must either remember how many calories are in what amount of which food, or he must engage in a table look-up operation.

Other special diets (*e.g.*, Weight Watchers) delineate specifically what foods and how much (by weight) the person should eat.

These activities generally lead to weight loss; however, the dieter learns virtually nothing about the nutrients contained in his many different foods. Even more importantly, modification of his basic eating habits is not attained. Therefore, when he goes off the diet, his weight usually reappears with astonishing rapidity.

Thus is generated the *Diet Dilemma*, which is described by one participant as follows:

"The name of the game is to lose weight and fast. Neither your health nor what happens at the end of the diet comes into mind. You're usually depressed by your body and feel rejected by loved ones. Then you start your diet. After a few weeks you lose 10 to 20 pounds, but you begin to feel frustrated. And then second-phase dieting sets in -- boredom with what you're eating -- and then a little cheating never hurts? You have 100 calories left. So why not have something really tasty instead of cottage cheese? The *caloric content* is the *same* so there's no difference. Mmm, the cocoanut fudge is so much more delicious, too. Besides, you have received compliments, -- clothes fit again! Then suddenly you discover that one piece of fudge isn't enough. By the end of the week the 10 pounds are back on, and you're rapidly on your way to gaining even more weight."

What this patient never did learn was that even though the caloric content was almost the same, the nutrient content was very different, - in this case disastrously different! A one-inch square of Cocoanut Fudge has 120 Calories, only 2 grams of Protein, 3 grams

of Fat, and 22 grams of Carbohydrate. In contrast, the 120 Calories of Cottage Cheese (skim milk derived) contains 25 grams of Protein, negligible Fat, and only 7 grams of Carbohydrate. Obviously, the *better* selection would have been the Cottage Cheese (perhaps artificially sweetened and flavored to satisfy his craving for sweets) for several *very* important reasons:

1) The high Carbohydrate content of Cocoanut Fudge, although momentarily deliciously rewarding, produces an immediate increase in blood sugar (glucose), which, in turn, causes insulin production from the pancreas to increase. The higher insulin level leads to rapid utilization and consequent lowering of the blood sugar level. This is the initial phase of the characteristic blood sugar spiking phenomenon that aggravates emotional "ups and downs," and leads then to a "binge." Compare the foregoing with what happens when 120 calories worth of Cottage Cheese is ingested -- containing its 25 grams of Protein and only 7 grams of Carbohydrate. The Carbohydrate again produces a rapid increase in blood sugar level. However, the large amount of Protein concurrently causes a *slower but sustained rise in blood sugar* for one to three hours [12].

2) Selecting the Cocoanut Fudge instead of the Cottage Cheese tripped a second dieter's trap. Assuming that the intended diet was a well-balanced one, the deletion of 25 grams of Cottage Cheese Protein from the intake significantly reduced the necessary Protein allottment for that meal. When Protein deficiency occurs, metabolically needed Protein is literally "stolen" from one's lean tissue and vital organs (*e.g.*, lung, liver, and heart). Then, upon termination of the diet, when "normal" eating is restored, this Protein debt is rapidly repaid in a way that seems quite unfair of Nature -- *each one pound of Protein restored to lean tissue and vital organs brings with it approximately three pounds of intracellular water* [13]. This usually leads to depression, and a belief that "I can never be thin anyway -- I'm different from slim people -- so the Hell with it!" This is the beginning of the classical "Yo-Yo" Syndrome.

3) In this irresponsible, rebellious frame of mind the dieter usually responds to his cravings (which are becoming inordinate by this time) in the same old habitual way -- he gives in and overdoses on high-carbohydrate foods. Clearly the reason is that the diet *did not change* his *basic eating habits*. No diet, *per se*, can change one's eating habits -- except maladaptively as described below in the "Yo-Yo" Syndrome. Therefore he gains back the weight he lost on the diet, and then sooner or later, begins yet *another* diet to lose approximately the same number of pounds once again. This is called the "Yo-Yo" Syndrome. It would have been better not to have lost the weight instead of establishing this bad habit. Yo-Yo'ing causes cumulative, tough, tenacious, fatty deposits called "plaque" to attach themselves to the inner walls of the arteries -- somewhat analagous to scale in boiler tubes. Although there are some preliminary indications from recent research that these blood-flow constricting deposits are partially reversible, there is no proven way presently available to remove the plaque layers. The plaque is deposited when gaining weight, but *it is not removed by losing weight*. Here is another seemingly unfair way in which Nature treats those whose eating habits are maladaptive -- *but that is the way it is...*

o o o

These three reasons for the prudent selection of Cottage Cheese over Cocoanut Fudge highlight the importance of providing the overweight person with a rational system for storing immediately retrievable visual images of the four most significant indices of foods: Protein, Carbohydrate, Fat, and Calories.

AN ANSWER TO THE DIET DILEMMA:

Food Signatures©

The frustrated, quizzical looking fellow in Fig. 1.a. is experiencing the "Diet Dilemma" that our hypothetical dieter above failed to solve. Food Signatures © graphically and poignantly prove that all calories are *not* the same -- that when in doubt, Protein calories are (usually) a *better* choice than Carbohydrate or Fat calories. A Food Signature *identifies* a food, and thus may be called a *Food Print*©. When combined with appropriate *subliminal stimuli*, the Food Signatures become powerful "early warning" aids for resolution of the Diet Dilemma. They appeal to the patient's visual imagery by means of a unique graphical representation of the nutrients in each given food. The caloric content of each food is broken down into its three major components: 1) grams of Protein, 2) grams of Carbohydrate, and 3) grams of Fat, as illustrated in Fig. 1.b. The Food Signatures also

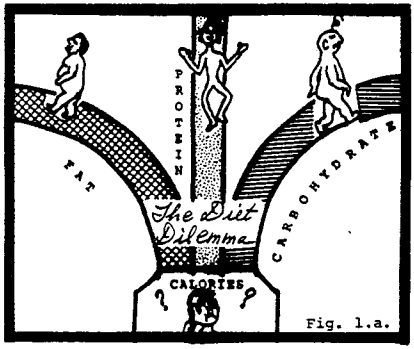

Fig. 1.a.

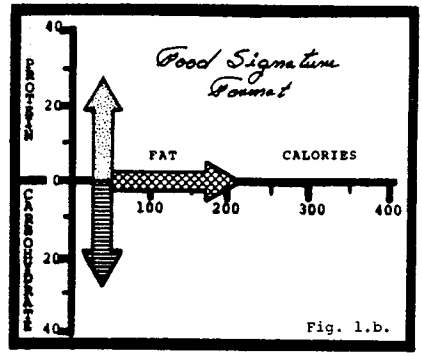

Fig. 1.b.

CONDITIONING SUBLIMINAL STIMULI AND THEIR CORRESPONDING *Food Signatures©*

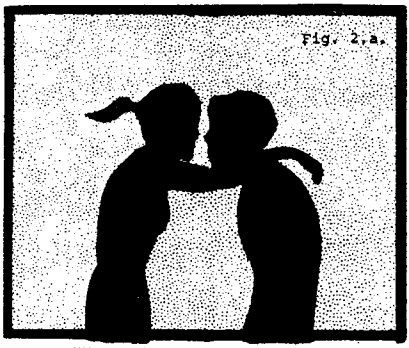
Fig. 2.a.

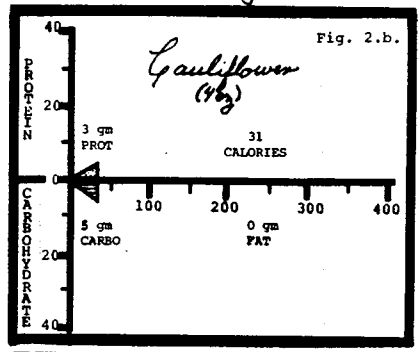

Fig. 2.b.

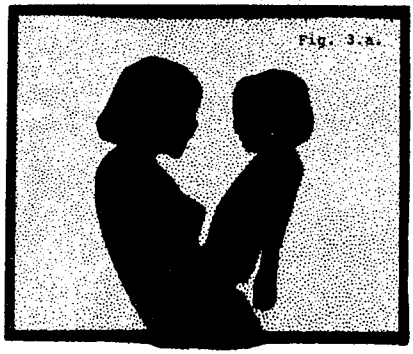
Fig. 3.a.

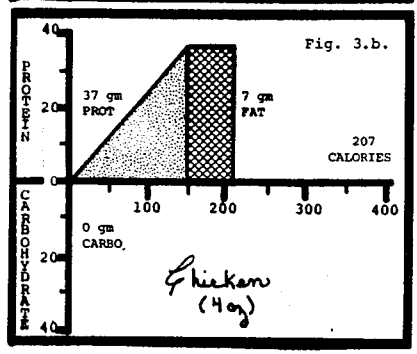

Fig. 3.b.

Fig. 4.a.

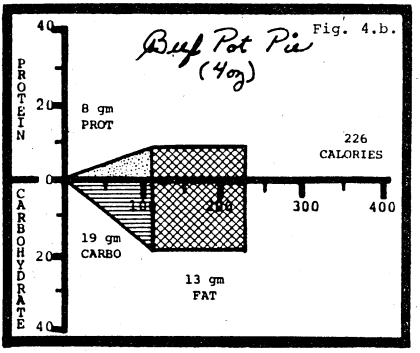

Fig. 4.b.

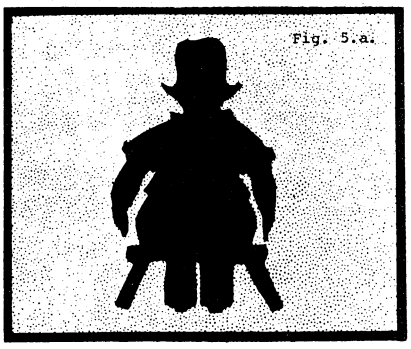

Fig. 5.a.

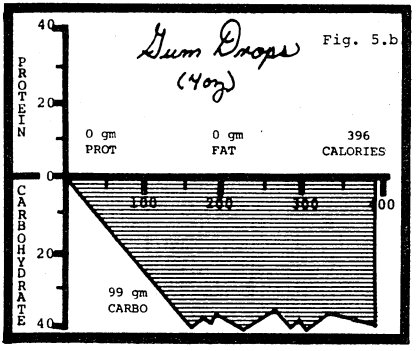

Fig. 5.b

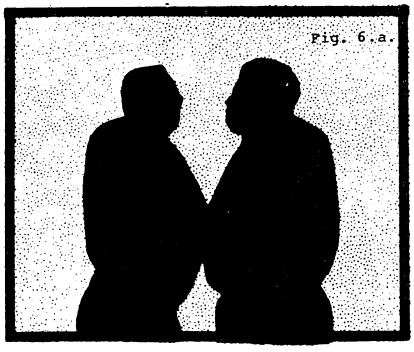

Fig. 6.a.

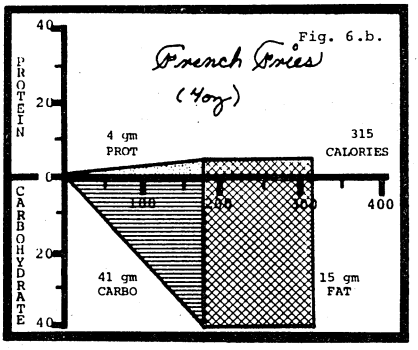

Fig. 6.b.

display the total number of Calories in a four-ounce (Avoirdupois) portion. These graphs are designed to help one easily visualize the true worth of a given food. For example, a high-Protein, nutritious food would have a large stippled triangle extending upward from the horizontal axis. The stippling gives a Cream Cheese effect, light and appealing to the eye and palate -- nicely demonstrated by the Food Signature of Chicken in Fig. 3.b.

If a cross-hatched rectangular area is predominant in any Food Signature, that food contains a large proportion of Fat. The X's that make up the cross hatched Fat area are intended to suggest negation, as can be seen in the Food Signatures for Beef Pot Pie, Fig. 4.b.; Gum Drops, Fig. 5.b.; and French Fries, Fig. 6.b.

In a high-carbohydrate Food Signature the predominant area is the triangle below the horizontal axis containing horizontal bar hatching. These bars are intended to suggest that one's "width" will increase if high-carbohydrate foods such as Gum Drops, Fig. 5.b., are consumed indiscriminately.

The nutrients of some foods are such that a person may have as large a quantity as desired. Typical of these foods is Cauliflower, whose Food Signature is shown in Fig. 2.b. Notice that it appears strikingly different from those of all the other Food Signatures, demanding only a very small area of the Food Signature plane.

On videotape the Food Signatures are presented at the *supraliminal* level, while an appropriate silhouette is presented at the *subliminal* level -- either for positive conditioning (reinforcing stimuli) as in Figs. 2.a. & 3.a., or for negative conditioning (mildly adversive stimuli) as in Fig. 4.a., 5.a., & 6.a.

The Food Signatures in this paper are constrained to black and white display. However, on color videotape, they are displayed in three hues: Blue for Protein, Red for Carbohydrate, and Yellow for Fat. Even children easily comprehend and retain the Food Signature Messages -- *Blue* for Blue Sky (have as much Protein as you wish), *Red* for Danger (watch the Carbohydrates), and *Yellow* for Caution (warning to minimize Fat).

VIDEO AND AUDIO SUBLIMINAL INSERTION AND PROCESSING EQUIPMENT

This section briefly describes the equipment used to insert *subliminal stimuli* into video and audio programs either in a live real-time environment or on magnetic tape.

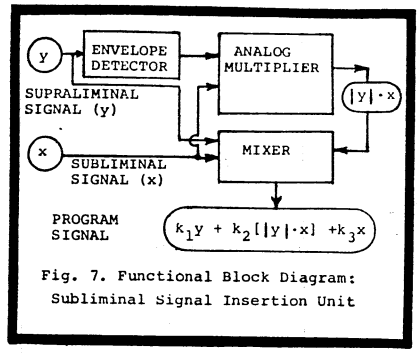

Fig. 7. Functional Block Diagram: Subliminal Signal Insertion Unit

Fig. 8. Prototype Audio Subliminal Signal Processor and Insertion Unit

Both video and audio subliminal insertion equipment conform to the generalized functional block diagram of Fig. 7.

The supraliminal signal amplitude envelope is monitored, and the rectified envelope signal is used to control the amplitude of the subliminal signal that is admixed with the standard supraliminal signal. This allows the subliminal information to be held dynamically near -- but not exceeding -- the conscious threshold detection level regardless of wide excursions in amplitude of the supraliminal information.

In television use, a vertical interval switcher is frequently employed between

the Insertion/Processing Unit and the Program Line to allow subliminal image insertion on alternate fields. This mode yields a subliminal image insertion repetition rate of 30 per second, *i.e.*, Frame Frequency.

In addition to the applications already described, it is relevant to identify another area in which the use of specially designed audio subliminal insertion/processing equipment appears to possess powerful promise. It is possible to deliver repetitive endless loop subliminal audio messages via an in-house multiple-speaker background music system. Potential applications are many, and varied. A prototype of this equipment is shown in Fig. 8. It consists of an audio Subliminal Insertion/Processing Unit and an endless-loop audiocassette playback machine housed in a sturdy Fiberglass cabinet equipped with a security locking feature. Security provisions were included in the design to assure deterrment of unauthorized intervention into the established subliminal programming format.

DISCUSSION

The library of six color videotapes and a specially produced audiotape (*"GET ON THE LIGHTER SIDE"* ©) employing *subliminal communication* are now used in weight control programs by several professionals (Physicians and Psychologists) in Australia, Canada, and the U.S.A. Although it is too early to derive a statistical level of confidence from these clinical trials, preliminary results with patients who have "tried everything else many times" encourage design of an audiovisual "mass media" approach to obesity. The authors believe that a carefully designed, behaviorally programmed assault on obesity could remove exogenous obesity from its present rank on the list of prime health problems [14] in the U.S.A.: by *prevention* for children and *therapy* for adults.

The recent introduction of low-cost consumer oriented videotape equipment coupled with a heightened national interest in controllable health risk factors could make weight control therapy affordable for the 60 to 80 million people in the U.S.A. who are significantly overweight.

In 1974 Becker [15] demonstrated that weight control behavior modification therapy could be delivered to groups via color videotape with effectiveness equal to that of a live *in person* therapist. Perhaps mass-produced self-help color videotape libraries incorporating these new methods for weight control could reach a large enough segment of the population to control exogenous obesity in one generation. This could fulfill Stunkard's [16] idea that behavioral techniques might be introduced on a scale grand enough to generate a "...program large enough to affect the health of the Nation."

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25 – 3 SUBLIMINAL COMMUNICATION: BIOLOGICAL ENGINEERING CONSIDERATIONS (1)

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Subliminal communication is controversial because it influences a person's behavior without his conscious awareness. It induces serious ethical and emotional considerations. Bevan (1964) surveyed over a hundred related papers and states, "....that the topic has come of age is indicated by several facts. Experiments are no longer directed simply toward establishing subliminal perception as an empirical phenomenon but incline more toward examining its influence upon a variety of behavoral events...."(2)

We have two purposes - 1.)to describe a series of studies, begun in 1950, designed to assess the efficacy of subliminal stimulation as a communication medium and 2.) to discuss some of the unique engineering problems which appear to have been ignored heretofore. Since one of us (3) has dealt with some of the problems of theoretical intervening processes, we present certain results, then restrict ourselves to an analysis at the stimulus-response level requiring no assumptions about mental events.

Using a tachistoscope with experimental and control groups of subjects in laboratory environment, it was demonstrated (Fig. 1) that subjects who were presented anagram solutions at the non-verbally-reportable visual level (subliminal) solved the anagrams in 15% to 46% less time than subjects who had been presented a series of X's subliminally ($P<0.005$).

We then investigated subliminal communication with groups of subjects in a non-laboratory environment by concurrently presenting entertaining visual and auditory information supraliminally in the form of a motion picture (movie) cartoon in color with sound. Initial experiments led to control of: 1.)luminance of the subliminal information in accordance with the changing, instantaneous luminance of the supraliminal information, 2.)average luminance of both sub- and supraliminal information, 3.)temporal duration of sub- and supraliminal light pulses, 4.)temporal phasing between the light pulses, 5.)repetition rates, temporal patterns of appearance, and Alpha modulation of the subliminal information. These are some of the parameters of the total visual stimulus.

Fig. 2 is a dual projector method (4) for presenting subliminal information concurrently with a supraliminal color, sound movie. Two movie projectors mechanically synchronized and oriented to have optical axes intersect at the center of the projection screen presented duplicate films. Proj. 2, supraliminal, operates in standard way. Proj. 1, subliminal, is modified to receive a "stationary frame" very near object plane of its optical system. The on-screen image from Proj. 1 is the luminance information matrix whose elements are proportional to the product of the in-line elements of the transmission matrix of the stationary frame and the transmission matrix of the particular frame of the motion picture film in the gate. The stationary frame contains information to communicate at subliminal level, while the movie film in Proj. 2 provides entertaining supraliminal information.

Fig. 3 is a sample stationary frame containing subliminal information - one of three petroleum names and symbols (SHELL, ESSO, GULF). Other symbols were geometric figures - triangle, circle, square.

Volunteer subjects, approximately 18 per group, were university students and acquaintances. Subjects were seated symmetrically before a projection screen, while projectors and tape recorder (which gave instructions) were behind a curtain.

Our results are drawn from a total of 17 such independent groups. Eleven received one of the three symbols - triangle, circle, or square - subliminally, while the remaining six groups received one of three petroleum names - ESSO, SHELL, or GULF - subliminally. Each group received supraliminally a seven minute motion picture cartoon - Woody Woodpecker in "Well Oiled" or Mickey Mouse in "Clock Cleaners".

Order of experimental tests for each group was essentially the same. Subliminal stimulus was different for different groups. Subjects were ushered into the viewing area as a group, seated, told they would participate in a market research experiment, and asked "...to sit back, relax, and watch the movie." Conversation was not permitted until each group experiment was completed. By questionaire following the movie, all subjects were asked their attitude toward the film, i.e., whether they Liked, were Neutral toward, or Disliked the movie, also whether anything unusual had appeared, in order to determine which subjects might have seen the "subliminal" information. Questionaires were collected, and subjects were told a series of symbols would be presented for a short period. The series of symbols appropriate for the particular group (three petroleum names or three geometric symbols) were presented for 45 seconds with a rotating display, and subjects were asked to select "...that symbol which appeals to you the most, the one for which you have the most positive feeling...."

The 17 experimental groups comprised 314 people. On these data we have carried out many statistical analyses which indicate a high degree of significance for subliminal communication with those persons who said they liked the movie. For one analysis we deleted 83 people (occupying seats 1, 2, 5, 6, 7, and 12) who were found by illuminometer measurements to have received less than 50% of the maximum illumination from the screen received by those on the axis of symmetry. Three percent of the remaining 231 people reported seeing the subliminal information. These 7 subjects were also deleted for the following analysis.

Correct response is defined as a person's selection of the symbol that was subliminally presented to his group. With data from 17 groups, a percentage correct response score was derived for each of the three movie attitude

categories (Like, Neutral, Dislike) for each of the six different sets of groups that received the six different symbols subliminally (triangle, circle, square, SHELL, ESSO, and GULF). Results of an analysis of variance comparing the mean percentage correct response found in the L, N, and D attitude categories are shown in histogram, Fig. 4. Analysis of variance yielded an F=13.9, df=2/15 (P<0.005), indicating differences between the means were highly significant. Note that the mean percentage correct response in the Like category is more than double the responses in the Neutral and Dislike categories.

We have photographically inserted subliminal information into two feature-length movies in an attempt to enhance entertainment value of films, in cooperation with a motion picture production organization. The degree of success in this attempt has not yet been assessed reliably.

We also have specially designed equipment which should be capable of inserting effective subliminal stimuli into standard television systems, radiated or closed-circuit (4). We have not yet tested efficacy of this equipment with television audiences.

In most of our experiments and in our equipment we have incorporated a way to modulate intensity of the subliminal information in accordance with intensity of the concurrent supraliminal information. Theoretical consideration and practical experience demonstrate that optimal control of the ratio of subliminal to supraliminal intensities, at every area element of the viewing screen, is almost impossible to achieve in practice. One can postulate, however, various analog and/or digital computing configurations which would dynamically optimalize this ratio during presentation. This appears to be one feasible approach.

Further debate will occur on the question of ethics raised by development of subliminal communication theory and techniques. However, the impact, we venture to predict, will not be felt in moot areas such as commercial advertising and political influence, but rather in fields more fundamentally acceptable such as education, personnel selection, mental health, and psychological diagnostics.

We stress that while our data, considered along with those previously reported by others, seem to portend future use of subliminal communication, definitive analysis of significant factors which contribute to these phenomena await the coalition of many more data. For example, our data not reported here because of space consideration suggest a reciprocal functional relationship as a result of the subject's response to the subliminal stimuli in the form of an effect upon the subject's attitude toward the supraliminal information concurrently presented.

Future experiments will be directed toward problems such as - 1.)what physiological mechanisms are involved when organisms yield motor or verbal responses to stimuli they reported earlier they could not see and 2.)to what extent might habit response be sustained by subliminal cues. The fact that behavior can be modified in this way warrants carefully planned experimental analyses of the significant variables.

Finally, a comforting note is sounded in the Summary of Bevan's paper when he states that one of the roles of subliminal variables "...is similar to that of supraliminal variables and the behavior, far from being irrational, is not only rational but appropriate to the circumstances as the behaving individual perceives them."(2)

ACKNOWLEDGEMENTS

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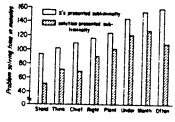

Fig 1 Solution times of anagrams

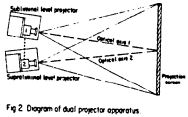

Fig 2 Diagram of dual projector apparatus

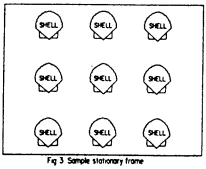

Fig 3 Sample stationary frame

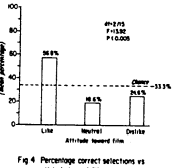

Fig 4 Percentage correct selections vs attitude toward film

SUBLIMINAL COMMUNICATION AND HYPNOSIS*

A Poster Session Presentation to the American Society of Clinical Hypnosis
25th Annual Scientific Meeting, October 24-30, 1982, Denver, CO

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INTRODUCTION

Search of the literature has revealed no study describing the use of hypnosis and subliminal perception as a combined technique. While the literature on hypnosis is vast and that on subliminal perception is growing annually, the absence of studies using both techniques together is notable. This paper provides a brief overview of research, development, and field applications of subliminal communication over the last half century together with preliminary results from the combined use of hypnosis and subliminals.

Both subliminal perception and hypnosis address non-conscious portions of the mind. Work by Corrigan (1954), Becker *et al* (1965, 1966, 1977, 1978, 1979, 1980), Dixon (1971), Erdelyi (1977), and Silverman (1976) have presented evidence to indicate that non-conscious perception of stimuli can result in behavior change. In extensive research, Silverman (1976) has demonstrated that verbal stimuli associated with conflictual wishes or symbiotic fantasies have brought about behavior change. Silverman (1980), in a comprehensive report of studies using a method he calls "subliminal psychodynamic activation" designed to study the impact of Freudian motives in the laboratory, listed three types of studies: (1) laboratory studies in pathological populations (schizophrenics, depressives, etc.) in which the experimental stimuli were intended to either intensify or reduce particular kinds of unconscious conflicts, thereby exacerbating or diminishing the degree of psychopathology manifasted in a single laboratory session; (2) laboratory studies on non pathological populations of mostly college students. The stimuli were designed to increase or decrease unconscious conflict; (3) treatment adjunct studies in which subjects divided into experimental and control groups received subliminal stimulation over time to determine if the experimental stimulation brought about more adaptive behavior.

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Fisher (1954, 1956) in his now classic work demonstrated that subliminal stimuli were registered within a subject on the unconscious level. Also in this same year, Corrigan and Becker (1956) provided what appears to be the first sound evidence that new and useful information can be subliminally communicated to the unconscious and then used successfully at a later time at the conscious level in a problem-solving situation -- a significant reduction in the solution time of anagrams ($p<0.005$) after tachistoscopic subliminal presentation of the unscrambled words. Silverman (1976) has described an experimental design which he has employed in more than thirty published studies on *subliminal psychodynamic activation*. Using a tachistoscope, he presented a brief (4-msec) visual stimulus. One such message reportedly had a powerful effect on the subject's behavior and/or pathology: "Mommy and I are one." This message was designed to activate symbiotic fantasies, and was found to alleviate anxiety in schizophrenics (Silverman, 1979; Silverman *et al*, 1969, 1971, 1975; Silverman & Candell, 1970; Leiter, 1972; Kaye, 1975); to assist in the behavioral treatment of smoking (Palmatier & Bomstein, 1980) and obesity (Silverman, Martin, Ungaro, & Mendelsohn, 1978); anxiety and defensiveness reduction in homosexuals (Silverman, Kwawer, Wolitzky, & Coron, 1973); as an adjunct to the behavioral treatment of insect phobias (Silverman, Frank, & Dachinger, 1974); and to improve academic performance (Parker, 1982).

While subliminal psychodynamic activation studies proliferate, other studies of subliminal communication have shown the effectiveness of the subliminal message. Borgeat, Chabot, and Chaloult (1980) found that auditory subliminal perception influenced the level of activation in their subjects. They also reported positive results in clinical work with smokers, alcoholics, and obese patients.

Budzynski (1977) described the twilight state, in which a brainwave pattern of Theta activity is produced, as a kind of pipeline to the unconscious. While the subject is in this state, verbal material presented appears to be learned more rapidly than it would be under non-twilight conditions. Budzynski noted that the twilight state resembled other altered states of consciousness including those seen in hypnosis and meditation techniques. To better understand the similarities, he referred to the relatively new research field of brain lateralization.

Brain lateralization refers to the functional differences between the two hemispheres. For most people the left hemisphere is associated with verbal, analytic, sequential, and logical modes; while the right hemisphere is associated with spatial, synthetic, holistic, and intuitive modes (Gazzaniga, 1970; Levy, 1974). Individual differences in the activation of the hemispheres is referred to as hemisphericity. Bogen (1969) has described split-brain patients and their peculiar characteristics.

Studies have been made in both hypnosis and subliminal communication with hemisphericity as a variable. Sackeim, Packer, & Gur (1977) found that hemisphericity and cognitive set were correlated with subliminal response. Right hemisphericity individuals showed a subliminal effect when their cognitive set was holistic and intuitive; whereas left hemisphericity individuals showed a subliminal effect when encouraged to think in an organized and logical manner. The authors speculated that the discovery of

hemisphericity and cognitive set variables in subliminal perception may have accounted for the discrepancies found in the subliminal literature.

Carter, Elkins, & Kraft (1982), in a review of the literature, have commented that the effectiveness of hypnosis relies heavily upon the subject's ability to cognitively respond in particular ways to stimuli provided by the hypnotherapist. They suggest that one might logically expect a relationship between findings on hemispheric asymmetry and hypnotic phenomena. A careful examination of the hypnotic work of Erickson, as described by Bandler & Grinder (1975), indicated that linguistic and nonverbal patterns of behavior involving both distraction of the dominant hemisphere and utilization of the dominant hemisphere below the level of awareness as well as assessment of the non-dominant hemisphere were important in achieving the therapeutic effect. Watylawick (1978) attributed the effectiveness of Erickson's work to the use of language patterns which engage the right hemisphere, and block the interfering functions of the left hemisphere.

Carter *et al* (1982) have speculated that much of Erickson's unique approach to hypnosis may be attributable to his mastery in engaging the right hemisphere of his subject. Communication that distracts the left hemisphere, and makes use of right hemisphere processing of sensory information, may be involved.

Since brain laterality appears to be a common denominator in both hypnosis and subliminal perception, the combined use of both techniques becomes logically more appealing. While hypnosis as a therapeutic intervention can contribute much to help a person achieve a more satisfactory adjustment, the resistances often encountered when attempting to use hypnosis leave room for adjunctive methods which can work synergistically with hypnosis, and serve as a facilitator. One such method is subliminal communication.

INSTRUMENTATION FOR SUBLIMINAL COMMUNICATION

Several subliminal processors are now being produced by one of the authors (HCB) in two general classes, *audio* and *video*. In the *audio* class are:

a) the MARK II, a flexible research and/or production instrument designed for the experimental laboratory, commercial/industrial audiotape master production, and radio broadcast use -- requiring both supraliminal and subliminal external audio sources;

b) the MARK III, a simplified, economical field oriented device (which a media person has dubbed the "little black box") designed for use in department stores, supermarkets, drug stores, real estate agencies, professional placement agencies, automobile dealerships, computerized apartment rental agencies, and medical and dental clinics -- requiring both supraliminal and subliminal external audio sources;

c) the MARK III-B Programmable Analog Audio Subliminal Processor [1], an upgraded MARK III containing three calibrated DIAL-POTENTIOMETERS allowing precise adjustment of supraliminal gain, subliminal to supraliminal ratio, and composite signal output amplitude, specifically designed for professional therapists to prepare composite audiocassettes using background music or pink sound [2] for the supraliminal signal with individualized appropriate words and phrases for the embedded subliminal signal -- words and phrases (referred to as "Veridicals" and "Affirmations" [3]) that are derived from an endless-loop audiocassette that can be produced in any well-equipped audio laboratory;

d) the MARK VI, essentially a MARK III Processor with a self-contained digital speech synthesis module to provide several selectable pre-programmed sub-sets of subliminal words and phrases (affirmations) for eight different applications: Professional Placement Offices; Medical and Dental Offices and Clinics; Banks, Supermarkets, and Retail Stores; Real Estate Offices; Automobile Dealerships; Apartment Rental Agencies and Travel Agencies; General Offices; and Smoking Determent, Special Application; and

e) the MARK IX System, a Background Music and/or Pink Sound Source containing an 18-hour endless-loop music and/or pink sound tape with its own laboratory embedded subliminals, designed for connection to an existing power amplifier and loudspeaker system.

In the *video* class at this time is one model, the MARK II, which contains color video signal conditioning, modulation, switching, color keying, and program subliminal insertion solid-state circuitry employing several wide-band analog multipliers -- which requires external supraliminal and subliminal video sources. The MARK II Video Subliminal Processor contains a built-in 3" oscilloscope module which provides comprehensive switch selectable monitoring of all critical signals and functions dynamically on-line.

The basic means and method by which all of these subliminal processors operate are contained in a United States Patent by Becker [1]. Both the audio and video processors are solid state (except for the cathode-ray tube), and functionally they work as follows: The processor monitors and rectifies the amplitude envelope of the supraliminal signal, either background audio music or conventional conscious-level video. Through an electronic analog multiplier this rectified envelope signal is used to control the amplitude of the subliminal signal that is admixed with the standard supraliminal signal, while a second analog multiplier reduces the supraliminal signal amplitude by just the value of the admixed subliminal signal to prevent overmodulation. This allows the subliminal information to be held dynamically near -- but not to exceed -- conscious threshold detection level, regardless of full excursions in amplitude of the supraliminal information.

In the *audio* class the subliminal signal consists of carefully chosen words and phrases delivered at normal speech rate and multiples of normal speech rate with pitch restoration, while in the *video* class the subliminal signal may be words, phrases, silhouettes, half-tone monochrome or color pictures, and combinations of these.

The subliminal signal information is chosen and designed to: 1) link up with and activate pre-existing unconscious wishes, drives and value systems, and 2) impart to the unconscious new and useful substantive, therapeutic and educational information.

HYPNOSIS AND SUBLIMINAL COMMUNICATION IN A DESENSITIZATION EXPERIMENT

One of the authors (DRM) has recently used hypnosis and subliminal communication within a behavior therapy context to treat the fear of thunderstorms in a 58-year-old married female suffering from agoraphobia. Since the fear of thunderstorms was severely incapacitating, and the season for such storms was imminent, it was decided that a multifaceted approach employing hypnotic, subliminal, and behavioral methods might provide rapid desensitization. Baseline behavior indicated tachycardia, shortness of breath, feelings of terror, and a need to run and hide in a sheltered place within the house (*e.g.*, basement room without windows) whenever there was even a warning of a thunderstorm.

A tape recording of a thunderstorm was made, and subliminal messages to relax and be calm were embedded, using the Behavioral Engineering Corporation MARK III-B Audio Subliminal Processor [1]. The subject was then placed in a hypnotic experience and the tape was played through stereophonic earphones. Hypnotic suggestions to remain calm and relaxed were made throughout. Although the subject experienced one intense rush of anxiety upon first hearing the thunder, she quickly quieted and became pleasantly relaxed. The duration of the tape was 30 minutes. At the completion of the tape she was awakened from the hypnosis, and asked to describe her experience. Her first comment concerned the intense fear she had when first hearing the clap of thunder. However, she marvelled at how quickly she had quieted and "accepted" the thunder without further discomfort. She was instructed to listen to the tape daily at home. A nearly one-year follow up revealed that, based on that one session, the patient was symptom free, and no longer was terrified of storms of any kind. Her husband reported amazement that she was able to travel in a car during near blizzard conditions without anxiety. While her agoraphobic symptoms (which were not addressed hypnotically or subliminally) continue to some extent, the thunderstorm phobia as well as fear of all storms were completely eliminated.

SUBLIMINAL COMMUNICATION IN THREE PINK SOUND EXPERIMENTS

The initial design of these experiments included placing the subject in a hypnotic state after the subject listened to a pink sound audiocassette containing an embedded subliminal three-digit number, and then with the subject under hypnosis requesting the subject to make one selection from five possible selections 1) through 4) -- four different three-digit numbers, and 5) -- no number at all, if he felt no number had been presented with the pink sound. Thus chance operating alone would have predicted a 20%

Correct response rate. One of the hypotheses was that the subliminally embedded number would be more often correctly selected by the subjects while under hypnosis than while in their normal, unaltered state of consciousness. However, to the surprise of the first experimenter (JWH, in Burlington, VT), the correct number selection rate obtained while the subjects were in the normal state was so nearly perfect ($p<10^{-8}$) that it seemed trivial to proceed with the initial experimental design.

Two additional similar pink sound experiments were later carried out in other cities by another of the authors (SBC, in Salt Lake, UT) and by another colleague, Prof. Thomas P. Martini (TPM, in Spokane, WA), using identical pink sound audiocassettes containing the same three-digit subliminal number. These three pink sound cassettes were prepared in the laboratory of another author (HCB) using his MARK III-B Audio Subliminal Processor [1] and a Soundolier MG-1500 Pink Noise Generator [4]. Data from these experiments by JWH, SBC, and TPM are presented in the Tables below. Chi Square analysis was chosen because it is a non-parametric test and therefore its validity does not depend upon normality of the data. It was compensated for small-sample Expected Frequencies by means of the Yates Correction [5], which, in fact, tends to overcorrect and therefore bias the result against the investigator.

TABLE I (JWH)

N = 8		N = 19	
CONTROL GROUP		EXPERIMENTAL GROUP	
Correct	Incorrect	Correct	Incorrect
1	7	17	2
df = 1, $X^2 = 0.167$		df = 1, $X^2 = 38.8$	
p = 0.68 (non significant)		$p < 10^{-8}$ (highly significant)	

TABLE II (SBC)

N = 20		N = 20	
CONTROL GROUP		EXPERIMENTAL GROUP	
Correct	Incorrect	Correct	Incorrect
1	19	17	3
df = 1, $X^2 = 3.27$		df = 1, $X^2 = 35.27$	
p = 0.071 (non significant)		$p < 10^{-8}$ (highly significant)	

TABLE III (TPM)

N = 18		N = 21	
CONTROL GROUP		EXPERIMENTAL GROUP	
Correct	Incorrect	Correct	Incorrect
3	15	12	9
df = 1, X^2 = 0.296		df = 1, X^2 = 9.92	
p = 0.586 (non significant)		p < 0.002 (highly significant)	

Discussion of Results from Pink Sound Experiment

The results from these three investigations by JWH, SBC, and TPM using pink sound with an embedded subliminal number again confirmed that new and useful information *can* be imparted to one's unconscious mind, and that this same information can be accessed and cognitively used at the conscious level at a later time -- in other words, clearly demonstrating measurable critical incidents -- at levels of confidence respectively of $p<10^{-8}$, $p<10^{-8}$, and $p<10^{-2}$, based upon a Chi-Square analysis with a Yates Correction for small expected frequencies. It is important to note that JWH and SBC conducted their experiments in their own Clinics with the cooperation of their private patients, while TPM carried out his experiment in a university classroom with another Professor's students.

The authors have designed further experiments that should allow evaluation of their earlier stated hypothesis that subliminally imparted information should be more readily, and more accurately, accessible when the subject is under hypnosis.

SUBLIMINAL COMMUNICATION FOR HUMAN RESOURCE POTENTIATION IN THE FIELD

Subliminal communication appears to offer a broad spectrum of approaches for *human resource potentiation*, which might partially be defined as enhancement and optimization of one's basic adaptive stimulus-response chains in at least three ways: 1) by enlivening and activating healthy wishes and drives already present in one's unconscious, 2) by imparting new and useful information into one's unconscious, and 3) by increasing one's unconscious selective attention while potentiating awareness.

This broad spectrum of approaches contains clusters of finely-tuned, narrow spectral lines of mode and technique selection, since the subliminal stimuli appear to reach directly primitive and unconscious levels of the mind -- suggesting a wide range of therapeutic, educational, and industrial applications -- possibly limited only by the ingenuity of the therapist or

investigator. Both video and audio subliminal communication are efficient, unobtrusive, powerful, and they operate while one is fully aware of and attending to, normal activities at work or in recreation.

When subliminal communication is used in field applications for human resource potentiation, the authors refer to it as *Applied Subliminal Communication*™, in order to distinguish it from *laboratory* experiments in subliminal perception or subliminal communication. As anyone who has taken a laboratory-developed system into a field situation in the real outside world has discovered, an additional entirely different set of criteria need to be satisfied -- *and*, many parameters and variables that were quantifiable and controllable in the laboratory are no longer under experimenter control.

This usually produces field results that are more anecdotal and sometimes less quantifiable than results from laboratory tests. Without apology, but with this *caveat* in mind, the authors invite the reader to review the following results from some of their experiences with Applied Subliminal Communication™ (ASC™).

ASC™ IN A NEW ORLEANS AREA SUPERMARKET

A single-channel subliminal sound conditioning background music system was installed in a New Orleans Area Supermarket by HCB on November 7, 1979, and a letter from the Store's Manager dated June 5, 1980, stated:

"We have: 1) witnessed an almost complete turnaround in cashier shortages, turnovers, and very important -- their attitudes,

2) been able to reduce our stock work force in half, and yet maintain our same level of efficiency,

3) (and most importantly) found our shortages throughout the store at an all-time low.

"[Further] results we discovered:

1) Cashier shortages have dropped from a total of approximately $125.00 per week to less than $10.00 per week. Complaints from customers about cashiers are now nil, and many times we have received compliments.

2) The reduction in damaged merchandise by our stock force has been surprising. Before installation of your equipment, we donated a truckload of damaged merchandise to our local church every three months. We have not collected enough damaged merchandise to fill up one truckload since installation of your subliminal equipment 8 months ago.

3) Pilferage loss was running an average of $50,000.00 per each 6-month period. This has dropped since installation of your equipment to the astounding figure of less than $13,000.00."

ASC™ IN TWO STORES OF A LARGE SUPERMARKET CHAIN

A single-channel subliminal sound conditioning background music system was installed by HCB in each of two stores of a Large Supermarket Chain in July, 1981. A letter from the Personnel Manager stated that over the following eleven months personnel *turnover* was reduced to one half of "...what it ran the two years prior to installation...[while]... overall *turnover* [in the other approximately 60 stores] has remained the same...The overall workers compensation claims in all but the two stores tested were about the same, while claims in the stores tested have been reduced."

ASC™ AT THE MC DONAGH MEDICAL CENTER

At the McDonagh Medical Center [6], where a 3-channel subliminal sound conditioning background music system was installed by HCB, a significant improvement was documented in four target behavioral areas over the period April through October, 1979:

1) "*Steam-ups*" in the Patient Waiting Room were reduced by about 60%. Waiting Room population was running approximately 70 to 90 patients per day.

2) *Fainting* in the Intravenous Chelation Therapy Clinic upon IV needle insertion was reduced essentially to zero. The chelation fluid is highly acidic (Vitamin C), and needle insertion is accompanied by intense "smarting" and frequently by pain.

3) *Smoking* in the Staff Lounge was reduced by 50 to 70%, as determined by counting of daily butt accumulation. The Staff Lounge accommodated about 8 to 10 persons each day, while cigarette butts prior to system installation were about 60 to 70 daily.

4) *Harmony* and *cooperation* among Clinic personnel appeared to improve significantly. No attempt was made to quantify this behavioral area.

ASC™ IN HEALTH PROMOTION SELF-HELP AUDIOCASSETTES

In January, 1982, one of the authors (HCB) released a Health Promotion/Self-Help Audiocassette (one hour) [7] for use by the participants in his weight control program, and for acquisition by the general public, containing on Side 1 a one-half hour narrative over background music embedded with appropriate subliminal *affirmations* and subliminal *veridicals*[3], and on Side 2 one-half hour of the same music and embedded subliminals, recorded at normal listening level for the music, with the subliminals remaining undetectable at the conscious level.

The response to this cassette has been universally good, and unsolicited reports from field users indicate that it is working for them. The cassette program is novel in that it is appropriate not only for those who are overweight, but also for those who are normal weight and having a difficult time remaining that way. The program is *not a diet* in the usual

sense of the term, since it prescribes three balanced meals plus high-Protein and/or low-Carbohydrate/low-Fat snacks between meals, with a *minimum* of 900 total calories each day. It is called the Becker Weight Control Program©. And, in 1979, a four-year computerized random-sample follow up on 151 patients (N=42) conducted as a Master's Degree Nutrition Research Special Project [8] revealed weight loss maintenance statistics that were significantly better than any in the literature, *viz.*:

> "Approximately fifty per cent maintained 50% or more of the weight lost during the Program for a mean period of two years...twenty-three per cent maintaining 75 to 100% of their loss...eleven per cent maintained only 1-25% of weight lost in the Program."

The basic strategy -- proven over the last eight years -- is to shift the spectrum of nutrient intake toward high Biological Value Protein, moderate Carbohydrate, low Fat, and not forbid Alcohol; while at the same time, to provide a programmatic series of small, but permanent, changes in eating and drinking habits, referred to as *behavior moderation*, through subliminal discrimination training at the unconscious level involving review and recall, self-image, assertiveness, relaxation, stress management, and anxiety reduction.

Since the substantive content of this cassette program is multi-focal: nutrition, metabolism, self-image, assertiveness, stress management, anxiety reduction, and mild exercise (when medical conditions permit), it should, when combined with hypnosis, offer a *superior therapeutic weight control program* for patients of a Hypnotherapy Practice. The principal criticism about the use of hypnosis in weight control therapy focusses on the fact that most hypnotists are not trained in nutrition or behavior modification, and therefore tend to cause the patient to *lose* weight, but to lose it in an *unhealthy* and *temporary* way through malnutrition, and absence of permanent behavioral change.

It seems, therefore, that judicious use of this cassette to provide nutritional and behavioral modification guidance, subliminal activation, review and recall -- in *combination with hypnotherapy* -- could result in a therapeutic treatment effect whose whole could be greater than the sum of its parts.

ASC™ IN A CHIROPRACTIC PRACTICE

A Chiropractor colleague, Paul Tuthill, D.C., (in Wyoming, MI) has recently produced several self-help therapeutic subliminal audiocassettes using the MARK III-B Subliminal Processor, that he has made available to his patients and to the general public, entitled: Stop Smoking, I Like to Study, Exercise, Self-Confidence, Relaxation, Memory, Concentration & Stress. Dr. Tuthill has shared with the authors some of the more interesting results reported by his patients. Apparently there have been no dissatisfied listeners -- all seeming to react favorably, and some outstandingly well, as

epitomized in the following delightful case history of Ms. J.B.:

> "Ms. J.B. (a 27-year old body-building enthusiast/ instructor. This patient does 1,000 leg-lift repetitions each day as a part of her regular floor exercise program. I gave her our 'Exercise' tape at her request and told her to return in two weeks. The positive affirmations on the tape are enclosed.
>
> "Ms. B. returned in two weeks and reported doing 2,000 leg lifts daily with good results. At the end of the third week, she reported an all-time high of 3,800 leg lifts and a general doubling of her floor exercises. I would note that Ms. B. is currently unemployed and plays her tape a great deal.
>
> "An interesting side effect, apparently from the tape, occurred to this lady's cat. The cat has lived indoors ever since birth. It has not ventured outside in five years. The cat is also a little fat and sluggish. When Ms. B. played her tape, the cat showed signs of increasing activity -- pacing the room and finally running around the house quite playfully. Ms. B. said she has started to let the cat outside every day, and the animal is much more active and is toning up!"

CONCLUSIONS

From the foregoing overview of Subliminal Communication, quantitative positive results from several laboratory experiments, and encouraging results from commercial and industrial field applications -- all carried out by experienced and credible investigators -- it appears most reasonable persons would conclude that the phenomenon known variously as *subliminal perception, subsception, subliminal communication,* and *perception without awareness* is not only real and repeatable from laboratory to laboratory, but also is beginning to exhibit its identity and take its place in a spectrum of societally beneficial field applications -- recently referred to as Applied Subliminal Communication™ for Human Resource Potentiation.

Although a few minimal "paradoxical effects" and "idiosyncratic responses" have been reported in the literature, there has been no proven harm to anyone from the use of subliminals -- even though subliminals have been experimented with by professionals and dilettantes alike for scores of years.

The question of how to define *ethical* and *unethical* uses of this proven phenomenon is often raised, and this question needs serious attention now and in the future in order to seek and discover reasonable answers. However, such considerations are beyond the scope of this paper. It will constitute the principal focus of a later publication by these authors.

In 1964, after surveying over a hundred related papers, Bevan wrote:

"...that the topic has come of age is indicated by several facts. Experiments are no longer directed simply toward establishing subliminal perception as an empirical phenomenon but incline more toward examining its influence upon a variety of behavioral events..."

Then in 1980, Shevrin and Dickman stated:

"The notion of complex psychological processes operating outside of awareness has traditionally been associated with the concept of the unconscious used by psychodynamically oriented clinicians; it has never found an equivalent place in the mainstream of American experimental psychology. However, mounting evidence from several rather diverse fields of empirical research (*e.g.*, selective attention, cortical evoked potentials, subliminal perception) provides support for such a concept, and, in fact, explanatory constructs of a similar nature have been embodied in several current models of perceptual processing."

The investigations that the authors of this paper have conducted impel them to believe that the appropriately subtle and sensitive uses of carefully selected and adequately presented (*i.e.*, an *adequate stimulus* nearly 100% of the time) *subliminal communication stimuli* could create significant educational and healthy therapeutic responses in situations that heretofore have been intractably resistant. It appears that we now have available a technologically feasible, practical, readily implementable way not only to enliven and activate healthy unconscious wishes and drives that might have become "psychostatic," but also impart new and useful information into the unconscious, while at the same time increasing selective attention and potentiating awareness -- *all* while the subject is engaged in *normal* activities.

With specific relevance for the Clinical Hypnotist, the authors' experience using the combined techniques of hypnosis and subliminal communication suggests that accessing the unconscious through subliminal communication is probably one of the most promising routes to provide post-hypnotic suggestion.

NOTES

1. MARK III-B Programmable Analog Audio Subliminal Processor (U.S. Patent No. 3,278,676) -- available to qualified professional therapists from Behavioral Engineering Corp., 4801 Green Acres Court, Metairie, LA 70003. Telephone (504)455-2999.

2. *Pink* noise is usually defined as *white noise* that has been passed through a filter having a 3db per octave attenuation or "roll-off" with increasing frequency. In practice, however, depending upon the specific application, the "pinkness" of the filtered noise is tailored as a function of frequency to meet the specific needs using a set of continuously variable active filters spaced 1/3 octave over the frequency range desired. In other words, the power density curve of the pink noise spectrum is shaped to fit the investigator's necessary criteria. The Soundolier MG 1500 Masking Noise Generator (see Note 4, below) is such an instrument.

   White noise sounds more or less like the sound from a television set whose station channel selector is set to an unused channel -- a hiss and crackle sound that is fairly obtrusive. *Pink noise*, however, sounds more or less like the soft, unobtrusive sound of a well-designed air-conditioning louvre.

   One of the reasons for using *pink noise* in subliminal applications is that the choice of an optimal music supraliminal signal frequently becomes difficult, or even impossible.

3. Subliminal *veridicals* are defined as concise statements of universal *truth, e.g.*:

   Stealing is dishonest.
   Speeding is dangerous.
   Reading is fun.

   whereas subliminal *affirmations* are defined as concise declarative statements of *desired attributes or conditions, e.g.*:

   I do not steal.
   I do not speed.
   I like to read.

4. MG 1500 Masking Noise Generator, Soundolier, Inc., 9380 Watson Industrial Park, St. Louis, MO 63126.

5. For a lucid exposition of the elegantly simple Yates Correction, see Downie, N.M., & Heath, R.W. Basic Statistical Methods, 4th Ed. Harper & Row, New York, 1974, 196-199.

6. McDonagh Medical Center, 2800-A Kendallwood Pkwy., Gladstone, MO 64119 (Dr. E. W. McDonagh).

NOTES (Continued)

7. Kick the Diet Habit, a Health Promotion/Weight Control Audiocassette using Subliminal Communication. Music© Thomas J. Valentino, Inc., 1982, © and ℗ 1982 Behavioral Engineering Corp., 4801 Green Acres Court, Metairie, LA 70003.

8. A Special Research Project by Ms. Pamela Finnegan in partial fulfillment of the requirements for the Master's Degree in Nutrition, Dept. of Nutrition, Tulane University School of Public Health and Tropical Medicine, New Orleans, LA, August, 1979.

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February 20, 1981

Senator Paul Tsongas
342 Russell Building
Washington, D.C. 20510

SUBJECT: Response to Your Telephone Request through Ms. Phyllis Bernstein for Information on My Work in Subliminal Communication

Dear Senator Tsongas:

I am happy to respond to your request for information on my company's activities in the societally beneficial applications of Subliminal Communication. I wish to assure you that I intend to cooperate in every reasonable way with you and other responsible officials. In this vein I have enclosed several documents (including my Curriculum Vitae, Encl. 1) and photocopies of various items from the media, along with a List of References to additional documents that are important and relevant to your request. Since during the last three years there have been hundreds of articles, radio shows and television presentations -- both pro and con -- concerning the use of Subliminal Communication, the enclosed documents and List of References should not be considered by any means complete or comprehensive. They simply represent my selection of a minimal number of related items in both "for" and "against" categories. Some, in my opinion, are clearly irresponsible and inflammatory...

The recent flurry of publicity began in April, 1978, when Mrs. Norma Glanzer and I presented a paper to an Electronics Engineering Annual Conference in Atlanta, entitled "Subliminal Communication: Advances in Audiovisual Engineering Applications for Behavior Therapy and Education" (Encl. 2). In this paper we tried to highlight certain societally beneficial uses of Subliminal Communication in the field, including weight control, and in the Discussion session of the paper -- honesty reinforcement, theft determent, and loss prevention in industrial and commercial settings. The Associated Press picked up the latter application and alluded to it on the AP international wire as "Dr. Becker's Electronic Conscience" -- later dubbed by the media "Dr. Becker's Little Black Box."

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Since April, 1978, I have been interviewed by more than 300 journalists -- newspaper, magazine, radio, and television -- to whose requests I have attempted to respond responsibly in a field of activity that is clearly sensitive and controversial. Most of the media representatives have cooperated in my attempt to inform the public about what should and should not be expected from the use of subliminals. However, some of the writers have behaved irresponsibly (Encl. 3,4,5). In contrast to the latter publications are several responsibly written ones (Encl. 6,7,8,9,10; Refs. B,C,D,E).

Some public officials have operated with open minds in bringing the latest information on crime prevention to the attention of those who are in a position to use it. For example, Attorney General William Guste, Jr., State of Louisiana, has been conducting Seminars on shoplifting (Encl. 11; Ref. F) in various cities over the last few months. Although Attorney General Guste makes it clear in these Seminars that he is not endorsing me or my company's instruments, it has been my honor, at his invitation, to speak at the last two of these Seminars held in Lake Charles, Louisiana, and Shreveport, Louisiana. Attorney General Guste and certain other responsible officials realize that crime -- juvenile crime and adult crime -- are no longer responding effectively to conventional methods. They also seem willing to consider the possibility that subliminal techniques just might be one of the most effective and economical methods of crime prevention ever discovered. All seem to agree that PREVENTION is the stratagem for success in future handling of crime. It is clear to all of us that prevention is enormously better than detection and apprehension, both for the private individuals involved and the authorities -- and obviously also the taxpayers. The Program from Attorney General Guste's latest Seminar in Shreveport, Louisiana, is enclosed (Encl. 11).

Since 1951 my colleagues and I have been carrying out research and development programs in the field of subliminal perception, or, as I prefer to call it, "Subliminal Communication." More and more scientific and real-world field evidence is appearing which strongly indicate that visual and audio Subliminal Communication are economical, efficient, unobtrusive, and powerful methods for enlivening and activating healthy unconscious wishes and drives, while also imparting new and useful information to one's unconscious (Encl. 12,14,15) -- while he or she is fully aware of and attending to normal activities at work or in recreation.

Neither my company nor I have ever used subliminals in any advertising, political, or religious setting, because I feel such use would be inappropriate.

Although more work needs to be done on the applications of subliminal methods in crime prevention and therapeutic settings, significant evidence of their power and future potential in these applications already exist (Encl. 2,6,7, 8,9,10,14,15,16,17; Refs. C,D,E).

I frequently receive letters and telephone calls from distraught, desperate parents whose kids are into crime and/or substance abuse. I believe properly administered subliminal video and audio therapy could be effective in these cases, and we are working toward proving this -- but in a boot-strap funding way, *i.e.*, funding our own R & D -- unsupported by any contracts or grants. And we are making significant though modest progress.

Subliminal Communication might just be the most effective therapeutic method yet discovered to help in these areas that seem not to respond well to conventional therapies.

But now enters the ACLU's New York Legislative Director, Ms. Barbara Shack, who is quoted in the Wall Street Journal (Encl. 3) as stating "The potential for abuse is enormous... If it is a distortion of sound and camouflaged so the receiver isn't aware and can influence his behavior, it's tantamount to brainwashing and ought to be prohibited by legislation."

I consider Ms. Shack's statements irresponsible, not based upon fact, and clearly inflammatory. She has used emotionally loaded words, and she, herself, has frightened her readers in order to impel them to enter complaints about subliminal methods and instruments -- specifically ours...

In my opinion the Wall Street Journal also acted irresponsibly in publishing Ms. Shack's charged statements without affording me an opportunity to rebut her charges in the same article. I believe this is WRONG, and counter to the public interest.

Further examples of this kind of less-than-responsible, emotionally driven journalism follow. Incidentally, the negative letters that you are receiving from your constituents probably stem from the effect of these articles.

From the Boston Globe of December 14, 1980 (Encl. 4), "The ACLU, by the way, is objecting to the Box, and Barbara Shack, legislative director of the group's New York branch, has said, 'the potential for abuse is enormous.' 'It's tantamount to brainwashing and ought to be prohibited by legislation,' she said. Amen, hallalujah, and go get 'em Barbara. Retalliate, retalliate. The rest of us should do

the same. Yell, scream, write congresspersons, call Louisiana, (504-455-2999), and pull the plug on Becker, no matter how 'good' for us his messages are supposed to be." My General Counsel tells me that some of the statements in this article by Susan Trausch border "perilously on character defamation."

From The Leader of February 5, 1981, reprinted from the Christian Science Monitor (Encl. 5), "The real threat in a free society is that such attempts at thought control -- or 'behavioral modification,' as its promoters call it -- would be tolerated at all." and "Nevertheless, this technique is an invasion of thinking. It could easily be put to political or oppressive purposes. It should be prohibited."

In my opinion, the statements I have quoted above, and others in these articles are not only reckless and irresponsible, but also are counter to the public interest since they in effect recommend *legislation against crime prevention.*

What really bothers me is that local, state, and federal legislators just might fall for this kind of radicalism since these articles have been published in such respected, credible, and well-read organs like the Wall Street Journal, the Boston Globe, and the Christian Science Monitor.

I am not adverse to some kind of reasonable regulatory statutes for subliminals, and I would be happy to serve on any duly constituted commission responsibly designed to explore this area. As I stated earlier, I am attempting to respond responsively in a societally beneficial way in a field of research, development, and application that is sensitive and controversial -- at least on the surface -- which is where most of the critics are operating.

It is important, however, to realize that even though professionals and amateurs as well have experimented with subliminals over the last 100 years, *there has been no proven case of significant harm having come to anyone from the use of subliminals.*

Regarding alleged "invasion of privacy," it is important to remember that all property owners have a legal right to use reasonable means to protect their property. Can you think of any more reasonable means than a simple inaudible message that said, "I am honest. I will not steal."?

It is no longer a question of whether or not the use of subliminals in places where the public gathers -- private property or not -- constitutes an invasion of privacy. Obviously it is an "invasion of privacy" to some degree. The important question is, does it constitute a *serious* invasion of privacy, and if it does, then what should be done about it?

This is a *real* world we live in -- not a storybook, fictional one. In our real world are numerous daily invasions of privacy -- some trivial, and some very serious. Some of the serious ones we excuse because we feel that their benefits to society outweigh their intrusions.

A serious invasion of privacy that I find impossible to excuse is the injury and death of completely innocent persons from automobile accidents. It is entirely possible that the use of Public Service Message subliminals on television and radio could significantly reduce the number of urban and highway accidents. Instead of entertaining thoughts of, and actively recommending legislation to prohibit the public use of subliminals, shouldn't we seriously be considering the positive side -- *e.g.*, a request to the Federal Communications Commission for a new comprehensive review and analysis of the benefits that could accrue in the public interest by encouraging television and radio Public Service Messages?

In order to restore some kind of real-world perspective in the mind and vision of our detractors, it might be productive to remind them that we are still killing more than 50,000 people each year with automobiles, and who knows how many are killed with kitchen knives. Then remind our detractors once again that no one has been proven harmed in any significant way by the use of subliminals.

Regarding what can and cannot be accomplished with subliminals, Eric Lander in the February, 1981, issue of OMNI Magazine (Ref. E, page 46) states, "Unfortunately for the movie's creators, turning the population into zombies by subliminal subterfuge is the only thing scientists unanimously agree is out of the question. Now they are trying to decide just what is possible." Lander's article is informative, responsible, and for the most part -- accurate. I respectfully suggest that you read it carefully.

SUMMARY

This report has been prepared under pressure in the face of an already heavy schedule to comply as best I could with your urgent request for information relayed to me through your Administrative Assistant, Ms. Phyllis Bernstein, who spoke with my wife, Pat. I hope it will help you in your decisions regarding responses to your constituents who have shown their interest and concern in this matter. I WOULD APPRECIATE RECEIVING COPIES OF THEIR COMMUNICATIONS SO THAT I MIGHT RESPOND WITH FINER FOCUS AT A LATER TIME.

Some of the Enclosures and References that I have not referred to directly are important for reasons that would require many more pages to outline. One of these is Corrigan's Doctoral Dissertation (Ref. A). Please secure a copy and at least scan it for relevancy.

Uses of subliminals in Therapy and Human Resource Potentiation are set forth in the remaining Enclosures and References.

Please let me know if I can be of further help.

Respectfully,

BEHAVIORAL ENGINEERING CORPORATION

Hal C. Becker, Ph.D.
President

HCB/pb

Enclosures

cc- President Ronald Reagan
The Honorable J. Bennett Johnston
The Honorable Russell Long
The Honorable Robert Livingston
The Honorable Lindy Boggs
The Honorable Billy Tauzin
The Honorable Charles Roemer, Jr.
The Honorable Jerry Hackabee
The Honorable W. Hanson Moore
The Honorable John B. Breaux
The Honorable Gillis W. Long
The Honorable David C. Treen, Governor of Louisiana
Attorney General William J. Guste, Jr., State of Louisiana
Dr. Robert E. Corrigan
Mr. William B. Reinhardt, Jr., Esq.

LIST OF ENCLOSURES

1. Curriculum Vitae, Hal C. Becker, Ph.D.

2. Becker, Hal C. and Glanzer, Norma H. "Subliminal Communication: Advances in Audiovisual Engineering Applications for Behavior Therapy and Education," presented 1978 Institute of Electrical and Electronics Engineers Region 3 Conference, April 10-12, 1978, Atlanta, Georgia.

3. Wall Street Journal, November 25, 1980, article by Neil Maxwell, "Words Whispered to Subconscious Supposedly Deter Thefts, Fainting."

4. Boston Globe, December 14, 1980, article by Susan Trausch, "This Mamma Will Faint If She Wants To."

5. The Leader, February 5, 1981, article by Robert C. Cowen from Christian Science Monitor, "Subliminal Warrants Caution."

6. Cincinnati Enquirer, April 17, 1977, article by Bill Boshears, "Subconscious Can Be Guide for Dieters."

7. London Daily Mail, October 2, 1978, article by John Womersley, "Should You Be Brainwashed Like This To Be Honest?"

8. New Orleans Times-Picayune, October 19, 1980, article by Angela M. Carll, "Subliminal Effects Achieved by Metairie Inventor's Box."

9. TIME Magazine, Behavior Section, September 10, 1979, "Secret Voices: Messages That Manipulate."

10. Kansas City Times, February 4, 1981, "Pool Sitter Praises Odd Pals."

11. Program for SEMINAR ON SHOPLIFTING, conducted by Louisiana State Department of Justice, Caddo Parish District Attorney's Office, and Retail Merchants' Council of the Shreveport Chamber of Commerce.

12. Becker, H.C. *et al.* "Subliminal Communication: Biological Engineering Considerations," presented at 6th International Conference on Medical Electronics and Biological Engineering, 1965, Tokyo, Japan.

13. Becker, H.C. *et al.* "Video and Audio Signal Monitors/Processors for Subliminal Communication in Weight Control," presented at 12th Annual Meeting of Association for the Advancement of Medical Instrumentation, March 13-17, 1977, San Francisco.

14. Becker, H.C. *et al.* "Applications of Subliminal Video and Audio Stimuli in Therapeutic, Educational, Industrial, and Commercial Settings," presented to 8th Annual Northeast Bioengineering Conference, M.I.T., March 28, 1980.

LIST OF ENCLOSURES (Continued)

15. Becker, H.C. *et al*. "New Subliminal Processors for Therapy, Industry & Education," presented at 33rd Annual Conference on Engineering in Medicine and Biology, Washington, D.C., September 30-October 3, 1980.

16. Brochure of Becker Weight Control Program©

17. Brochure of Mark VI Digital Audio Subliminal Processor, "What Is Dr. Becker's Black Box?"

LIST OF REFERENCES

A. Corrigan, R.E. "Verbal, Visual, and Motor Responses as Indicators of Personal Values in Perception," Doctoral Dissertation, submitted May, 1954, to Department of Psychology, Tulane University of Louisiana.

B. LIFE Magazine, March 31, 1958, article by Herbert Brean, "Hidden Sell Technique is Almost Here."

C. Family Health, 1978, article by Art Athens, "Beware: Here Come the Mind Manipulators."

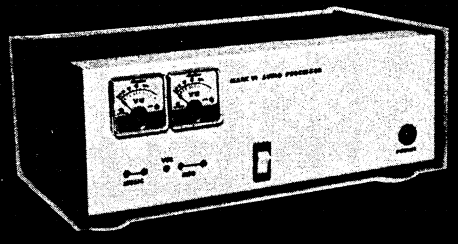
D. Los Angeles DAILY NEWS, January 19, 1981, article by Ira Rifkin, "His Subliminal Message Is All In Your Mind."

E. OMNI Magazine, February, 1981, article by Eric Lander, "In Through the Out Door."

F. Booklet: "Shoplifting -- A Discussion of the Law," prepared by the Louisiana State Department of Justice, William J. Guste, Jr., Attorney General.

ENCLOSURE 17

What is Dr. Becker's Black Box? ? ?



FAMILY HEALTH, Art Athens
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LONDON DAILY MAIL, John Wormsley
"... and as Dr. Becker flicked the dials of his little box of electronic tricks, science crossed a threshold ..." (1978)

TIME MAGAZINE, Behavior Section
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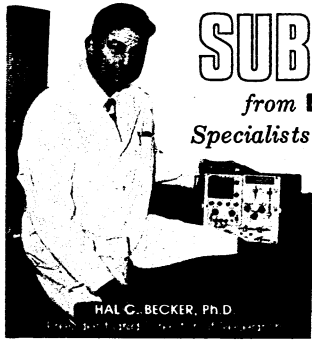

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*Becker, H.C. et al. *"Applications of Subliminal Video and Audio Stimuli in Therapeutic Educational, Industrial, and Commercial Settings,"* Proceedings of Eighth Annual Northeast Bioengineering Conference, Massachusetts Institute of Technology, Cambridge, Mass., March 28, 1980.

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Brief Resume of
HAL C. BECKER, B.E., M.S., Ph.D.

Dr. Becker holds three degrees from Tulane University in New Orleans. He was a Faculty Member of the Tulane Medical School for 27 years. He has published more than 40 research papers and holds several patents. He is listed in *AMERICAN MEN OF SCIENCE, WHO'S WHO IN AMERICA,* and *INTERNATIONAL WHO'S WHO IN MEDICAL ENGINEERING.* In 1963 he received the IBM Corporation's Outstanding Technical Contribution Award for Digital Computer Retrieval of Medical X-Ray Images. Dr. Becker is a Registered Professional Engineer, and a Certified Clinical Engineer.

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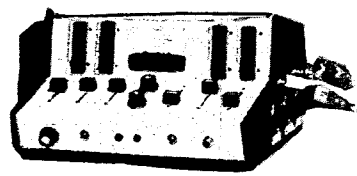

*U.S. Patent No. 3,278,676

Dr. Becker and his work in Subliminal Communication have been featured in:

- LIFE MAGAZINE (1957)
- NEWSWEEK (1957)
- FAMILY HEALTH (1978)
- LONDON DAILY MAIL (1978)
- TIME MAGAZINE (1979)
- NEW YORK TIMES (1979)
- WALL STREET JOURNAL (1979)
- *THAT'S INCREDIBLE!* (1980)
- OMNI MAGAZINE (1981, 1982)
- *TO TELL THE TRUTH* (1981)
- *PM MAGAZINE* (1981, 1983)

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Brief Resume of
HAL C. BECKER, B.E., M.S., Ph.D., C.C.E., P.E.

Dr. Becker holds three degrees from Tulane University in New Orleans. He was a Faculty Member of the Tulane Medical School for 27 years. He has published more than 40 research papers and holds several patents. He is listed in *AMERICAN MEN OF SCIENCE, WHO'S WHO IN AMERICA,* and *INTERNATIONAL WHO'S WHO IN MEDICAL ENGINEERING.* In 1963 he received the IBM Corporation's Outstanding Technical Contribution Award for Digital Computer Retrieval of Medical X-Ray Images. Dr. Becker is a Registered Professional Engineer, and a Certified Clinical Engineer.

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HAL C. BECKER ENTERPRISES, INC.
Post Office Box 8856
Fort Collins, Colorado 80525

CURRICULUM VITAE April, 1984

Hal C. Becker, B.E., M.S., Ph.D., P.E.

A. PERSONAL DATA:

Born July 12, 1922; Married; One Daughter 27 yrs. old, married

Office/Laboratory/Home Address and 'Phone Numbers:

4104 Sumter Square	Ofc./Lab. (303)223-5675
Fort Collins, CO 80525	Residence (303)223-3172

B. CURRENT PROFESSIONAL AFFILIATIONS:

President, BEHAVIORAL ENGINEERING CORPORATION

Research, Development, and Application of Instrumentation and Techniques for Video and Audio Subliminal Communication and Other Life Science Processes such as the Becker Weight Control Program© and a new series of Self-Help Subliminal Audiocassettes entitled "HEADED FOR SUCCESS." (The BWCP© employs Subliminal Communication in a Multimodal, Multifocal Behavioral Modification Weight Control Program that stresses proper nutrition and adaptive eating habit changes with mild exercise.)

President, HAL C. BECKER ENTERPRISES, INC.

Marketing products of Behavioral Engineering Corporation.

President, UNCORKERS, LTD.

Marketing The UNCORKER™, Champagne Plastic Cork Extractor.

C. FORMAL EDUCATION:

1938-42 Tulane University of Louisiana, B.E. in Electrical Engineering, June, 1942

1942-43 Massachusetts Institute of Technology, Special Training in Ultra-High Frequency Techniques, Differential Equations, Electromagnetic Fields

1946-53 Tulane University of Louisiana, The Graduate School, M.S. in Physics

1953-54 Princeton University, The Graduate School, Further Studies in Electrical/Electronics Engineering and Physics

1973 George Washington University, School of Engineering and Applied Science, Continuing Education Program, "Implementation of Clinical Engineering"

1973-74 Tulane University of Louisiana, The Graduate School, Interdisciplinary Ph.D. in Biomedical Communications Awarded December, 1974, from the Department of Psychology through The Center for Teacher Education

1974 Education Committee of the Association for the Advancement of Medical Instrumentation. Sheraton Park Hotel, Washington, D.C. "The Computer in Clinical Electrocardiography"

D. PROFESSIONAL EXPERIENCE (NS = Number of People Supervised):

1942-45 Research Associate, Radiation Laboratory, Massachusetts Institute of Technology. Radar bombsight development. (NS: 3)

1945-46 Assistant Project Engineer, Bendix Radio, Baltimore, Maryland. Television development. (NS: 3)

1946-47 Instructor, Department of Physics, Tulane University of Louisiana.

1947-49 Marine Radio Engineering, Self-employed, Hal C. Becker Electronics, Inc., New Orleans, La., Sales, engineering, installation, and maintenance of communications and navigational instruments (NS: 4)

1949-53 Research Electronics Engineer, Department of Psychiatry and Neurology, Tulane University School of Medicine. (NS: 2)

1952-53 Consultant, Medical Physics, Southeast Louisiana State Hospital, Mandeville, La. (NS: 2)

1954-58 Assistant Professor of Experimental Neurology, Tulane University School of Medicine. (NS: 2)

1954-present Vice President, Research and Development, PRECON Process and Equipment Corporation, Research and development in subliminal communication. (NS: 3)

1954-60 Consultant, Premature Infant Center, Charity Hospital of Louisiana at New Orleans.

1959-60 Head, Data Processing Section, Collaborative Child Development Program, Charity Hospital of Louisiana at New Orleans. (NS: 4)

1960-61 Senior Scientist, Department of Clinical Research, Eastern Pennsylvania Psychiatric Institute. (NS: 2)

1961-64 Systems Engineer--Medical, IBM Corporation. Computers in Life Sciences. (NS: 4)

1964-65 Associate Research Scientist, Tulane Computer Center. (NS: 4 to 6)

1962-70 Consultant, Eastern Pennsylvania Psychiatric Institute.

1964-69 Associate Professor of Biomedical Engineering (Radiology), Tulane University School of Medicine.(NS: 4)

1964-73 Director, Radiology Research Laboratories, Tulane University School of Medicine.(NS: 6)

1969-73 Professor of Biomedical Engineering (Radiology), Tulane University School of Medicine. (NS: 6)

1964-70 Lecturer, Department of Psychiatry and Neurology, Tulane University School of Medicine.

1965-73 Visiting Scientist, Department of Diagnostic Radiology, Charity Hospital of Louisiana at New Orleans.

1967-73 Consultant in Biomedical Engineering, Department of Diagnostic Radiology, Charity Hospital of Louisiana at New Orleans.

1969-73 Technology Utilization Consultant at Tulane University, NASA Biomedical Applications Team, Research Triangle Institute, Research Triangle Park, North Carolina.

1973-75 Professor of Biomedical Engineering, Director of Laboratory for Clinical and Behavioral Engineering, Tulane University.

E: PATENTS:

United States Patent No. 2,953,689, Actuating System, 1960

United States Patent No. 3,060,795, Apparatus for Producing Visual Stimulation, 1962

United States Patent No. 3,278,676, Apparatus for Producing Visual and Auditory Stimulation, 1966

United States Patent No. 3,557,371, Method and Apparatus for Calibrating a Cardiac X-Ray Synchronizer, 1971
This patent covered in following countries:
Great Britain, No. 29257/69, 1971
Germany, No. P 1929131.7, 1971
Japan, No. 45117/69, 1971
Canada, No. 053,847, 1971
Switzerland, No. 8726/69, 1971

United States Patent No. 3,626,932, Method and Apparatus for Double Pulse Cardiac X-Ray Synchronizer, 1971
Japan, No. 81480/69, 1969

Germany, No. P 1951232.4, 1969
France, No. P.V. 6934765, 1969
Great Britain, No. 50096/69, 1969
Sweden, No. 13976/69, 1969
Canada, No. 064,487, 1969

United States Patent No. 4,437,360, Apparatus for Controlled Stopper Extraction from and Reinsertion in Sparkling Wine Bottles, 1984.

F. AWARDS:

1951 Grass Trust Fellowship (Summer), Woods Hole, Massachusetts, Marine Biological Laboratory

1953-54 Arthur LeGrand Doty Fellowship, Princeton University

1955 Sigma Xi Award for Research (Master's Thesis)

1963 Outstanding Technical Contribution Award, International Business Machines Corporation, "Digital Computer Retrieval of X-Ray Images"

G. LICENSES AND CERTIFICATES:

1951-present Registered Professional Engineer, State of Louisiana, Reg. No. 3779

1937-present United States Amateur Radio License

1948-present United States Commercial Radiotelephone License, First Class

1976 Certification in Clinical Engineering by AAMI Board

1984 Certification in Clinical Engineering by International Certification Commission

H. PROFESSIONAL SOCIETIES:

Institute of Electrical and Electronics Engineers:
Member of Professional Group on Computers
Member of Professional Group on Engineering in Medicine and Biology (G-EMB)
Organizer and Chairman (1966-67) of New Orleans Chapter of the G-EMB
Member of the Executive Committee of New Orleans Section (1969-70)
Vice Chairman of the New Orleans Section (1970-71)
American Association for the Advancement of Science
Research Society of America
Louisiana Engineering Society
Association for the Advancement of Medical Instrumentation
Member of Advisory Board, Clinical Engineering News

National Society of Professional Engineers
Society of Tulane Engineers
Society for Radiological Engineering
Association for Computing Machinery and its special interest group: Biological Information Organization
Society of Photo-Optical Instrumentation Engineers
Radiological Society of Louisiana
American Association of University Professors
Marine Technology Society
American Society for Oceanography
National Rifle Association
United States Power Squadron

I. HONORS:

Tau Beta Pi, Sigma Pi Sigma, Sigma Xi, Kappa Delta Pi

Listed in American Men of Science, Who's Who in the South and Southwest, Who's Who in America, International Who's Who in Medical Engineering, Men of Achievement

J. PUBLICATIONS:

1. In Books

Becker, H.C., Peacock, S.M., Jr., "Subcortical Stimulation Techniques," Heath, R.G., (ed.), Chapter 12 of Studies in Schizophrenia, (Harvard University Press, Cambridge, Mass., 1954, pp. 201-233.

Becker, H.C., Founds, W.L., Jr., "Improvements in the Technique for Implanting Subcortical Electrodes by a Stereotaxic Method," Heath, R.G., (ed.), Section VI, Addendum D to Studies in Schizophrenia, Harvard University Press, Cambridge, Mass., 1954, pp. 565-570.

Becker, H.C., Peacock, S.M., Jr., "Improvement in the Technique of Electrical Stimulation," Heath, R.G., (ed.), Section VI Addendum D to Studies in Schizophrenia, Harvard University Press, Cambridge, Mass., 1954, p. 571.

Becker, H.C., Peacock, S.M., Jr., Heath, R.G., Mickle, W.A., "Stimulation Control and Electrographic Recording," Sheer, D.E., (ed.), Chapter 8 of Electrical Stimulation of the Brain, University of Texas Press, Austin, Texas, 1961, pp. 74-90.

Meyers, P.H., Moser, P.J., Nice, C.M., Jr., Elder, S.T., Becker, H.C., Meckstroth, G.R., A Programmed Introduction in Differential Diagnosis of Lung Disease, Published by the Department of Radiology, Tulane University School of Medicine, New Orleans, Louisiana, 1964.

2. Papers Published

Becker, H.C., Hodes, R., Founds, W.L., Jr., and Peacock, S.M., Jr., "Application of Autosyns to Multi-Channel Physiological Recording," Proceedings of the Society of Experimental Biology and Medicine, April, 1951, 76:761-763.

Becker, H.C., Founds, W.L, Jr., Peacock, S.M., Jr., Heath, R.G., Llewellyn, R.C., Mickle, W.A., "Roentgenographic Stereotaxic Technique for Implanting and Maintaining Electrodes in the Brain of Man," Journal of EEG and Clinical Neuro-Physiology, August, 1957, 9:3.

Becker, H.C., Mickle, W.A., Heath, R.G., "A Variable Frequency, Variable Selectivity Filter for Electroencephalograph," EEG and Clinical Neuro-Physiology, November, 1958, 10:4, 731-735.

Becker, H.C., "Tulane University-IBM Electroencephalogram Study," IBM Technical Information Exchange, White Plains, New York, August, 1963.

Meyers, P.H., Becker, H.C., Sweeney, J.W., Nice, C.M., Jr., and Nettleton, W.J., Jr., "Evaluation of a Computer Retrieved Radiographic Image," Radiology, August, 1963, 81:2, 201-206.

Nice, C.M., Jr., Becker, H.C., Meyers, P.J., Sweeney, J.W., Nettleton, W.J., Jr.,"Evaluation of a Computer Retrieved Radiographic Image," Proceedings of the 5th IBM Medical Symposium, October, 1963.

Bonner, R.E., Yoder, R.D., Becker, H.C., Schenthal, J.W., Sweeney, J.R., "Pattern recognition of Electroencephalograms," Proceedings of the 5th IBM Medical Symposium in Endicott, New York, October, 1963.

Meyers, P.H., Becker, H.C., Sweeney, J.W., Nice, C.M., Jr., and Nettleton, W.J., Jr., "Evaluation of Computer Reconstructed Radiographic Images," Radiology, February, 1964, 82:303.

Becker, H.C., Okubo, S., "Heart and Rib Cage Dimensions Measured and Cardiothoracic Ratio Determined Automatically by IBM 1410 Computer Analysis of Digital X-Ray Film Images," IBM Technical Information Exchange, White Plains, New York, April, 1964.

Becker, H.C., Nettleton, W.J., Jr., Meyers, P.H., Sweeney, J.W., Nice, C.M., Jr., "Digital Computer Determination of a Medical Diagnostic Index Directly from Chest X-Ray Images," IEEE Transactions on Biomedical Engineering, July, 1964, BME 11:3, 67-72.

Meyers, P.H., Nice, C.M., Jr., Becker, H.C., Nettleton, W.J., Jr., Sweeney, J.W., Meckstroth, G.R., "Automated Computer Analysis of Radiographic Images," Radiology, December, 1964, 83:6, 1029-1034.

Becker, H.C., Meyers, P.H., Nice, C.M., Jr., Meckstroth, G.R., "Automatic Analysis, Processing and Display of Radiographic and Other Images By Means of Digital Computers," Digest of the 6th International Conference on Medical Electronics and Biological Engineering, Tokyo, Japan, August 22-27, 1965, pp. 150-151. Presented to the 6th International Conference on Medical Electronics and Biological Engineering, Tokyo, Japan, August 22-27, 1965.

Becker, H.C., Corrigan, R.E., Elder, S.T., Tallant, J.D., Goldstein, M., "Subliminal Communication: Biological Engineering Considerations," Digest of the 6th International Conference on Medical Electronics and Biological Engineering, Tokyo, Japan, August 22-27, 1965, pp. 452-453. Presented to the 6th International Conference on Medical Electronics and Biological Engineering, Tokyo, Japan, August, 22-27, 1965.

Becker, H.C., Longenecker, H.E., Jr., Cusachs, L.C., "Pictures of Molecular Orbitals," Communications of the ACM, September, 1965, 8:9581-582.

Becker, H.C., "Summary Progress Report and Budget Information: NIH Grant 11619, Computer Analysis of Radiographic Images," Internal report dated May 11, 1965.

Meyers, P.H., Nice, C.M., Jr., Meckstroth, G.R., Becker, H.C., Moser P.J., Goldstein, M., "Pathologic Studies Following Magnetic Control of Metallic Iron Particles in the Lymphatic and Vascular System of Dogs as a Contrast and Isotopic Agent," American Journal of Roentgenology, Radium Therapy and Nuclear Medicine, April, 1966, 96:4:913-921.

Becker, H.C., Meyers, P.H., Nice, C.M., Jr., Goldstein, M., "Cardio-Pulmonary X-Ray Synchronizer with Cathode-Ray Tube Display," Proceedings of the Symposium on Biomedical Engineering, Marquette University, Milwaukee, Wisconsin, June 23-25, 1966, 1:28-31.

Becker, H.C., Elder, S.T., "Can Subliminal Perception Be Useful to the Psychiatrist?" Excerpta Medica, International Congress Series No. 117, Excerpta Medica Foundation, pp. 114-115, Abstract of paper presented to the IV World Congress of Psychiatry, Madrid, Spain, September 5-11, 1966.

Becker, H.C., Meyers, P.H., Nice, C.M., Jr., "Density to Hue Transformation for Medical Radiographs," Abstracts: Second International Biophysics Congress, Vienna, Austria, September 5-9, 1966. Presented to the Second International Biophysics Congress, Vienna, Austria, September 5-9, 1966.

Becker, H.C., Meyers, P.H., Nice, C.M., Jr., "Laser Light Diffraction, Spatial Filtering and Reconstruction of Medical Radiographic Images: Preliminary Results," Conference Record of the 1967 IEEE Region III Meeting, Jackson, Mississippi, April 17-19, 1967.

Becker, H.C., Meyers, P.H., and Nice, C.M., Jr., "Laser Light Diffraction, Spatial Filtering, and Reconstruction of Radiographic Images: Preliminary Results," Digest of the 7th International Conference on Medical and Biological Engineering, Stockholm, Sweden, August, 1967. Presented to the 7th International Conference on Medical and Biological Engineering, Stockholm, Sweden, August, 1967.

Becker, H.C., Meyers, P.H., Nice, C.M., Jr., Goldstein, M., "A New Cardiac X-Ray Synchronizer System with Cathode-Ray Tube Display," Record of the IEEE 1968 Region III Convention, April 22-24, 1968.

Becker, H.C., Meyers, P.H., Nice, C.M., Jr., Goldstein, M., "A New Cardiac X-Ray Synchronizer System with Cathode-Ray Tube Display," The Bulletin of the Tulane University Medical Faculty, May, 1968, 27:2:147-153.

Becker, H.C., Meyers, P.H., Nice, C.M., Jr., "Laser Light Diffraction, Spatial Filtering, and Reconstruction of Medical Radiographic Images: A Pilot Study," IEEE Transactions on Bio-Medical Engineering, July, 1968, BME-15: 186-195.

Becker, H.C., Meyers, P.H., Nice, C.M., Jr., "Laser Light Diffraction, Spatial Filtering and Reconstruction of Medical Radiographic Images: Preliminary Results," Annals of the New York Academy of Sciences, March, 1969, 157:1:465-486.

Gammill, S.L., Krebs, C., Mevers, P.H., Nice, C.M., Jr., Becker, H.C., "Cardiac Measurements in Systole and Diastole," Radiology, January, 1970, 94:1:115-119.

Becker, H.C., Neely, J.H., Gutierrez, R., Neely, D.L., Tallant, J.D., "A New Continuing Education Videotape Learning System and Evaluation Package, Part I," Record of the IEEE 1971 Region III Convention, April, 1971, Charlottesville, Virginia.

Becker, H.C., "Live Therapist Vs. Videotaped Therapist: Weight Control and Maintenance Through Behavior Modification," Doctoral Dissertation, The Graduate School, Tulane University, December, 1974, New Orleans, Louisiana.

Becker, H.C., Edisen, C.B., Edisen, B.S., Leeson, Jr., R.A., Luthringer, W.L.,"Behavioral Engineering: Therapeutic Effectiveness of Videotaped Therapist vs Live Therapist in Behavior Modification Weight Control Course," Proceedings of the 28th Annual Meeting of the ACEMB, September, 1975, New Orleans, La., 421.

PAPERS PRESENTED RECENTLY:

Becker ,H.C., Jewell, J.F., "Subliminal Communication: One Year's Experience Using Videotaped Visual Subliminal Stimuli in a Behavior Modification Weight Control Program," Annual Fall Meeting American Physiological Society, August, 1976, Philadelphia, Pa.

Becker, H.C., Jewell, J.F., "Weight Control Through Behavioral Engineering: One Year's Experience Using Behavior Modification With Videotape Biofeedback and Subliminal Communication," 29th Annual Meeting of the ACEMB, November, 1976, Boston, Mass.

Becker, H.C., Jewell, J.F., "Weight Control Through Behavior Modification Using Videotape Feedback and Subliminal Communication," Annual Meeting of the American Society of Bariatric Physicians, October, 1976, Las Vegas, Nevada.

Becker, H.C., et al, "Video and Audio Signal Monitors/Processors for Subliminal Communication in Weight Control," 12th Annual Meeting of AAMI, March, 1977, San Francisco, California.

Becker, H.C., Jewell, J.F., "Weight Control Through Behavior Modification: Applied Communications Technology," IEEE Region 3 Conference, April, 1977, Williamsburg, Virginia

Becker, H.C., Glanzer, N.H.,"Subliminal Communication: Advances in Audiovisual Engineering Applications for Behavior Therapy and Education," IEEE Region 3 Conference, April, 1978, Atlanta, Georgia.

Becker, H.C., McDonagh, E.W., "Subliminal Communication (Subliminal Psychodynamic Activation) in Rehabilitative and Preventive Medicine," Ninth Annual Conference of Society for Computer Medicine, November, 1979, Atlanta.

Becker, H.C., Charbonnet, K.D., Marino, D.R., Steck, C.G., Warren, E.S., "Applications of Subliminal Video and Audio Stimuli in Therapeutic, Educational, Industrial, and Commercial Settings," presented to Eighth Annual Northeast Bioengineering Conference, M.I.T., March 27-28, 1980, Cambridge, Mass.

K. SCIENTIFIC EXHIBITS:

Heath, R.G., Becker, H.C., Peacock, S.M., Jr., Llewellyn, R.C., Founds, W.L., Jr., Miller, W.H., "Some Aspects of Subcortical Studies in Man," Transactions of the American Neurological Association, 1953.

Becker, H.C., Heath, R.G., "Some Aspects of Stimulus Artifact Elimination in Simultaneous Electrical Stimulation and Recording," Presented to the 8th Annual Meeting of the American Academy of Neurology, St. Louis, Missouri, April 23-28, 1956.

Nice, C.M., Jr., Meyers, P.H., Becker, H.C., Meckstroth, G.R., "Programmed Instruction in Radiology at Tulane University School of Medicine," presented to Radiological Society of North America, Chicago, Illinois, December, 1964.

Becker, H.C., Meyers, P.H., Nice, C.M., Jr., Meckstroth, G.R., "Cardio-pulmonary X-Ray Synchronizer, Model 1," exhibited to the Sixth International Conference on Medical Electronics and Biological Engineering, Tokyo, Japan, August 22-27, 1965.

Becker, H.C., Meyers, P.H., Nice. C.M., Jr., Meckstroth, G.R., "Cardio-pulmonary X-Ray Synchronizer, Model 1" exhibited to XI International Congress of Radiology, Rome, Italy, September 22-28, 1965.

Becker, H.C., Meyers, P.H., Nice, C.M., Jr., Meckstroth, G.R., "Cardio-pulmonary X-Ray Synchronizer--Model 2 (Miniaturized)," exhibited to the Annual Meeting of the Radiological Society of North America, Chicago, Illinois, November 28-December 3, 1965.

Becker, H.C., Edisen, C.B., Edisen, B.S., Leeson, R.A., Jr., Luthringer, W.L., "Behavioral Engineering: Therapeutic Effectiveness of Videotaped Therapist vs Live Therapist in Behavior Modification Weight Control Course," exhibited to the 28th Annual Conference on Engineering in Medicine and Biology, New Orleans, Louisiana, September 20-24, 1975.

Becker, H.C., Jewell, J.F., "Weight Control Through Behavioral Engineering: One-Year's Experience Using Behavior Modification With Videotape Biofeedback and Subliminal Communication," exhibited to the 29th Annual Conference on Engineering in Medicine and Biology, Boston, Massachusetts, November 6-10, 1976.

Becker, H.C., Jewell, J.F., Alito, P.N., "Video and Audio Signal Monitors/Processors for Subliminal Communication in Weight Control," exhibited to the 12th Annual Meeting of the Association for the Advancement of Medical Instrumentation, San Francisco, California, March 13-17, 1977.

Becker, H.C., et al.,"Innovative Technology in Weight Control," exhibited to the New Orleans Dental Conference, New Orleans, Louisiana, September 16, 1978.

Becker, H.C., et al.,"New Subliminal Processors for Therapy, Industry & Education," exhibited to the 33rd Annual Conference on Engineering in Medicine and Biology, Washington, D.C., September 30-October 3, 1980.

Becker, H.C., et al., "Subliminal Communication and Hypnosis," Poster Session Presentation to American Society of Clinical Hypnosis 25th Annual Scientific Meeting, Denver, CO, October 24-30, 1982.

L. LIST OF RESEARCH GRANTS WRITTEN PRINCIPALLY BY H. C. BECKER AND ACTIVATED AT TULANE UNIVERSITY, 1964 THROUGH 1974:

	Approximate Amount (Incl. Direct and Indirect Costs)
"Computer Analysis of Medical Radiographic Images," from NIGMS, for three years.....	$430,000
"Analysis of Radiographs Using Laser Coherent Optics and Other Methods," from the John A. Hartford Foundation, for four years.....	250,000
"Analysis of Radiographs Using Laser Coherent Optics," from the Edward G. Schlieder Educational Foundation, for three years.....	170,000
"Audiovisual Lecture Demonstrations in Radiology and Radiologic Techniques: Via Videotape and Live Productions for Continuing Education of Physicians and Technologists," from the Louisiana Regional Medical Program, for one year.....	27,000
Various "Institutional Faculty Grant-In-Aid of Research" Awards, through Tulane Medical School from NIH, each for one year, totalling approximately.....	17,000
"X-Ray Microtomography of Various Organ Systems," from the National Cancer Institute, for one year	42,000
TOTAL Amount Awarded (1964-1974).....	$936,000

Mr. GLICKMAN. Why don't you do that. Then we will let Mr. Tyler talk and then ask some questions.

Dr. BECKER. May I just say this, please. I am sorry. I have a statement from Dr. McPhilamy and his group saying what he is doing and why he thinks subliminals are going to be very useful in therapeutic substance abuse approach, and from Dr. Budzynski's group in Denver, stating the same kind of thing about his tapes, and from Mr. Larry Connor, who is a security expert and an innovator in anti-shoplifting and theft deterrent schemes.

Mr. GLICKMAN. If you would leave them for the record.

[The information follows:]

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englewood, colorado 80111
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Statement on Applied Subliminal Technology

In response to the request for information for the U.S. House of Representatives Committee on Science and Technology hearing on subliminal communication technology - -

I have been developing subliminal tapes for clinical purposes for seven years. These cassette tapes are used in our clinic to augment such therapy procedures as biofeedback, hypnosis and relaxation training. Moreover, most clients opt to use them at home as well.

Although the data are anecdotal, my strong impression gained from this large group of clients is that subliminal process shortens the duration of therapy required. Clients report feeling more relaxed, confident and in-control after tape usage. These cassettes feature the music of Steven Halpern mixed with a pleasant ocean background. Themes include Pain Relief, Self-Esteem, Coping With Stress, and Relaxation/ Handwarming.

More recently (for the last ten months) we have used a unique subliminal videotape (produced by Videophonic Enterprises) to further enhance therapy progress. The videotape features a beautiful slowly revolving kaleidoscope with a stereo audio track of an ocean sound and the original music of Steven Hering. The subliminal messaging, both audio and video, contains self-esteem, relaxation and self-confidence suggestions. The viewing of this video, even for 5 minutes, produces a feeling of peaceful, safe relaxation. It is used with each client at least once a week.

All clients are informed as to the general content of the tapes before they use them.

In summary, I believe that the use of positive subliminal suggestions can significantly enhance therapeutic progress.

Thomas H. Budzynski, Ph.D
Clinical Director

8/2/84

thomas h. budzynski, phd
richard c. leete, md
kirk e. peffer, phd
william r. saetveit, cpa

To: Dr. Hal C. Becker 8-7-84
From: Dr. Wm. P. McPhilamy

Dr. William P. McPhilamy, Silas Steele, and sons are a group of management consultants who specialize in alcohol, substance abuse, motivation, self-esteem and need fulfillment.

Being in the post-production phase of their seminar, subliminal communication, both audio and video, will be employed to reinforce their already successful methodology, which is based on hundreds of case studies with a recidivism rate of less than 5% over a 2 year period.

It is our belief that some kind of Self-regulatory National Society should be formed by the professionals who are presently involved in responsible uses of Subliminal Communication.

KEEP WATCHING

by
LARRY CONNER

SERIES 2, ISSUE 5 • Subscription fee $65.00

SUBLIMINAL MESSAGES -PART 1

Some years ago, researchers at Tulane University's Laboratory of Clinical and Behavioral Engineering began experimenting with subliminal messages. The messages were played on cassette tapes through the music system of a store at 30 to 40 decibels below the volume of the music and below the conscious level of hearing.

The objective of a subliminal message is to influence behavior. The theory inside the store, calls for a positive reinforcing message to be delivered below the conscious level of hearing on a repetitive basis with the intent to influence a person who has a predisposition toward honesty to refrain from stealing. The use of subliminal stimuli to influence a variety of behavior is not new. During the past 25 years, thousands of universities and research institutions have studied the phenomena of subliminal perception. There are strong indications that this type of communication can reinforce preexisting value systems such as honesty. The unique feature of the research by the people from Tulane was the application of the principle inside a store. Actually 9 large stores were used in the test which lasted 9 months. The researchers used prototype equipment to deliver the subliminal message and at the end of the test reported a 37% reduction in shrinkage.

The results of the test were released to the public but unfortunately the remarkable accomplishment in shrinkage reduction was overshadowed in controversy. The media immediately focused upon mind control and invasion of privacy. The word "subliminal" took on a sinister connotation. This unfortunate introductory episode has retarded the fair and impartial evaluation of the technology as a potentially viable force to prevent stealing in stores. The time has come to begin the long overdue task of evaluating the subliminal approach in a calm and rational manner. Anyone with tenure in the retail business will surely recall the adverse reaction to the introduction of both closed circuit television systems (CCTV) and electronic article surveillance systems (EAS). Only a few years ago there was near unanimous resistance on the part of merchants against electronic surveillance devices. Today these systems are becoming an acceptable method of operation. When it comes to new concepts in store security, the unwillingness of the merchant to repond quickly is exceeded only by the historic ineptness of innovators to establish good, initial communication with both the retailers and the media. We should not, therefore, be surprised that the subliminal concept has been forced to run the gamut of unacceptability.

DETERRING THE THEFT

There are two methods that can be used to deal with stealing inside a store. The first approach is to discourage people from stealing, thereby preventing the theft from occurring. The second method is to catch the person after the theft occurs and then recover the money or merchandise. Both CCTV and EAS are offered to retailers as two-dimensional systems. The primary function is to detect a theft in progress and their secondary function is to act as a deterrent by preventing the theft before it occurs. Subliminal message systems are one-dimensional, focusing entirely on the deterrent approach. Regardless of the system involved, it is always far better to discourage someone from stealing than it is to catch them after the theft. Catching a thief in a store is a time-consuming, expensive event which always carries with it the potential for a hazardous situation or a law suit.

It is, however, easier to evaluate the effectiveness of a system designed to catch thieves. One simply tabulates the number of apprehensions, totals up the dollar value of the merchandise recovered and weighs these factors against the cost of purchasing, maintaining and operating the system. It is, on the other hand, much more difficult to measure the number of times a theft is not committed. This intangiblility also provides those who may have something to benefit with the opportunity to claim they have the potential to deter thefts. In this connection, I have never seen any substantive evidence produced by the CCTV and EAS industries that would convince me their systems actually discourage people from stealing. This same difficulty will exist with any effort to evaluate subliminal message systems.

TRIAL BY INNUENDO

The subliminal message industry claims they have found a feasible solution. It is time to examine these claims and analyze the other aspects of using subliminal systems in retail stores. There are no laws prohibiting the use of subliminal messages in retail establishments. It is not an illegal nor an improper act. Quite the contrary, retailers should be commended for any use of a dignified, positive reinforcing message designed to keep customers and employees from becoming involved in a crime. In addition, it should be noted that the invasion of privacy charges, commonly associated with subliminal messages, have never been founded upon even a single transgression occuring in a store. The resulting public hostility was based upon fiction and we were, quite frankly, exposed to a "scaremonger's dream" that played upon myth and superstition.

The unfortunate part of this scare scenario is that no one challenged the illusion created in the media. No one insisted upon a balance of facts that weighed the potential economic and humanitarian benefits against the alleged fictional abuse. Let us not forget that the subliminal concept was not hatched by some crackpot in a back alley. The technology evolved as a result of respectable researchers reporting what they considered to be factual results. If subliminal messages work, then the operating costs in stores can be substantially reduced which, in turn, will hold down prices. Thousands, perhaps millions, of otherwise honest people and their families may be saved the trauma which accompanies arrest and prosecution. Police departments and courts throughout the country might be relieved of a great burden and this deliverance could surely benefit beleaguered taxpayers.

OVERDUE EVALUATION

Some time ago, I attended a workshop on subliminal messages. I did not leave this session convinced that subliminal messages would do all that the moderator claimed. I left somewhat skeptical but I also left angry because I realized that over the years I had become the victim of a lot of "media hype" which destroyed my objectivity. I have corrected that oversight and I feel the retail community has much to gain by thoroughly examining the subliminal message concept. The retailers equivalent of the quest for the "Golden Fleece" should be the search for all appropriate methods to discourage theft inside the store.

In the next issue I will explain the results of a personally conducted experiment involving a subliminal message. I will point out what I consider to be the strong and weak points of the subliminal approach.

KEEP WATCHING

by
LARRY CONNER

SERIES 2, ISSUE 6 • Subscription fee $65.00

SUBLIMINAL MESSAGES -PART 2

I felt uneasy dealing with a subliminal medium which I could not hear, see, smell, touch or taste. With the help of my son who works in a professional sound studio, I concocted an experiment. I had him prepare 5 audio cassette tapes. Each contained a message telling me that it was important that I get up at a specific hour in the morning. Each tape repeated a message which said, "You must get up tomorrow morning at exactly - 6AM - 6:30AM - 7AM - 7:30AM - or 8:30AM. Each tape was numbered so I could not tell in advance what time the message called for me to arise in the morning. A recorder was set up in my bedroom that would play for exactly 15 minutes and then shut off. The message delivered to me during this time was sent out at 25 decibels below the conscious level of hearing. No matter how hard I tried, or how closely I listened, I could not hear the message.

Over the past 20 years, I have been using my mind as an alarm clock. If I want to get up a certain time in the morning, I just think about it before I go to sleep and I will wake up within a few minutes of the selected time. My system is very accurate although it will foul up occasionally because of medication, exhaustion or a change in time zones. Under normal conditions, however, my system has proven to be very dependable over a prolonged period of time. We decided to challenge this durable system with subliminal messages. We conducted a 5 day test, during which time I set my mental alarm clock for 8AM. Four out of five times, the subliminal message overrode my normally, effective, conscious message to get up at a specific time. On 4 occasions, I did not get up at the 8AM time I consciously selected the night before, but I did awake within 3 minutes of the time called for in the subliminal message. The one failure occurred on the subliminal message that called for me to get up at 8:30AM. On this occasion, my conscious message got me up at 1 minute before 8. This experiment does not prove it is possible to modify the behavior of a potential thief inside a store using a subliminal message. My experience did, however, convince me to proceed with less skepticism and give greater credence to the claims of the proponents of subliminal messages.

DEFINING THE BEHAVIORAL RESPONSE

On the whole, the subliminal industry claims shrinkage reduction success around 30 to 40%. I cannot verify these claims because the stores that use these systems appear determined to avoid all publicity. In addition, the companies that manufacture and market subliminal messages and equipment, also keep secret the exact wording of the subliminal message being delivered at the store level.

This secret approach involving messages must never extend to the participating retailers. No one in store management should ever install a subliminal message system without being fully aware of every word in the message. I was unable to review the exact wording of subliminal messages put out by each company. I was, however, able to examine the methodology of the behavioral approach used by the companies involved. The object is to deliver a reinforcing message through subliminal modality to prevent theft by those employees and customers who have a predisposition for honesty. Based on this concept, professional thieves would not be affected because they have a predisposition to steal. Likewise, kleptomaniacs have a predisposition to steal based on a psychopathological illness. Habitual shoplifters form a compulsion or a predisposition to steal based on repetition. Occasional shoplifters have no predisposition to steal but they are only responsible for 20% of all shoplifted merchandise.

I have been involved in almost all of the research designed to evaluate and influence the behavior of shoplifters. Extensive testing has proven the effectiveness of a number of things designed to transmit an inaudible subliminal message to a shoplifter. There was nothing mysterious about what we did. One example is as simple as a clerk repeatedly staring at a suspected shoplifter. There is no verbal communication, nothing is said, but a message is transmitted and received. This situation will almost invariably deter or abort a theft and it succeeds without regard to any predisposition on the part of a shoplifter. Based on what I have seen, I do not think the proponents of subliminal messages know very much about the behavioral responses of shoplifters inside a store. I also do not have much confidence in the effectiveness of the reinforcing messages presently being used in subliminal systems. I am not disputing the technological capability to transmit an audio message that can be perceived subliminally. In addition, I am not challenging the success stories reported from subliminal use inside stores.

I am, however, drawing two conclusions based on factual research and empiricism. First, I feel that any success attributed to subliminal messages has come from reduced employee theft rather than decreased shoplifting. Second, I believe the subliminal messages presently being used can be modified to conform with the things which we now know influence the behavior of shoplifters inside stores. In this event, a whole new dimension can be added to this deterrent approach.

SUMMARY

I could only find three companies that provide subliminal systems to retail stores. Two of them - Midwest Research and The Viaticus Group use the traditional approach of recording their subliminal messages on a cassette tape and this message is then delivered through the store's sound system simultaneoulsy with music. Contacts with these companies can be made as follows: Midwest Research, Inc., 6515 Highland Rd., Suite 211C, Pontiac, Michigan 48054. The Viaticus Group P.O. Box 8267, Cranston, R.I. 02920.

The third company is called Proactive and its equipment differs from the other companies. This equipment requires no employee monitoring. It uses the existing speakers in a store but it is not tied in with the music which means it operates continuously even though the music is not playing. The subliminal message in this system is produced through electronic chips instead of an audio tape. The manufacturer claims this is more reliable and, in addition, elimates charges that the retailer may have tampered with the message. For information, contact Proactive Systems, Inc. 4000 SE International Way, Building 204, Milwaukie, Oregon 97222.

Mr. GLICKMAN. Mr. Tyler, why don't you go ahead.

Mr. TYLER. Thank you, Mr. Chairman.

Proactive Systems, Inc., is a Portland, OR, based company which manufactures a patented subliminal audio messaging system. The system was patented about a year ago.

Our product is a little different than what was described in the opening remarks. We present an audio subliminal message in a room independent of any carrier. We don't use slides, movies, background music.

We raise and lower the volume of our message adjusted to changes in the noise level in the room. As the noise level gets louder, we get quieter, quieter and quieter, floating the message at near or below threshold level of hearing. That is threshold for somebody with good hearing.

Obviously, threshold levels do change. We produce two types of systems, a subliminal messaging system which does present an audio subliminal message and a verifiable messaging system of which there are now only two installed.

The verifiable messaging system, our new product, presents an audio message which can be heard if you stop to listen to it and cannot be heard if you are not listening for it. It is a subconscious reinforcement device, but not subliminal in the conventional definition, in that it is possible to tell what the message is.

We have been active primarily in the retail theft prevention market over the last 3 years.

The national marketing of this product has been going on since October. We chose the retail market place because we sell the product as really a win-win situation. If it can be used to reduce theft in retail stores, it is preventing customers from being arrested, it is preventing employees from being arrested and fired, and in today's retail market place what we hear from our clients is that reduction in theft, that terrible component that a retailer must bear, about 5 cents on the dollar or $250 for every family, can mean a lowering of prices.

Obviously with the price competition faced, if one store doesn't have to bear the components of theft, 5 percent, sometimes more, they can lower prices to consumers and maintain the same margins, increase market share.

We have been involved in other additional research applications but only in a research mode. We have not offered products for sale in any additional application.

Some of the areas we have been involved in with our product have been basically research studies in the University of Washington on messagings, what works, what doesn't work, what kinds of messages are effective.

There are several systems that we loan. We have also, as Dr. Becker mentioned, we have what we call the first-born male child lease. When we do put a system out on lease, we don't sell them, they have very tight prohibitions on what they can and cannot be used for.

We have loaned systems to the University of Washington, we have loaned systems to a resident treatment school for emotionally disturbed kids used for self-esteem enhancement, we are loaning

systems to a medical center in Portland, OR, for several applications—two of their four cardiac recovery rooms.

They have four ICU's for open heart surgery patients. We are going to do two of those rooms, pending a meeting next week for the final approval, that will work in pain management, trying to reduce pain following open heart surgery.

Mr. GLICKMAN. Tell me about that. What actually happens? You have a couple of patients in there with tubes running through their bodies.

Mr. TYLER. As in all cases where we have the system used for anything other than theft prevention, it is full disclosure. The patient will sign a disclosure statement agreeing to being subjected to the experimental treatment.

There would be a speaker located above the hospital bed with a microphone as well. Somebody visiting the patient would be able to hear the message, they are closer to the speaker.

The patient laying in the bed will not be able to hear it.

The double-blind conditions are a little shaky, in that they can tell the patient that the message is there. It would be a better test if there was no way for the patient to know.

Mr. GLICKMAN. What is the message?

Mr. TYLER. They are working on that now. It will probably be more along the lines of an encouragement message, that they are getting stronger, and they are feeling better.

One of the problems of open heart surgery is depression which follows, and pain is real and pain exists, but your management of it is a variable depending on physical condition and your emotional condition.

What the doctors there are trying to get at is the emotional response to the situation they are in. Also, one of the systems will be in theory installed in a third room, or it won't really be there.

Again, it is kind of a double-blind test. So it is one example of some of the work we are doing.

Mr. GLICKMAN. The patient cannot hear this encouragement audibly?

Mr. TYLER. Right. But someone standing up could. Subliminal messages in audio work on a threshold level.

The closer you are to the speaker, the more likely you will be hearing it. Because someone standing up is 3-feet higher in the air than the patient, they will probably be able to hear it. The patient will not. Sitting up there may be times when they can.

We do have a system placed in a stockbrokers firm, one going into a chemical company, again, with full disclosure, for stress management. We are loaning a system to a hyperactive children program in Oregon, in a medical center. It would be again done under double-blind conditions where the kids would be exposed in their particular room.

Our philosophy on the research has been that this product has a great deal of potential to be of assistance in the medical area, not necessarily with direct medical treatment, but working more with self-esteem enhancement.

At the same time, however, we really don't know a lot about what this potential is beyond theft reduction. In the theft reduction applications we have had now, along with stretching back 2½

years, we have seen theft reductions ranging from nothing in a store that would only measure arrests to a 100 percent in a chain which had very good numbers.

I have problems accepting that. But we normally achieve a 30- to 50-percent reduction in theft.

Mr. GLICKMAN. How many stores have you been able to test this in?

Mr. TYLER. The written testimony is a little outdated. It says 40. We are in about 50 now.

We will have 50 by the end of the month.

Mr. GLICKMAN. Fifty different types of stores?

Mr. TYLER. Department stores, clothing, grocery, drug. Not record stores yet.

Mr. GLICKMAN. Around the country or in certain regions?

Mr. TYLER. Around the country, but mostly on the west coast.

Mr. GLICKMAN. Again, these are audio devices where some sort of audio message is being broadcast—what—at the same time MUZAK is coming out?

[See appendix for clarification.]

Mr. TYLER. It can be at the same time or without it. Our system works independently of background music. You can turn off the music and we are still there. It operates 24 hours a day.

Mr. GLICKMAN. What does the message say?

Mr. TYLER. We have two messages. One for our verifiable system, which anybody can listen to, says "be honest, don't steal, we arrest shoplifters," and we are switching most of them over to that now.

The older message is "I am honest, I do not steal." A very basic simple message. What we are trying to do is get a few words through, "honest" and "don't steal." From our research and the research that has been done for us, we don't believe that sentence works very well in terms of presenting subliminal messages.

We don't believe brief exposures work very well; we don't believe you can make people do things they don't want to do; we don't think we can stop somebody who walks in a store intending to steal.

But someone standing in the store, thinking about stealing, trying to decide whether or not they are going to do it, that we can use it to help push them the other way with a message which maybe makes them a little nervous because of the "don't steal" application or reinforces a sense of honesty.

Mr. GLICKMAN. And again you mentioned the word "verifiable." What do you mean by that?

Mr. TYLER. To us, and I was going to get into that next on our corporate philosophy, we have something patented, we will have it for the next 16 years, that we think has a great deal of benefit to society. Medical uses, educational uses and theft prevention.

At the same time, however, we don't believe really in the secret use of subliminal messages. We will tolerate it for theft prevention, because we think preventing a crime is a different issue. And a lot of things happen for crime prevention that we do tolerate because of it.

But for any other application, we require disclosure that a message is in place. To our way of thinking, it is not good enough to

put a sign on the door saying we are using subliminal messages here to keep you from falling down in a warehouse, for instance.

That the public and the people subjected to the message would be nervous about that, because you have to trust somebody. That for a subliminal message to be marketable and also to answer our own ethical concerns about it, there has to be a way to personally verify what the message is.

So with our verifiable messaging system, you can walk into a store or warehouse or hospital and stand under the speaker and listen for the message and here it. The message is there and it is audible if you decide to focus and pay attention to it.

If you are not focusing, if you are not paying attention to it and standing under the speaker, you are not going to hear it. We are offering the verifiable system for all other applications, for any other applications we require disclosure, and we would hope within a year our theft preventions systems would be verifiable as well.

We have had one installed for 2 months now.

Mr. GLICKMAN. Do you think the technology of this technique is such that you could begin to compel people to do things they don't want to do?

Mr. TYLER. There has never been any evidence that it will do that. The University of Washington has done some things with anxiety levels on measuring how anxious people may be to response of words. Some words can create higher anxiety levels.

All the indications are, no, you cannot use it to make somebody do something they don't want to do. All it can be used for is reinforcement.

We think it is even more basic than that. You cannot get specific with it. It could not be used to sell corn flakes if you wanted to. Perhaps it can be used to make somebody hungry in a grocery store, an application we would not approve of.

We have no evidence of it. If you do continue with this process in looking at subliminal messaging, I would suggest there is tremendous potential here for benefit. What we still don't know really is how effective can it be.

If we are achieving greater than 50-percent reduction and we do that quite often, it is a substantial impact on the retail store, we think it is coming primarily from employee theft and regular customers rather than from somebody who walks in and walks out.

But there is still a great deal to be learned as to how much benefit the system can do in other applications. To continue, we share the concerns about making sure that our product is tamperproof and not abused.

After it leaves our production facility, how do we maintain control of the product? We lease it exclusively. We do not sell. Our messages are on chips, not tape.

The chips are programmed in a proprietary manner by us. Certainly an electric engineer could find a way around the messaging with a great deal of time and money. There is also the self-regulating aspect.

A retail store that tries to make people hungry or sell corn flakes is asking for a great deal of abuse, from the customers, their employees, from the unions, the press and the public. That if we were to find another company involved in those kinds of applica-

tions, the best defense for my company would be to see they were exposed in their uses.

Mr. GLICKMAN. That is true to the extent that you find out about it. That was my question both to the FCC and will be both to you and Dr. Becker.

There is no, so to speak, automatic sensing device to find out whether subliminal techniques are being used in any kind of, like a geiger counter. I assume that if you go up and listen closely and you are experienced in it, you might know.

Maybe there are some techniques you don't know anything about yet.

Mr. TYLER. There are ways to detect our system. We have to build a detection device that if you play it in a store, it will bring our message up to an audible level.

This was actually a week ago. We have been working on it for a long period of time. It had been suggested by one retailer from national department store chain that eventualy not for legal reason but for public relations reasons the retailers may move to a certain fix program through, say, the better business bureau or some other organization that would certify systems on an occasional and random basis on inspection, because, again, there is that issue of secret use of subliminals which we again do not approve of.

But the tradeoff of crime prevention as an example where we do tolerate things that are in the public good to prevent a crime.

For instance, retail stores, they have people that watch the rest rooms, to prevent sexual abuse of children in the rest rooms. It is not something they like to talk about.

But it is something that I support and I am pleased occurs in the stores.

To finish, then, to conclude, we also have the development of a personal unit, a small unit, about the size of a large paperback book, that can sit on your desk and talk to you in a subliminal manner. It is our expectation in the future as we do become more involved in other applications on a nonsecret basis, the personal unit will offer a way somewhat around some of the ethical considerations, in that the individuals himself or herself will control that, say, in the volume levels.

Use in that application, or that method, offers a whole wide range of possibilities for prescription use, subliminal messaging, say, in the treatment of alcoholism for self esteem enhancement after they leave the treatment program.

So down the road there are other future developments of subliminals which can be of great benefit with less controversy as well.

[The prepared statement of Mr. Tyler follows:]

WRITTEN TESTIMONY

DAVID L. TYLER, PRESIDENT

PROACTIVE SYSTEMS, INC.

AUGUST 6, 1984

BIOGRAPHY - DAVID L. TYLER

DAVID TYLER IS CO-FOUNDER AND PRESIDENT OF PROACTIVE SYSTEMS, INC., A PORTLAND, OREGON ELECTRONICS MANUFACTURER. HE IS CO-PATENT HOLDER FOR THE PROACTIVE MESSAGING SYSTEM, A SYSTEM FOR PRESENTING AUDIO SUBLIMINAL MESSAGES.

THE SYSTEM WAS THE TOPIC OF DAVID TYLER'S HONORS COLLEGE THESIS FOR HIS BA FROM THE UNIVERSITY OF OREGON IN JUNE, 1979.

PROACTIVE HISTORY

The Proactive concept is an outgrowth of David L. Tyler's College Thesis. Research began in 1979 through a partnership formed by Mr. Tyler and Rene R. Lundy. Initial systems were installed in late 1981 in a Northwest store chain and showed an indicated reduction in retail theft of 35 percent. In July, 1983, a United States patent was granted covering all circuitry and generic claims.

CURRENT STATUS

Over 40 Messaging Systems are on lease or on order to date. Results in retail shortage reduction average 30 to 50%. Clients include supermarkets, clothing stores, off-price retailers, discount chains, and general merchandise chains. Client size ranges from independent operators to very large multi-state chains.

The Company is conducting development work on future applications of the Proactive technology. A rich base of academic research, including over 2,000 published studies, indicates many additional application areas. Large markets for medical uses such as pain management, weight loss, and alcoholism treatment are anticipated. Other application areas include motivation in education and sales, physical therapy, and stress reduction. All these applications have been tested to some extent.

BUSINESS DESCRIPTION

Proactive Systems, Inc. markets a patented in-store broadcast system for reducing theft in retail stores. The Proactive Messaging System broadcasts Honesty Reinforcement messages at a subliminal level. Customers and employees are deterred from stealing. Results over the last two years show 30 to 80% reductions in theft, and a bottom line savings to retailers of $1,200 to $10,000 per month per store.

Proactive's unique and newly patented method of presenting audio subliminal messages is the most important technical advance in subliminals in 25 years. For the first time, subliminal messaging is effectively taken out of the laboratory for commercial application.

A subliminal message, either visual or audio, is received subconsciously. The subject is not consciously aware that the message has been stored. A message thus received can reinforce existing value systems, beliefs, or intentions. Proactive has confirmed this effect in over two years of theft prevention use, in sponsored medical research, and in sponsored academic studies.

THE PRODUCT

Proactive's technology delivers audio subliminal messages in an entirely new way. The Proactive concept is to adjust the volume level of subliminal messages to changes in ambient noise levels. The Messaging System uses sensor microphones to measure room noise levels (ambient), and adjusts the volume of the subliminal message to the increases and decreases of room noise levels. The message volume "floats" constantly, and remains at a predetermined number of decibels below ambient noise level. The message is delivered continually at the most effective level.

With this technology, an audio subliminal message can be installed in virtually any room. Current installations range from 100 square foot hospital rooms to 65,000 square foot retail stores. Constant and long-term exposure to messages is now achievable without consciously distracting the subject, as in the case of movies, headphones, or music.

Proactive offers two types of Messaging Systems:

SUBLIMINAL MESSAGING SYSTEM

Message volume is set at three to five decibels below conscious hearing threshold for individuals with relatively good hearing. Message volume floats up and down as ambient noise levels in the store change, always remaining just below threshold. The message is entirely undetectable at all times and is never consciously audible.

VERIFIABLE MESSAGING SYSTEM

Typically signs are posted at store entrances announcing the System. In the quietest areas of the store the message is slightly audible to someone standing under a speaker straining to hear the message. This System offers a distinct advantage. The message can be verified directly coming out of a ceiling speaker. Proactive is out of the secrecy business and retailers can be up front about the System.

CORPORATE PHILOSOPHY

Proactive Systems, Inc., has an ongoing policy of ethical restraint in the use of subliminals. As a leader in the introduction of the technology to the marketplace, the burden of fair and ethical dealings is upon us.

The Company's System is designed with a proprietary speech technology on digital chips as opposed to a tape deck. This precludes the change of messages without a large commitment of funds in reverse engineering. Further, Systems are leased only; thus preventing ownership from being transferred to another party.

Finally, Proactive will not install a system without the public's knowledge, unless it is to prevent a crime. The Company anticipates all crime prevention Systems will be non-secret within a year.

USE AND ABUSE OF SUBLIMINALS

After spending four years in development and study it would appear that subliminals are an effective and yet subtle tool. It is not possible to overcome a persons strong desires or goals. Trying to influence specific behavior is impossible. Subliminals may stop a basically honest person from stealing but will not stop a hardened thief. Because of this, Proactive believes the potential for abuse is greatly reduced. The economic and political necessity of self regulation prevents abuse. Retailers and others contemplating changing the message to suit their own whims face the prospect of public outcry, lawsuits and possible governmental intervention.

Responsible, thoughtful expansion of the use of subliminals into new areas has the potential to vastly improve many lives. Proactive has a prototype personal unit suitable for future use on prescription or in therapy.

Subliminal messaging has achieved laboratory success in many areas including:

Alcoholism
Anxiety Reduction
Athletic Performance
Fainting Reduction
Honesty Reinforcement
Job Performance
Learning Improvement
Memory Enhancement
Mental Illness
Motivation
Pain Management
Phobia Treatment
Self-esteem Enhancement
Smoking
Stress
Training
Theft Prevention
Weight Loss

Although over 2,000 studies have been conducted, subliminal perception is still viewed as primarily a laboratory tool. Until recently, the technology had not evolved to allow the use of subliminal techniques in practical applications.

POTENTIAL APPLICATIONS & RESEARCH

The potential applications of the Proactive Messaging System are indeed vast. Because the Proactive System presents audio subliminal messages so unobtrusively, it is suitable for application in any environment, ranging from home to office, hospitals, retail stores, prisons, and even outdoor areas.

TARGETED APPLICATIONS

The Company has identified nine general application areas we believe are the most promising in terms of effectiveness. They are:

1) Theft Prevention
2) Safety
3) Education
4) Stress Management
5) Alcoholism/Substance Abuse
6) Weight Control/Eating Disorders
7) Rehabilitation
8) Motivation
9) Athletic Performance

In the effort to provide a firm foundation for entering these new environments, Proactive Systems, Inc. is engaged in ongoing subliminal research.

The following research projects have been conducted, or are in development:

a) Four studies at the University of Washington on message design.

b) Systems on loan to a resident treatment center for emotionally disturbed adolescents, working with self-esteem enhancement.

c) Systems on loan to a commodities firm, retailer, and a manufacturing company, working with motivation and stress reduction.

d) Research by a clinical psychologist with patients measuring skin resistance response.

e) EEG research with message design in conjunction with epilepsy treatment.

f) System on loan to a cardiac care unit for pain management of open heart surgery patients.

g) System on loan to a medical center research program dealing with hyperactive children.

All testing is done with full disclosure prior to, or following the test.

REGULATORY NEEDS

Proactive has found no reason to believe that subliminals can harm or be made to harm exposed individuals. The company has found no abuse and a generally high level of responsibility in individuals involved in subliminal research. As dictated by these indications, no regulation is currently necessary.

If in future years abuses become apparent, Proactive Systems would take an active role in prohibiting such abuse. The use of signs stating and making public the presence of a subliminal message is a possible regulation the company would suggest at this time.

Unethical use of subliminal messaging would threaten the entire subliminal industry. As an act of self-preservation, as well as maintaining ethical standards, Proactive Systems, Inc., would hasten to report any discovered abuse of subliminal messaging. The subliminal companies make excellent policemen in that abuse by one company threatens all the others.

In conclusion, Proactive Systems, Inc., recognizes the possible concern that subliminals might be used in unethical ways, although we do not believe such use is effective. The company is dedicated to bringing subliminals into public awareness and to applying the technology for the benefit of society.

Mr. GLICKMAN. Let me ask you this question.

First of all, what is the extent of this business, the development of subliminal techniques? Is it a big growing business?

Of course, Dr. Becker, you say you are basically in the process of retiring in some aspects. But is it a growing industry?

Mr. TYLER. There has been—several companies sell subliminal tape systems. Typically they were selling self-hypnosis tapes. Now they carry a line of subliminal tapes, as well.

There is controversy as to whether or not that is an effective delivery method. Other companies involved have been a company which makes a device that plugs into a home computer and runs subliminal works on your TV screen.

Then there is a professor in Rhode Island that has a theft prevention system, I understand he has been marketing to a limited extent. So it is not a great ground swell of increase in marketing of subliminal products other than the tapes which are becoming more and more accepted.

If you walk into a book store you may find a rack of tapes that are by Potentials Unlimited that provide subliminal messages. So there is not a great deal.

Nobody has our technology, which is different than what has been done before, with the adjusting the threshold levels. It allows us to put it in, say, at the hospital without having music along to distract or be irritating.

Mr. GLICKMAN. To set the record straight, self-training tapes are not the same as subliminal tapes.

I mean, tapes—in the old days where you would put on a record and you went to sleep and woke up and you are fluent in Spanish, that is not what you are talking about.

Mr. TYLER. They are subliminal. A white noise generator, you hear the sound of ocean waves, and all you hear is that and the messages are underneath. Conceivably, those tapes could be used in general broadcast, broadcast in this room or another area.

There is some—again, not a whole lot—of research that can be effective unless somebody has it at a high volume perhaps with headphones on. So that is really the greatest use of subliminals today.

Mr. GLICKMAN. Dr. Becker, do you think this is a growing field?

Dr. BECKER. I agree with everything that Mr. Tyler has said. And he is more on top of what is happening right now in the field; 2 years ago I thought I was through with it, except for education training and therapeutic uses.

So I really have made no attempt to keep up with what is going on in the retail and industrial and commercial fields.

Mr. GLICKMAN. If you were a K-Mart store, would you consider this? Let me put it to you like this. Are the statistics pretty good in terms of the reduction of theft in stores where these devices are used?

Mr. TYLER. Most are. We avoided, but we will do a chain that doesn't have good numbers.

The hard part is the retailer can measure what is gone, but they don't know if it is paperwork, if it is employee theft, customer theft, because they track their prices up and down wrong.

So it is a difficult issue. Our numbers are very good from many chains and marginal for others. We have found, though, the chains with the best numbers give us the best results.

They are cleaner. There are a lot of things you can do to get good results—doing three stores, keeping the conditions the same, et cetera, et cetera, to assure we have the good results.

We have seen spotty results in other areas, such as reductions in bad checks and reductions in arrests. But they are spotty, they are not necessarily consistent, and there are reasons for that, too.

The security guard that arrested five people last month is probably going to arrest five people this month.

Mr. GLICKMAN. I want to repeat this question. Are either of you aware of any stores that use subliminal communication system to increase sales?

Dr. BECKER. I am not.

Mr. TYLER. We are not, either. Our systems are locked and inspected every 90 days on a random basis.

Mr. GLICKMAN. Any of your competitors that you mentioned, are they all in the same business that you are, or are you aware of any that might be——

Mr. TYLER. With Dr. Becker's retirement, we really don't have competitors for theft prevention, other than a few people that have some kind of dabbling in it. There are two companies we know of that try and market criminal theft prevention devices.

We get strange requests as well. A New York firm called us about a "vote no" message for a union election coming up. For our company, if we are——

Mr. GLICKMAN. Would you design such a message?

Mr. TYLER. Could we? That says "vote no." It would be easy to do.

Mr. GLICKMAN. Would it be effective?

Mr. TYLER. I don't think you can use it to make people do things they don't want to do. I think it has to be someone on the border line for us to even be effective with honesty reinforcement.

Mr. GLICKMAN. Given that most applications have not decided which way they are going to vote, particularly until the last few days, could you lead those people periodically into making a decision on how to vote because of a subliminal message.

Mr. TYLER. The evidence is unclear. Our belief is that you cannot do it that way. You cannot make people do things specifically either.

They did an experiment, if I recall, where they tried to make people buy turkey sandwiches. This is in a laboratory situation. They had a deli set up. They bought more meat sandwiches, but not more turkey.

In other words, they could not get specific with the message. We agree as well——

Mr. GLICKMAN. Let's say hypothetically that a message was flashed on TV during President Reagan's reelection commercials which said, "If you believe in home, family and motherhood, vote for President Reagan." And you know, that is a pretty general message that does not get to specific points on the nuclear freeze or the budget issues. Would that be a kind of a message that could be used subliminally to get people maybe to do things that they were not otherwise interested in doing?

Mr. TYLER. First, from our research with audio subliminals, they have to be repeated very, very frequently, because it is frequency and repetition that makes it effective. A brief exposure will not do much. There are other researchers that say we are wrong.

It is possible that it could be done if it was appealing to some kind of emotional impact. But I have no expertise in the visual area.

Mr. GLICKMAN. How about in the audio area?

Mr. TYLER. In the audio area, it would be very, very questionable if you are trying to get a lot of things through, you are not trying to get one word through. You could play the word "Reagan" or "Mondale," are you going to have an impact, are they going to make a value judgment on those words.

Again, the answer to the abuse question, there are things that may work. I believe an "I am hungry" message could work in a retail store.

But it is real hard to get specific. It is something that I think should be looked at in terms of what are the limits of this system that we have now that does play constantly. That is what we are looking for now. Find out how much we can do to be of assistance in the medical field.

Mr. GLICKMAN. Are you aware of any research the Defense Department has done in any of these areas?

Mr. TYLER. I am not. I understand that you are.

Dr. BECKER. I am not at liberty to answer that question, I am sorry.

Mr. TYLER. In the press there has been some indication. Mother Jones, some indication it has been done. We have never been contacted.

Mr. GLICKMAN. I had Army folks a couple of years ago give me a little course in something called neurolinguistic programming. But that is not the same thing as subliminal conditioning.

But it has some parallels in certain areas.

Mr. TYLER. For instance, our verifiable system where you hear it in a store. It is similar to turning the bakery fans inside the supermarket instead of outside, where there is a presence there, the smell of fresh bread, wherein you pay attention you can pick it up.

There are lots of things done subjectively to influence people. There has been the talk of print media, subliminals. I am not a big believer in it. I don't think it works.

I think the people that have found some of the things have a real creative imagination. But there have also been some cases where there are really visual subliminals planted in advertisements. I have seen those as well.

They are limited. There are not many real examples of it. Does it work? Real questionable.

Mr. GLICKMAN. How would you feel about regulation of subliminal communication to assure that the public is made aware of its use?

Mr. TYLER. Again, I don't think it should be used secretly except for crime prevention. I don't think it should be used on TV unless there is a way to verify what is there. It is like a closed caption, where you can turn it on and see what it is.

That is a different issue. Because there has been no indication of any injury from subliminals, because of the self-regulatory nature of it, I think, which is the people that use it, I don't see the need now.

But if there is the potential for abuse, evidence of abuse, what we would recommend is legislation requiring signs be posted that subliminals are in use, and therefore there be informed consent they are there.

It is our intention as I said before to even leave the secrecy business on crime prevention. But if it is a very powerful technology, if it can be used for the benefits of society, then in shaping legislation I think the first answer is what will it do, what kind of benefits does this product have that we don't want to have prohibited.

Mr. GLICKMAN. OK. Finally, I want to ask, how many businesses in this country, as far as you are aware, use subliminal communications generally, either for theft reduction—I may be talking about—whatever users, maybe hosts—theft prevention, motivation of employees, whatever purpose.

Mr. TYLER. We have on loan, when we loan a system for research, we charge them a dollar a year, and make them sign all the legal paperwork, we have systems on loan to two, now going to three for stress management.

We are going into two host programs, the one school system we have is out now, the testing is completed there. To our knowledge,

the competitors, if you will, with subliminal audio devices, we know of no one they have sold to. We know people they have made presentations to.

So it is a very limited basis, except for retail theft prevention of our 50 systems I would say—I don't have the exact number—maybe 20 clients, 22 clients, with multiple installations.

Mr. GLICKMAN. OK. Dr. Becker, I understand you have discussed the possibility of audio conditioning someday being as common as air-conditioning. What do you mean by audio conditioning, and is this some type of subliminal pep talk to motivate people?

Dr. BECKER. It could be. When we view systems like that, we always have gotten informed consent. They have never been used in a covert, or as Mr. Tyler calls it, a secret way. And I am sorry, I have lost the thrust of your question.

Mr. GLICKMAN. Some sort of subliminal pep talk?

Dr. BECKER. It is entirely possible. That is what Dr. Budzynski is doing in his 30-minute tape called "Kaleidoscope," principally aimed at corporate executives. It is self esteem and motivation.

I guess you could call that a pep talk. And Dr. McPhilamy has some of that same element in his substance abuse therapeutic cassettes.

Mr. GLICKMAN. OK. I want to thank you both.

Next we will hear from Dr. Howard Shevrin and Dr. Lloyd Silverman.

Dr. Shevrin, you work at my alma mater. I am glad to have you here.

STATEMENTS OF HOWARD SHEVRIN, PH.D., UNIVERSITY HOSPITAL, UNIVERSITY OF MICHIGAN; AND LLOYD H. SILVERMAN, PH.D. RESEARCH PSYCHOLOGIST, NEW YORK VETERANS ADMINISTRATION, NEW YORK REGIONAL OFFICE

Dr. SHEVRIN. Thank you.

Mr. GLICKMAN. I understand, Dr. Silverman, you do not have a written statement.

Dr. SILVERMAN. That is correct.

Mr. GLICKMAN. Why don't you go ahead. Do it informally, if you wish.

Dr. SHEVRIN. Congressional interest in the subject of subliminal perception is both timely and welcome. I am grateful for this opportunity to present to this committee my views on subliminal communication technology. I have been investigating the nature of subliminal perception for the past 30 years.

My research has dealt primarily with the emotional aspects of subliminal perception in the course of which I have demonstrated the existence of certain brain wave correlates of subliminal perception which I will discuss in greater detail later.

In addition to my research, I am a practicing psychotherapist who deals every day with the consequences of emotional disorder. I am, therefore, quite interested in any advances in psychotherapy.

In fact, some of my most recent research is concerned with using subliminal perception as a way to determine the effectiveness of different treatments, not to actually constitute a treatment.

As a scientist, psychotherapist, and private citizen, I am quite concerned with any effort to use subliminal perception as a treatment or as a means to control behavior for commercial or any other purposes. As I will note later, there exist sufficient grounds on which to be concerned about the public welfare in these respects.

Although scientific acceptance of subliminal perception is fairly recent and its principles are far from well established, application of these principles to the treatment of mental disorders and for commercial exploitation have already been made.

In view of these and other potential uses affecting the public, I will conclude my presentation with recommendations for legislative or regulatory consideration. I will first briefly characterize the current status of research in the field.

It has been a field marked by considerable controversy. Early controversy focused on the methodological limitations of these initial studies in a new and untried field; improvements in method followed in the subsequent 30 years.

The original findings, since replicated and supported by improved methods, showed that pictures or words flashed so quickly that the person could not report seeing them, nevertheless registered in the mind unconsciously and influenced consciousness without the person being aware of it.

Such unconscious influences could be detected in dreams, images, hypnotic states, or by subtle changes in the perception of conscious stimuli presented at the same time as the subliminal stimulus. Thus, a neutral face would be seen as angry or happy, depending on whether the word angry or happy had been flashed subliminally at the same time as the neutral face was being displayed.

The evidence also suggested that stimuli were responded to differently depending on whether they were subliminal or consciously perceived [supraliminal]. Subliminal stimuli appeared to undergo various distortions so they would become more unrealistic and less like the original stimulus.

It was as if when outside of awareness the stimulus was treated in a more dream-like way and appeared to be caught up in the person's inner preoccupations and fantasies. These findings are of special significance with respect to various applications of subliminal perception which assume that subliminal stimuli are reacted to as if they were supraliminal stimuli and are perceived realistically. Instead, it would appear that subliminal stimuli are responded to in quite idiosyncratic and private ways.

In more recent scientific research, essentially the scientific interest has broadened and deepened considerably since its early days, and in particularly, cognitive psychologists have been focusing on the problem of selective attention which many consider to be at the heart of all perception, memory, and thinking.

Without the capacity for selective attention, it would be, for example, impossible for me at this moment to organize my thoughts, select appropriate words, and direct my comments to this committee.

Nor would it be possible for you as an auditor to be able to hear what I am saying clearly and make sense of it. Selective attention is a vital mental capacity.

By investigating subliminal perception in conjunction with selective attention, cognitive psychologists have begun to study the nature of the relationship between conscious and unconscious processes, a problem of considerable importance to psychology and in understanding how the mind works, both consciously and unconsciously.

But things can go wrong with selective attention, especially when strong feelings and conflicts enter the picture. And I might adhere parenthetically that I was struck by one of the statements made previously, that the subliminal message is directed to people who may be in some conflict over whether to steal or not.

And I would like that to be borne in mind as I continue.

In my own work, I have shown that stimuli related to a person's emotional conflicts evoke a very different brain response subliminally and supraliminally than stimuli that are not emotionally disturbing for the person. This difference in brain response suggests that stimuli related to pathological emotional conflict produce an inhibition of selective attention for the meanings associated with these stimuli. Selective attention becomes too selective and there are pathological delays in consciousness.

In other words, there is a pathological effect of subliminal messages which tune in to the person's unconscious conflicts.

Mr. GLICKMAN. Could you perhaps give us an example of that?

Dr. SHEVRIN. Yes, let me show you these illustrations, if I may. And then I will explain it as I go along.

What I am going to show you next are really, they look like squiggles, and then I hope in my explanation they will begin to assume some significance to you.

What you have here are the brain responses of a young man suffering from a blood phobia, sufficiently strong so that he presented himself for treatment.

Mr. GLICKMAN. Blood phobia?

Dr. SHEVRIN. Yes. He was fearful of the idea of blood, in all of its various manifestations. Now, what we were able to do on the basis of a thorough clinical examination of this patient was to select out words that he had used in his description of what it felt like when he saw blood.

We then presented these words which actually appear on the left in the upper left there—keep in mind one in particularly, gory picture, which is toward the bottom of the list.

Mr. GLICKMAN. These are all negative words, horrifying, suffer.

Dr. SHEVRIN. Right. They are intended to reflect his experience, his conscious experience of what happens when he sees blood. These words are presented to him both subliminally, which is at the bottom, and supraliminally, which is at the top.

In other words, when the words were flashed supraliminally, they were presented so slowly that he could read off every one. Down below they were presented at a thousandth of a second and he could not see them at all, let alone tell if there was a word there.

Now, you will note—and bear with me as I explain these squiggles—that there is a real striking difference between the brain response up above and down below, that is consciously and subliminally. Namely, that the major effect is found much later.

You notice that the big peak in the upper curve occurs approximately a half a second after the stimulus is presented, which is down in the lower left hand corner of the first curve.

Whereas, when the same stimuli are presented so he could not tell what was being flashed, you start to get rather striking brain responses very early.

Now, other than if you presented the same subject a series of words which although they are unpleasant by most standards are not related to his conflict, you get a very different kind of brain response, both subliminally and supraliminally.

And let me show you that next. You will notice that the upper curve now, these are ordinary unpleasant words, not related to the patient's conflict now, that is his difficulty with the blood, and you will notice there is a very big response present supraliminally rather early.

Subliminally there is very little difference between these ordinary unpleasant words and the conflict related words. Now, if I were simply to superimpose the two curves that you have just seen, you will be able to see the difference I am talking about.

You will notice now that the big peak that occurs early on is the brain response to the ordinary unpleasant words, and that is much bigger than any response that occurs in the conflict related words.

It is only later on that the conflict related words related to the blood phobia show a striking increase in brain response.

In other words, we are interpreting this to mean that when you present words that are pathologically related to an individual's emotional difficulties, that the brain responds differently, when they are supraliminally, that he is presented consciously, and when they are presented subliminally or unconsciously.

I think we can turn that off. Thank you.

I would be happy to entertain a question or two, if this is not clear at this point.

Mr. GLICKMAN. You said you had some legislative recommendations.

Dr. SHEVRIN. Yes. I do have a few things that I would like to call to the attention of the committee.

Let me bring some of these comments to a close by referring to an important piece of Russian research which may not be too well known in this country, which is also demonstrated that emotionally loaded words presented subliminally result in distinctive brain responses.

Now, I stress this emotionally loaded for several reasons, both in terms of its significance with respect to treatment, and also with respect to the comments made earlier that indeed the shoplifter, the person who is in conflict over shoplifting is the one who will be affected by the message, not the professional thief or the person who has no conflict over it.

This is what I understood to be the gist of Mr. Tyler's comments.

This work by Kostandov and Arzumanov, 1977 is of special interest because it was conducted with people who had been accused of having committed violent crimes. These Russian investigators were able to show that words selected so that they related to details or crime only known to the alleged criminal evoked a different pattern of brain response when presented subliminally as compared to

supraliminally; this was not found to be the case for emotionally neutral words.

I might note at this point that when I spoke personally to Kostandov at a conference in Russia in 1979, he assured me that his subjects were all volunteers and had been guaranteed that any information obtained in the course of the experiments would not be used against them.

Let me pick this point up at a later pont now, as I am pressed for time.

I come to a final point, which in my judgment is of the greatest potential importance. My own brain research and that in particular of the Russian investigator Kostandov point directly to the potential use of subliminal stimulation as a lie detector test far more powerful than ones currently in use.

By using brain waves which occur within milliseconds of the stimulus presentation, there is very little time in which efforts at dissimulation or the continuing effects of general stress can influence the course of the response. Although Kostandov assured me in 1979 that his subjects were protected from police use of his findings, for how long can that guarantee last in a police state? But we, too, may shortly be confronted by the same problem: The use of brainwaves to reveal information customarily protected by the utmost privacy of one's inner thoughts.

Although this may sound like science fiction, we may be on the threshold of invading the individual's last stronghold of personal privacy—his own inner thoughts, and this is 1984.

Research is already under way aimed at breaking the electrophysiological code for language so that in time it may be possible to read off a person's thoughts from the pattern of brain waves picked up at the scalp, Chapman, et al, 1977, Chapman, et al, 1980. We already know from our research that emotionally meaningful words have different brain patterns; others have shown that verbs and nouns regardless of language have different brain patterns and furthermore that there are different brain patterns for true and false statements. So the horizon is opening up as far as basic research is concerned in the relationship between brain wave patterns and thought both subliminal and superliminal.

If we have witnessed considerable amount of application of some of the weaker findings from subliminal research over the past two or three decades, I hesitate to think what future applications might be if these kinds of findings are further advanced and I would assume as in all scientific fields that they will be advanced. It is only a matter of time.

I am quite concerned that findings of this sort, which are of fundamental scientific importance and which can ultimately be used to benefit mankind, could in the wrong hands be used for invasive and manipulative purposes. Let me say before continuing with some recommendations concerning the use of subliminal messages in treatment, of course under those circumstances the individual presumably has given consent and, therefore, there isn't the same ethical constraint as in the failure to disclose the message.

However, as a psychotherapist and as someone concerned with not simply quotes changing or manipulating behavior, but in helping the individual to increase his mastery of his own self and what

is wrong with him, I consider that approach to be ultimately self-defeating insofar as it would tend to be substituted for much more thorough going ways of producing change that would be in my judgment longer lasting.

Finally, let me close with several recommendations for the committee to consider. First, that basic research into the nature and power of subliminal stimulation be more fully supported than at present so that we can learn more about this important scientific area. I would stress that it is along with many more problems a matter of fundamental scientific importance, certainly in the social sciences and psychology.

Two, that both legislative and regulatory action be considered that would undertake to control (a) the commercial misuse of subliminal messages which may be detrimental to the public and is certainly unethical, and I failed to comment on one point that I consider to be important in this respect, that there is no way of knowing to be sure that a subliminal message piped through the Muzak or any other method may indeed not have a harmful effect, noxious effect, especially if it hits a person in the midst of some conflict of which he may for example not be fully aware.

No one will know what the effects are least of all the person so affected. But I would like to suggest that some of my own research would strongly indicate that indeed people in conflict, emotional conflict over some action that they would have in mind, like shop lifting, even though they not end up shop lifting may indeed be adversely affected by such stimuli, regardless of whether they acted or did not act. We have no way now of assessing that but I think it is a matter that should be kept in mind aside from the issue of privacy.

Second, the potential exploitation of subliminal perception and correlated brain waves for invasive and manipulative purposes.

Lastly, and this is the gist of what I would like to emphasize in presenting this to you, that in order to provide time for legislative and regulatory consideration of these complex scientific, legal and moral issues, that a moratorium of some sort be established for a number of years for all applications and commercializations of subliminal perception and that basic research be encouraged during this moratorium so that a scientific foundation would be provided for enlightened legislative and regulatory action.

I really would like to express my thanks to you, Mr. Chairman, for this opportunity to present my views on this important matter.

I took note of the fact today, I believe today is the anniversary of the dropping of the first bomb on Hiroshima which I visited not too long ago actually, and, well, there was a series of scientific discoveries into the nature of the atom which resulted in that first bomb being dropped and we still are trying to get that horrifying genie back into the bottle.

And I don't wish to exaggerate this but I think that the success with which brain wave research as I have tried to describe it to you today is meeting even in its infancy that there may be another genie in the bottle we better be very careful about letting out.

[The prepared statement of Dr. Shevrin follows:]

Subliminal Perception and Subliminal Communication Technology

Report prepared for Invited Testimony
before

Science and Technology Subcommittee on
Transportation, Aviation and Materials

August 6, 1984

Howard Shevrin, Ph.D.
University of Michigan

Congressional interest in the subject of subliminal perception is both timely and welcome. I am grateful for this opportunity to present to this Committee my views on Subliminal Communication Technology. I have been investigating the nature of subliminal perception for the past 30 years. My first study in the field was published in 1956; the most recent presentation of my research was this past July at a conference sponsored by the MacArthur Foundation on Emotional and Cognitive Factors in Unconscious Processes which took place at the Center for Advanced Study of the Behavioral Sciences at Stanford. This conference was attended by a number of people engaged in the study of subliminal perception. Currently I am a Professor of Psychology in the Departments of Psychiatry and Psychology at the University of Michigan. I am also Director of the Department of Psychiatry Psychotherapy Evaluation and Treatment Laboratory in which I continue to pursue research on subliminal perception. My research has dealt primarily with the emotional aspects of subliminal perception in the course of which I have demonstrated the existence of certain brain wave correlates of subliminal perception which I will discuss in greater detail later. In addition to my research, I am a

practicing psychotherapist who deals every day with the consequences of emotional disorder. I am therefore quite interested in any advances in psychotherapy. In fact, some of my most recent research is concerned with using subliminal perception as a way to determine the effectiveness of different treatments. As a scientist, psychotherapist, and private citizen, I am quite concerned with any effort to use subliminal perception as a treatment or as a means to control behavior for commercial or any other purposes. As I will note later, there exist sufficient grounds on which to be concerned about the public welfare in these respects.

Ever since its first investigation at the turn of the century in Germany (Urbantschitsch, 1907) and its further pursuit in Austria during World War I (Pötzl, 1917) subliminal perception has been dogged by scientific skepticism and controversy (see Fisher, 1960, for a review of this early work). It has only been in recent years that the phenomenon of subliminal perception has achieved fairly broad recognition within psychology and has been established as a bonafide area of research having significant contributions to make to our understanding of how the mind works in normal and abnormal states (Shevrin and Dickman, 1980). A recent thorough review of the literature (Dixon, 1981) has amply demonstrated that the phenomenon as such does indeed exist. Scientific controversy now extends to understanding how it works, what it tells us about the relationship between conscious and unconscious psychological processes, and its role in abnormal phenomena. Although scientific acceptance of subliminal perception is fairly recent and its principles

are far from well established, application of these principles to the treatment of mental disorders and for commercial exploitation have already been made. In view of these and other potential uses affecting the public, I will conclude my presentation with recommendations for legislative or regulatory consideration. I will first briefly characterize the current status of work in the field.

Current Status of Research

What do we mean by subliminal perception? Whenever a known stimulus (usually visual or auditory) is presented in such a way so that an individual can not consciously report its presence while revealing indirectly some knowledge of the nature of the stimulus, we can consider that subliminal perception has occurred. Subliminal perception was pioneered by a small group of psychologists and psychoanalytic investigators beginning in the 1950's. Several important research centers were primarily involved: Mt. Sinai Hospital of New York (Fisher, 1954, 1956), the Mental Health Research Center of New York University (Klein, 1956, 1959), and the Menninger Foundation in Topeka, Kansas (Luborsky and Shevrin, 1956; Shevrin and Luborsky, 1958). Interest at that time was narrowly limited to using the technique of subliminal perception to establish that mental processes existed outside of consciousness and could influence consciousness without the person being aware of it. Early controversy focused on the methodological limitations of these initial studies in a new and untried field; improvements in method followed in the subsequent thirty years. The

original findings, since replicated and supported by improved methods, showed that pictures or words flashed so quickly that the person could not report seeing them, nevertheless registered in the mind unconsciously and influenced consciousness without the person being aware of it. Such unconscious influences could be detected in dreams, images, hypnotic states, or by subtle changes in the perception of conscious stimuli presented at the same time as the subliminal stimulus. Thus, a neutral face would be seen as angry or happy, depending on whether the word angry or happy had been flashed subliminally at the same time as the neutral face was being displayed.* The evidence also suggested that stimuli were responded to differently depending on whether they were subliminal or consciously perceived (supraliminal). Subliminal stimuli appeared to undergo various distortions so they would become more unrealistic and less like the original stimulus. It was as if when outside of awareness the stimulus was treated in a more dream-like way and appeared to be caught up in the person's inner preoccupations and fantasies. These findings are of special significance with respect to various applications of subliminal perception which assume that subliminal stimuli are reacted to as if they were supraliminal stimuli and are perceived realistically. Instead, it would appear that subliminal stimuli are responded to in quite idiosyncratic and private ways.

Following these early studies containing methodological flaws and maintaining a relatively narrow focus, in recent years scientific

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* Findings of this kind were usually based on quite small experimental effects and were often difficult to replicate; very likely this difficulty is the result of great individual differences in subliminal effects.

interest in subliminal perception has broadened and deepened consideraly. In particular, the method has gained acceptance as a way of understanding certain classical problems in psychology such as selective attention which is at the heart of all perception, memory and thinking (Shevrin and Dickman, 1980). Without the capacity for selective attention it would, for example, be impossible for me at this moment to organize my thoughts, select appropriate words, and direct my comments to this Committee; nor would it be possible for you as auditors to be able to hear what I am saying clearly and make sense of it. Selective attention is a vital mental capacity. We become aware of its value when we suffer for whatever reason from distraction or anxiety. Subliminal perception research tells us that the stimuli being heard or seen under conditions of distraction or anxiety have in fact registered, although we may not become aware fully of what has registered. Our minds are always open to much more input from outside or inside us than we become aware of at any given moment; otherwise we could not function in a coherent, organized, task-oriented fashion. Subliminal perception has a direct bearing on how selective attention works. Selective attention is the gatekeeper organizing and directing the flow of subliminal registrations into consciousness. By investigating subliminal perception and selective attention, cognitive psychologists have begun to study the nature of the relationship between conscious and unconscious processes.

One interesting finding has emerged: When stimuli enter and remain subliminal (unconscious), they are more likely to be coded in many

different ways simultaneously as if the stimuli enter into a number of different filing systems at the same time; once the stimulus enters consciousness only one such code or file is available, usually determined by the task or interest prevailing at the time. We can shift our attention to other codes, or meanings, as they become relevant and they are readily available because they have already registered subliminally. We can see that subliminal perception is a remarkably valuable adaptive capacity because with it we can maintain a great deal of information on tap without being overwhelmed by it.

But things can go wrong with this nicely adaptive system, especially when strong feelings and conflicts enter the picture. In my own work, I have shown that stimuli related to a person's emotional conflicts evoke a very different brain response subliminally and supraliminally than stimuli that are not emotionally disturbing for the person. This difference in brain response suggests that stimuli related to pathological emotional conflict produce an inhibition of selective attention for the meanings associated with these stimuli. Selective attention becomes too selective and there are pathological delays in consciousness. In Fig. 1 you can see the brain waves from a young man suffering from a blood phobia. The upper wave was obtained when he was being shown words supraliminally which had been used by him previously to describe his phobia; the bottom wave was obtained when the same words were flashed at 1/1000th of a second subliminally so that he could not see them. You will note that there is much more early activity subliminally than supraliminally. On the other hand, in Fig. 2 are shown the brain waves obtained when

ordinary unpleasant words, not related to his phobia, were shown to him. You will note that there is quite a quick response supraliminally--no delay as with the pathological phobic words. The same phobic words have no such effect on the subject who does not suffer from the same phobia and emotional conflict (see Fig. 3). I stress this finding in order to show that subliminal stimuli must be quite specific for the particular individual; they must have meaning of a quite personal and idiosyncratic sort in order for these effects to be demonstrated. There do not appear to be any generally pathological words which would work for everybody. This finding would fit with what I mentioned before about the distortions effecting subliminal stimuli found in earlier research. Subliminal inputs are apparently experienced in highly personal, private and idiosyncratic ways related to the quite concrete details of the individual's history. The stimulus 'gory pictures' means something quite different to this particular blood phobia patient than it would to a normal person; and in fact, 'gory pictures' may mean something entirely different to two different blood phobia patients. One would have to know each person's particular history and the unique nature of his experience.

I will close this brief review of current research by citing an important piece of Russian work which has also demonstrated that emotionally loaded words presented subliminally result in distinctive brain responses. This work by Kostandov and Arzumanov (1977) is of special interest because it was conducted with people who had been accused of having committed violent crimes. These Russian investigators were able to show that words selected so that they related to details

of the crime only known to the alleged criminal evoked a different pattern of brain response when presented subliminally as compared to supraliminally; this was not found to be the case for emotionally neutral words. I might note at this point that when I spoke personally to Kostandov at a conference in Russia in 1979, he assured me that his subjects were all volunteers and had been guaranteed that any information obtained in the course of the experiments would not be used against them. To my knowledge, Kostandov has an excellent reputation as a scientist and I have no reason to doubt his word. I will return to the special problems posed by this Russian research and my own research on brain response correlates of subliminal perception. Let me now comment on the treatment applications of subliminal perception.

Treatment Applications

First, I would stress that basic psychological research on subliminal perception is in its infancy. For a time we did not know if we had a viable baby, but we now know that we do; but this baby is still quite young and we do not know much about it. To a degree, controversy still exists concerning the exact nature of subliminality and in particular, how powerful its effects are. Some investigators (Klein and Holt, 1960) believe that a subliminal stimulus can only influence an already ongoing psychological process but is too weak to initiate a process itself. There is much evidence to support this contention. I mention this point because various treatment applications of subliminality assume that a subliminal message can not only initiate a process of its own, but can in addition reverse a strong, ongoing,

habitual process. For example, when a subliminal message is introduced to help a person lose weight or stop smoking, it must itself be strong enough to register in its own right and then go on to halt a strong habitual act. To my knowledge, the evidence is weak at best in support of this contention. Some recent research, for example, suggests that lengthy verbal messages often used in such studies have complex and confounded subliminal effects (Spence, 1984). A lengthy verbal message extends across the entire visual field so that part of the message goes to the right brain and part to the left brain. Spence has found that the left and right brains handle subliminal messages quite differently. The right brain cannot combine words into sentences; it can only register individual words. If these findings are correct, it would mean that the part of a lengthy message which goes to the right brain cannot be understood as intended. If, for example, the lengthy message was 'I must stop overeating,' the words 'I must'--which would go to the right brain because it was presented in the left visual field and crosses over--will not be understood as a verb-noun sequence but will simply be understood as two separate, unrelated words. Thus, Spence's research suggests strongly that complex subliminal verbal messages cannot be understood as intended. This is another finding supporting the hypothesis that subliminal messages are not understood or processed in the same way as supraliminal messages.

Moreover, good sound clinical practice requires that a person with a substantial problem with overweight, for example, should be treated as having a potential emotional and/or physical disorder. A thorough

examination should be conducted and a treatment program developed based on the total findings. Unfortunately, it is not uncommon to find subliminal tapes sold through the mail or only a perfunctory examination conducted prior to subliminal treatment. Although it is doubtful that the subliminal message can do much harm, if it is taken in place of a proper examination and overall treatment planning, the patient may still be victimized. In my judgment, the clinical value of corrective subliminal messages is far from established and they may indirectly harm the patient by replacing a thorough examination and more effective treatments.

Commercial Applications

Both treatment applications and recent efforts to exploit the commercial possibilities of subliminal stimulation assume that a person's motives and behavior can be influenced, not simply his perception, thought or mood. A subliminal message to stop eating is expected to change the patient's motivation to eat to excess as well as his behavior; or as a result of a subliminal message in the Musak of a department store, he is expected to change his motivation to shoplift and his shoplifting behavior. To my knowledge, there is no substantial evidence that a subliminal stimulus can effect motivation resulting in a change in behavior important to the individual. Aside from this failure to demonstrate effectiveness, there is an even more important question of ethics: Should people be exposed without their knowledge to a message intended to influence their minds and their behavior? My answer is a resounding no. Moreover, if the advocates and

beneficaries of this commercial application believe that subliminal messages are powerful enough to control one kind of behavior, why might it not have unwitting effects on other people exposed to the message? I have remarked earlier that evidence suggests that subliminal stimuli enter into the operations of the mind in highly individual and private ways. In and off itself, this finding would argue against the efficacy of the same message having the same effect on all people. But let us assume that an effect of the kind supposed occurs, might not then this powerful subliminal message adversely affect others who do not intend to shoplift? Might it not trigger intense guilt in someone who harbors the wish or fantasy to be a shoplifter but has never done so or would never commit such an act? Might it not push someone over the brink of his emotional tolerance and produce symptoms? Although I do not believe that these subliminal messages work at all, if they do work as its advocates believe, then they would be powerful enough to change other behaviors in unexpected ways. On both scientific and moral grounds, I believe that Congress ought to look carefully into the possible dangerous effects on the public of subliminal messages employed to change behavior without the individual's consent.

I come to my final point, which in my judgment is of the greatest potential important. My own brain wave research and that in particular of the Russian investigator Kostandov, point directly to the potential use of subliminal stimulation as a lie detector test far more powerful than ones currently in use. By using brain waves which occur within

milliseconds of the stimulus presentation, there is very little time in which efforts at dissimulation or the continuing effects of general stress can influence the course of the response. Although Kostandov assured me in 1979 that his subjects were protected from police use of his findings, for how long can that guarantee last in a police state? But we too may shortly be confronted by the same problem: The use of brain waves to reveal information customarily protected by the utmost privacy of one's inner thoughts. Although this may sound like science fiction, we may be on the threshold of invading the individual's last stronghold of personal privacy--his own inner thoughts. Research is already underway aimed at breaking the electrophysiological code for language so that in time it may be possible to read off a person's thoughts from the pattern of brain waves picked up at the scalp (Chapman, et al, 1977; Chapman, et al, 1980). We already know from our research that emotionally meaningful words have different brain patterns; others have shown that verbs and nouns regardless of language have different brain patterns (Brown and Lehmann, 1979) and that there are different brain patterns for true and false statements (Childers, et al, 1982). I am quite concerned that findings of this sort, which are of fundamental scientific importance and which can ultimately be used to benefit mankind, could in the wrong hands be used for invasive and manipulative purposes.

I would urgently recommend the following:

1) That basic research into the nature and power of subliminal stimulation be more fully supported than at present so that we can learn more about this important scientific area.
2) That both legislative and regulatory action be considered that would undertake to control (a) the commerical misuse

of subliminal messages which may be detrimental to the public and is certainly unethical, (b) the potential exploitation of subliminal perception and correlated brain waves for invasive and manipulative purposes.

3) That in order to provide time for legislative and regulatory consideration of these complex scientific, legal and moral illues, that a moratorium be established for a number of years for all applications and commercializations of subliminal perception and that basic research be encouraged during this moratorium so that a scientific foundation would be provided for enlightened legislative and regulatory action.

Thank you, Mr. Chairman, for this opportunity to present my views on this important matter.

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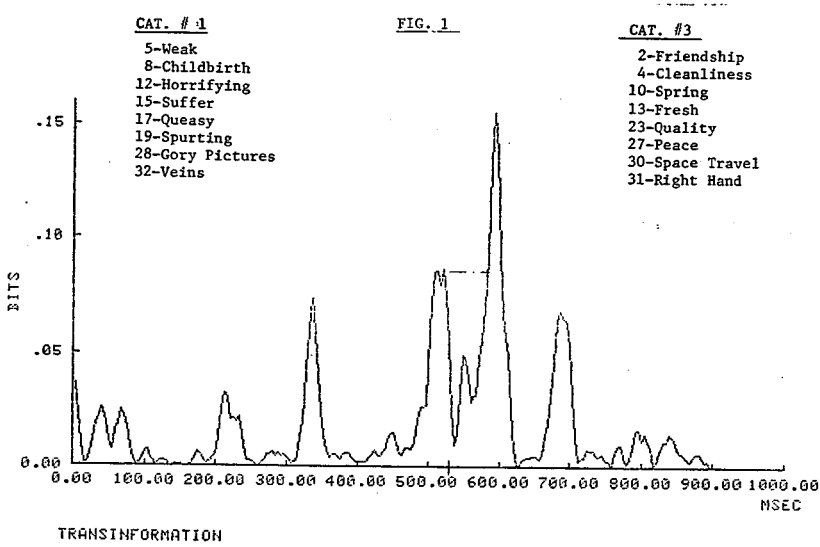
CAT. # 1
5-Weak
8-Childbirth
12-Horrifying
15-Suffer
17-Queasy
19-Spurting
28-Gory Pictures
32-Veins
FIG. 1
CAT. #3
2-Friendship
4-Cleanliness
10-Spring
13-Fresh
23-Quality
27-Peace
30-Space Travel
31-Right Hand
.15
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BITS
0.00 100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 900.00 1000.00
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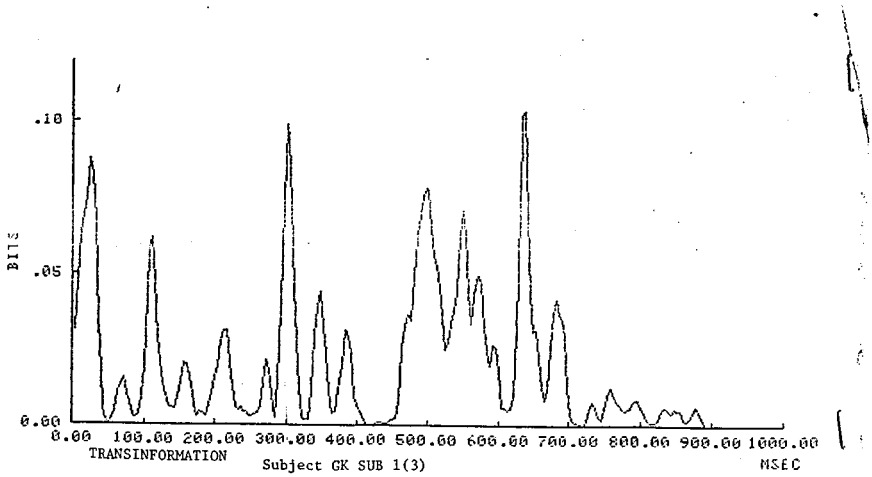
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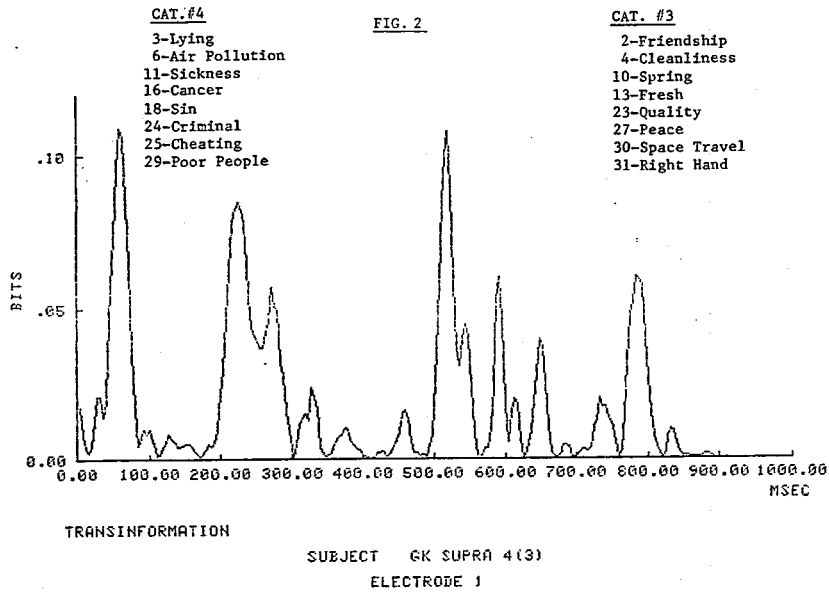
FIG. 2


CAT. #4
3-Lying
6-Air Pollution
11-Sickness
16-Cancer
18-Sin
24-Criminal
25-Cheating
29-Poor People
CAT. #3
2-Friendship
4-Cleanliness
10-Spring
13-Fresh
23-Quality
27-Peace
30-Space Travel
31-Right Hand
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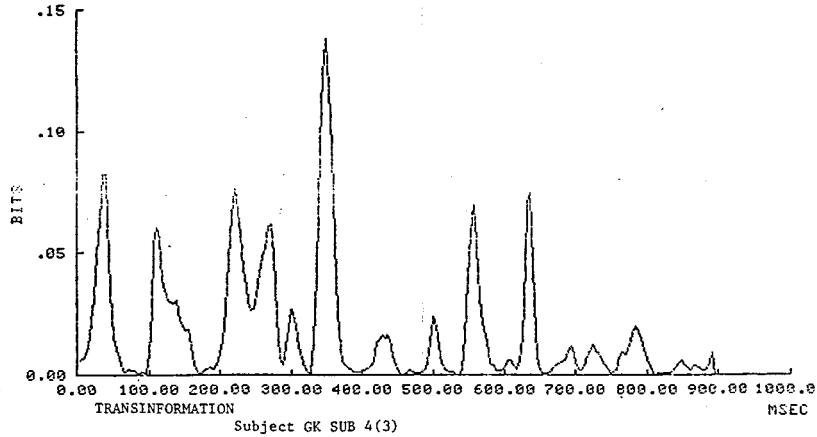
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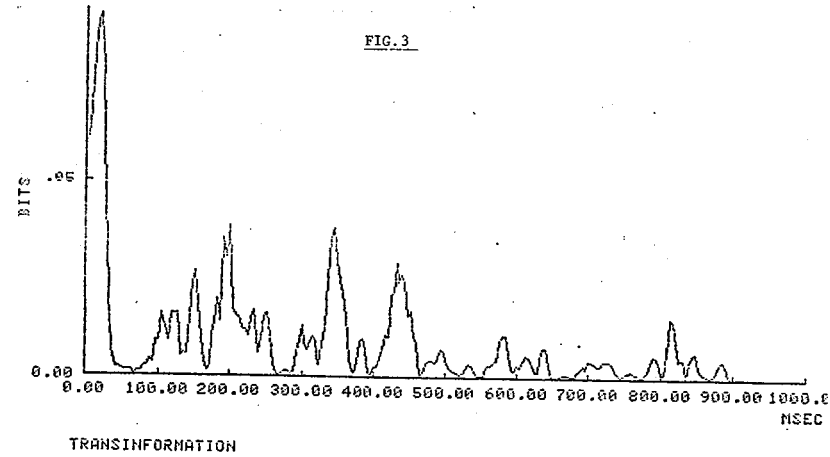
FIG. 3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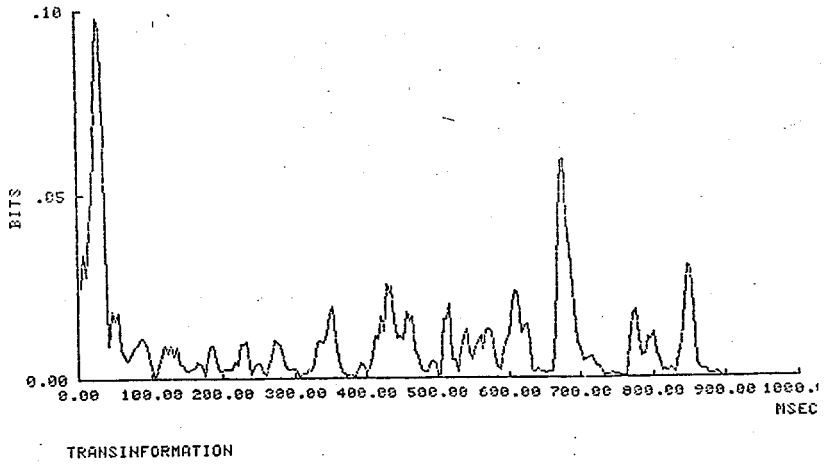
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TRANSINFORMATION

Mr. GLICKMAN. Thank you for an excellent statement.

Dr. Silverman.

Dr. SILVERMAN. Thank you, I would like to thank the committee for inviting me. For the past 20 years I have been in research in the subliminal communication technology area at the New York University and at the New York Veterans Administration.

I have had a double reaction today, one of excitement at some of the potential uses of subliminal perception, subliminal communication, that Mr. Tyler and Dr. Shevrin have mentioned; but also, I share very much Dr. Shevrin's concern. I think there are great potential dangers and I think that the committee is well advised to look at these.

Let me just briefly describe some of my own work that will broaden a bit the potential uses of subliminal communication for scientific purposes.

For a long time research in the subliminal area was concerned with simply testing whether subliminal phenomena existed. And at this point, I think it is fair to say that any reasonable review of the literature over the past 30 or so years would convince an unbiased observer that this is a real phenomenon. There is a book by Norman Dixon called "Preconscious Processing" in which he in a very scholarly way reviews the evidence and draws the same conclusion that I just did.

My particular interest in researching subliminal communication is in part to study its potential for understanding how the mind works, particularly the part of the mind that has been referred to as the Freudian unconscious. There have been a great many studies during the past 20 years that have demonstrated that many psychoanalytical ideas about psychopathology are indeed valid.

For instance, there was a study recently that demonstrated that people who are prone to depression could first be subclassified as having depressions that were either related to guilt or related to ideas of loss and then people in each group were subjected to subliminal stimuli that were designed to stir up either loss-related ideas or guilt-related ideas.

The loss-related idea, for example, was the sentence "I have lost mommy." The guilt-related idea was the sentence "I have been bad."

And low and behold, those who had first been classified as having guilt-related depressions responded to the idea, "I have been bad," by becoming more depressed; they on the other hand were unresponsive to the idea to the sentence "I have lost mommy," while those who had been preclassified as having loss-related depressions responded in the opposite way.

In other words, the experiment demonstrated quite clearly with double blind controls being used—that is with neither the people receiving the messages or those giving them knowing at the time just what the messages were—with these double blind controls where one was able to demonstrate that there are indeed people whose depressions are related to ideas of loss and other people whose depressions are related to ideas of guilt.

I should mention that when studies of this sort are conducted they are always conducted with informed consent beforehand and immediately after, the people are told what the messages are. And

that we have found will obviate negative effects that otherwise could occur.

Once subliminal stimuli are presented on a one exposure basis, typically they don't have long lasting effects but there are individual cases where they do. Therefore, this sort of debriefing where people are told what the stimuli are becomes very important.

The other area in which my research has taken me is to use messages that have been designed to facilitate behavior change where people want to change their behavior. In contrast to the messages that Dr. Becker and Mr. Tyler have told you about that I would call suggested messages, the messages that we use are designed to tap into what we call unconscious fantasies and very possibly unconscious memory traces. There are certainly unconscious ideas that people hold, which if stimulated, can have a facilitating effect on changing their behavior.

The particular message that has been found to do this most often happens to be the phrase "Mommy and I are one." If that message is presented subliminally for large numbers of people—though certainly not for all—it can facilitate the behavior change that the person is interested in making.

Recently, for example, there was a study conducted in Montana, the University of Montana, in which people who were interested in giving up smoking were given a behavior modification program for doing this and this was accompanied by subliminal stimulation. Half of the people who received the program received the message "Mommy and I are one," and the other half received a control stimulus, the sentence, "People are walking."

A month after the program ended, 13 percent of the people who had received the message "People are walking" were still abstaining from cigarette smoking which the program itself brought about, but only 13 percent were able to sustain this gain after a month's time while 67 percent of those who got the message "Mommy and I are one" were still abstainers. These were pretty striking results.

This is in the way of kind of broadening the area in which one could look at subliminal stimulation in a positive way, though I would agree with Dr. Shevrin that even when results of this sort are obtained, it does not mean that one should accept them in an entirely positive way. My view is perhaps somewhat more mixed than Dr. Shevrin's, I view it as a tradeoff. There are both negative and positive implications of changing behavior in this way.

What I would like to focus on for the remaining time that I have, however, are some concerns that I have that I think are important to keep in mind. Let me go to an example used early on by the first speaker when he was confronted with the possibility of a religious program flashing on the message "Honor thy father and mother."

Mr. Glickman, you commented that that would be a hard message to take issue with. And in a certain sense of course you are right. However, there are potential dangers in even using messages like this. This gets back to a point that Dr. Shevrin was making.

For example, someone who is dealing with guilt issues could well be made to feel more guilty receiving a message of this sort and it is not so much that the person would come out of the experience saying "I feel guilty"—that is unlikely though it is possible. What

is more likely is that a particular symptom, psychiatric symptom that the person was vulnerable to could become exacerbated under these circumstances.

If you go back to the study that I told you about earlier where you flash on the message "I have been bad," or "I have lost mommy," this did not lead the people in the experiment to say that they felt they had been bad or they were concerned with loss. What it led them to do is to become more depressed. So in other words, when people have vulnerabilities to particular symptoms these symptoms can be exacerbated by particular subliminal messages and not only noxious messages like the ones that we used in this particular experiment, and for which the people would be briefed, but even messages that could be viewed as only positive, quote unquote.

Let me give you a particular example that I think drives this point home quite well. In one of the studies that we carried out—it was a study on weight reduction where people who were interested in losing weight were given a weight control program that was accompanied by subliminal stimulation—and half of the people got the "Mommy and I are one" message that I told you about before, the other half got the message "People are walking."

One of the people in the control group, the group that was receiving "People are walking" suddenly left the study. Now whenever this happens we contact the person and try to find out what the person's experience was. When we contacted this woman she said that she felt very anxious for some reason after two experiences in this investigation. And at that point we debriefed her as to what the subliminal message was she was receiving, "People are walking." And she told us immediately the following, she said: "Gee, I can understand now why I got so upset." And she then went on to describe her childhood in which she lived in Canada, described a sadistic father and said that whenever she or any of the kids in the family were bad, he would tell them go out and take a walk.

Right after she related that she recalled that the day she left the study was a day that it was snowing.

Now, obviously this is anecdotal but I could cite for you other anecdotes as well that I think drive home what the danger is, that is, for this particular woman this phrase which anyone would say is completely innocuous, was not innocuous.

Mr. GLICKMAN. Dr. Silverman, would a phrase, be honest, do not steal, in a department store, would that cause problems to people along the same lines even though it is something that obviously is socially unacceptable to do.

Dr. SILVERMAN. Conceivably it could, too. There, too, it could stir up guilt issues and persons vulnerable to guilt and had psychiatric conditions in which guilt was implicated, those symptoms could become intensified. Now while typically if that happens I wouldn't expect it to last very long, there are instances, though few and far between, where effects could be longlasting because the situation in which it occurred could have particular meaning to the person so that it has a kind of impact that isn't easily lost.

Mr. GLICKMAN. It would seem to me if a person is going to be—and granted I have not near the expertise in this that you gentle-

men do—but if a person is going to be so reactive to a message like that subliminally, will he clearly be reactive to a message nonsubliminal, it is going to be hard for that people to deal in the real world under any circumstance.

Dr. SILVERMAN. That is likely to be true. However, we are also talking about instances where these messages are repeated over and over again so that if a person works in a department store and for every day that he is there for a period of time this message is going to come through, that is rather different than the situation you describe.

Dr. GLICKMAN. OK. Go ahead and finish your statement.

Dr. SILVERMAN. Well, I will end my statement there. I will certainly be happy to entertain any questions that you have. But the last point that I made that I wanted to particularly focus on—because I think this is something that people don't generally recognize—that is to say when people respond to subliminal messages even though the message may be suggestive of something it doesn't mean that the person will either do the thing or not do the thing. The idea that is embedded in the message, embodied by the message could stir up something in the person that has particular meaning to him that could trigger off symptoms or intensify them.

Now, as you implied this could happen in every day life and indeed it does. However, that simply is the chance one takes that you have no choice about. But to be subjected to subliminal messages goes beyond one's everyday expected experience. For that reason I think the committee is quite justified in being concerned.

Mr. GLICKMAN. Let me ask you this question, Dr. Shevrin. I would like you to restate if possible some very ominous concerns that you expressed in your statement about I would say the relationship between subliminal—as I look at your statement—the relationship between subliminal stimulation and brain wave electrophysiology and the implication is that some of the potentiality for some of the most evil forms of thought control and not just thought but action control that one could think of.

I wonder if you might restate that. It is a heavy thought and I think it is something that—it doesn't necessarily relate to the issue of don't steal, but it is something that may be even more important for us.

Dr. SHEVRIN. It does relate to the issue of don't steal, Mr. Chairman, it goes, I think, beyond it. But it is the very same kind of point of view that I am concerned about that would lead to using subliminal messages in that manner that would also lead to perhaps misuse of these new findings that I am so very concerned about. First let me say that the ominous warning that I gave is not something that I foresee happening the day after tomorrow.

I think that we are a long way off from that although I am in no position to say how long. But at the same time that is a consolation, I think, insofar as it does give us the opportunity, it does give us the time in this particular instance to carefully consider where research of this kind might be leading us and what its implications might be and how we can best maintain some control, beneficient control of this.

As I understand the intent of your question, it has to do with my elaborating a bit further some of the concerns that I have.

Well, I have already indicated briefly what some of the findings are right now in the literature. There is my own research that I have tried to illustrate for you this afternoon in which we have been able to show and repeat this for a number of people that indeed you can pick up significant differences in the way the brain responds to subliminal words that have very real emotional impacts for people.

We know this because they are related to a person's intense behavioral disturbances and emotional conflicts. It is for real. Indeed the brain does response differently.

I made reference to the interesting work of several Russian investigators, where they are at this point I cannot tell you because communication has not been very good with the Russian investigators in the last several years. But at least as of 1979–80, the Russian investigators have been able to show that again words that are selected very carefully to be of potent emotional significance with respect to their relevance to a supposed crime, again will give rise to very different patterns of brain response when they are presented subliminally.

I want to stress that.

Now, when we add to that a whole set of other findings that have nothing directly to do with subliminal perception as such, but for example with breaking as I would call it the electrophysiological code for thought or language, there is research going on right now in several different places in this country where we know something about the nature of the brain wave patterns if you will that are associated with different kinds of words that are associated with verbs and nouns. In this particular study interestingly comparing two very different languages like English and a Swiss dialect, the brain pattern for a verb is very different from the brain pattern for a noun.

It even is as subtle as I can portray in the following example. Take the word "fire." Well, you know we use the word "fire" as a noun or a verb, ready, aim, fire, or light the fire.

Well, researchers have been able to show that the brain pattern for these two different uses of the very same word are different. Now, in other words, you will be able to tell from the brain pattern that your computer will tell you is there whether the person has looked at the word "fire" meaning ready, aim, fire, or whether he has looked at a word in the sentence, "Light the fire."

It is as subtle as that. I also mentioned the research where people are presented with proportions of various kinds, some of which are true, some of which are false and these are ordinary harmless statements but then we are able to tell in this research when the person is saying true to a false statement or false to a true statement.

I indicated the implications this has for an immediate application and I mention this not because I want to encourage this application but rather because I want us to be forewarned about it. It has got to come. It is in the nature of the way people are that if something like this is going to be possible they are going to try to use it and that is to apply it for example for a very, very sophisticated lie detector test.

Now, the second important phrase of this research will have to take the form in which instead of beating off the brain pattern to words that have been presented to a person, either superliminally or subliminally it is rather to detect a pattern of brain response associated with thinking the word "fire" or whatever else you have in mind.

In principle this is entirely possible. There is some research already going on like that. In fact I think it is associated with the Defense Department and I am at full liberty to talk about it and that is where for example the effort is made to see if by detecting the pattern for the word "fire" like in ready, aim, fire, that you can have a pilot in an airplane be able to think the word "fire" in order to control his cannon rather than have to do anything else.

Now this research has some rather interesting psychological problems, for example, if I were to tell you don't think hippopotamus, you would think hippopotamus automatically and your cannon might go off; if you were related to that pattern.

But these are really solvable problems scientifically. It is only a matter of time, money and effort, ingenuity. We have seen this happen over and over again. It is not going to call for a stroke of genius to do this. It is going to call for a kind of steady scientific work, well-supported perhaps by defense contracts which will make it possible for us to identify these patterns that are associated with thought.

Mr. GLICKMAN. Let me go from that which is kind of some of the more perhaps cosmic consequences of one of these issues which I think are very important, down to the some of the current uses of subliminal technology. How do you respond to the use of technology as methods of controlling let's say the kinds of conduct like drug usage or alcohol usage that might be required of people who have been convicted or involved in some misuse of these substances?

Dr. SHEVRIN. I would be very much opposed to them. I would be opposed—the question was directed to me?

Mr. GLICKMAN. Both of you. You start and we will——

Dr. SHEVRIN. I perhaps differ with other panelists including Dr. Silverman, I would be opposed to their use at this time. I say "this time," I mean before there has been much, much more research done of a basic science sort to establish both the effectiveness of what is being applied; and second the absence of harm. I don't think we have a positive answer to either of these questions.

Furthermore, I think that with respect to the question of effectiveness and harm—mainly the latter—as Dr. Silverman was saying just a moment ago and I was saying in my prepared remarks when we provide a person with a subliminal message without really knowing something about that person we have no clear idea of what its impact may be on that particular person.

Now, if we deal with large groups of people we may get an overall group or average effect but we may have all kinds of very idiosyncratic effects on individuals. As Dr. Silverman was just illustrating through that very dramatic anecdote, in some people it may produce rather very noxious and substantial and longlasting effects only we will never hear about it. In other words, they won't complain to the FCC because they don't know what happened to

them. They certainly won't complain to the FTC or any other Government agency.

Mr. GLICKMAN. You say the jury is out on their effectiveness and they may cause harm.

Dr. SHEVRIN. That is right.

Mr. GLICKMAN. Dr. Silverman.

Dr. SILVERMAN. I don't think the jury is out on effectiveness, at least not for groups of people. In terms of any given individual that is another matter and as Dr. Shevrin was indicating for a particular person a message that may be effective for a group may not be effective for him or her and conceivably could even have a negative effect.

I agree with what Dr. Shevrin was saying, the question is what the implications are of that in terms of what we should view as reasonable at this time. I am undecided at this point as to whether it would be justified for people to use subliminal stimulation except for that of course for research investigative purposes which I myself do and which is very much needed to further understand the potential of this medium.

But what one's stand should be when it comes to using this therapeutically outside the context of a research study such as the instances that Mr. Tyler described using it in a hospital, I think it may be reasonable to use the technique at this time if certain precautions are taken. The precautions at the very least I would like to see done in order to use the technique as Mr. Tyler described, was first, informed consent which Mr. Tyler indicated would be the case in the hospital.

Second, to monitor very carefully what is happening in addition to what you are specifically looking for. That is to say, it is one thing to observe that a person is losing weight because he or she is getting a particular subliminal message but that may not be all that is happening. I would think that concerns like Mr. Tyler's would do well to proceed as good drug companies do, that is to say that they have a research and development unit; they test the effectiveness of their product; they are also on the lookout for unexpected effects; and they will also have if not warnings, statements to the consumer about potential negative reactions.

At the very least one would want to see that.

Mr. GLICKMAN. Well, I think your point is good. I think the problem in comparing with the drug industry is the tangibility factor of pharmaceuticals versus the intangibility factor of almost everything we are talking about here. But I think there are some relevancies to what you say as well and I do think that the research needs to go forward.

I think that perhaps that is the heart of your points today, is that I don't know how serious a national problem this is, it is obviously not of widespread use today in commercial sectors of our economy according to the testimony we have heard today. It may be widespread in the medical profession or maybe it is widespread in our sectors, but clearly we need to do more work in understanding it than we currently have done.

So we appreciate your testimony here very much and if either of you gentlemen want to share any other of your research benefits with us we would like to get that for the record as well.

Thank you very much.
[The information follows:]

BRAIN WAVE CORRELATES OF SUBLIMINAL STIMULATION, UNCONSCIOUS ATTENTION, PRIMARY- AND SECONDARY-PROCESS THINKING, AND REPRESSIVENESS

HOWARD SHEVRIN

In this paper I will describe a series of experiments which show, for the first time to my knowledge, a relationship between the electrical activity of the brain in response to a stimulus and unconscious thought processes involving attention, perception, primary-process thinking, and repression. Not all of the findings are solidly established, but the experimental method is rich in possibilities for investigating complex psychological events of interest to the psychoanalyst. This method draws upon two techniques, subliminal stimulation and the cortical evoked response, which will now be described.

SUBLIMINAL STIMULATION

Experimental work on subliminal stimulation goes back to well before the turn of the century, but it was not until Fisher (1956; Fisher and Paul, 1959) undertook to replicate Pötzl's lit-

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tle-known tachistoscopic experiments that investigations of subliminal stimulation were made relevant to psychoanalysis. Over the past 15 years more such studies have steadily accumulated, accompanied by heated controversy. Out of this controversy the existence of subliminal perception has emerged as a new scientific fact. This conclusion was reached by Bevan (1964), an entirely nonanalytically oriented psychologist and an accomplished experimentalist, on the basis of his review of over 80 studies.[1] In all the sound and fury of debate about the status of psychoanalytic concepts, the quiet birth of this scientific fact bearing so direct a relationship to psychoanalysis, born in the laboratory and not in the consulting room, has gone unnoticed. The baby is thriving, and as one of the first legitimate offsprings of psychoanalysis and experimental psychology it deserves some special consideration.

The center of interest can now shift from demonstrating the existence of subliminal perception to exploring its nature. Here we can expect new controversy. Bevan, although conceding the existence of subliminal perception, does not believe that the evidence warrants the conclusion that subliminal input is subject to laws of perception and association different from those governing supraliminal perception. Klein (1959) and Gill (1963), from the perspective of ego psychology, have also interpreted the data as suggesting that subliminal input is generally subject to a nondynamic inhibition rather than to a repressive force which would result in primary-process distortions in thinking. Elsewhere I have argued (Shevrin, 1968) that this interpretation can be challenged, in the light of the available evidence and because of the limited place accorded motives and transference factors in most subliminal experiments.

In the subliminal method used in the work to be described, a special stimulus was constructed which is capable of eliciting several types of associations related to the psychoanalytic distinc-

[1] In a more recent comprehensive review and analysis of research on subliminal perception, Dixon (1971) concluded that the existence of subliminal perception has been demonstrated in at least eight different contexts: dreams, memory, adaptation level, conscious perception, verbal behavior, emotional responses, drive-related behavior, and perceptual thresholds.

tions between primary- and secondary-process thinking. The aim was to investigate the conditions under which a subliminal input would undergo primary- and secondary-process transformations in the associative process. The method draws on certain psychoanalytic assumptions about language and speech in dream, symptom formation, and psychosis. We assume, for example, that in dream formation words may be treated as clanglike auditory patterns, seeming to lose their conceptual function. It is further assumed that this loss of conceptual function occurs as part of the defensive displacement and condensing process of dream work. An especially rich illustration of this process can be found in Erikson's (1954) description of a dream that consisted of one word, SEINE, in which was compounded allusions to the French river, the Latin word SINE, the English word SIN, and the German words SEHN and SEINE. Words can be pivotal in the formation of a dream; they have the further advantage for the experimenter of being easy units to identify and to add up in various ways for purposes of measurement. For technical reasons, however, it is advisable for the stimuli themselves not to be words, but to be capable of eliciting words. One such technical reason is that words, being greatly overlearned, have remarkably low recognition thresholds. It is also important that the elements of the stimulus should not ordinarily occur together. Most ordinary pictures, for example, have a great deal of internal consistency. A picture of a street scene would be a poor stimulus because if one were to catch a glimpse of a house such associations as street, tree, car, etc., would naturally follow and would not be instances of true subliminal perception. A stimulus constructed to overcome these problems is illustrated in Figure 1. It is a picture of a pen and a knee. Pens and knees do not ordinarily occur together and thus have a low order of contingent association. If one were to think of pen it is highly unlikely that one would also think of knee, and vice versa. The picture is of much more than a pen and a knee—there is a leg, calf, thigh, pen point, etc. It is also a male phallic symbol and a female knee; it is also cut off, mutilated, and contains hostile as well as sexual connotations. For present purposes, however, these other factors have been ignored (but it is by no means denied that all of these may play some part in subliminal perception). Instead, our interest has

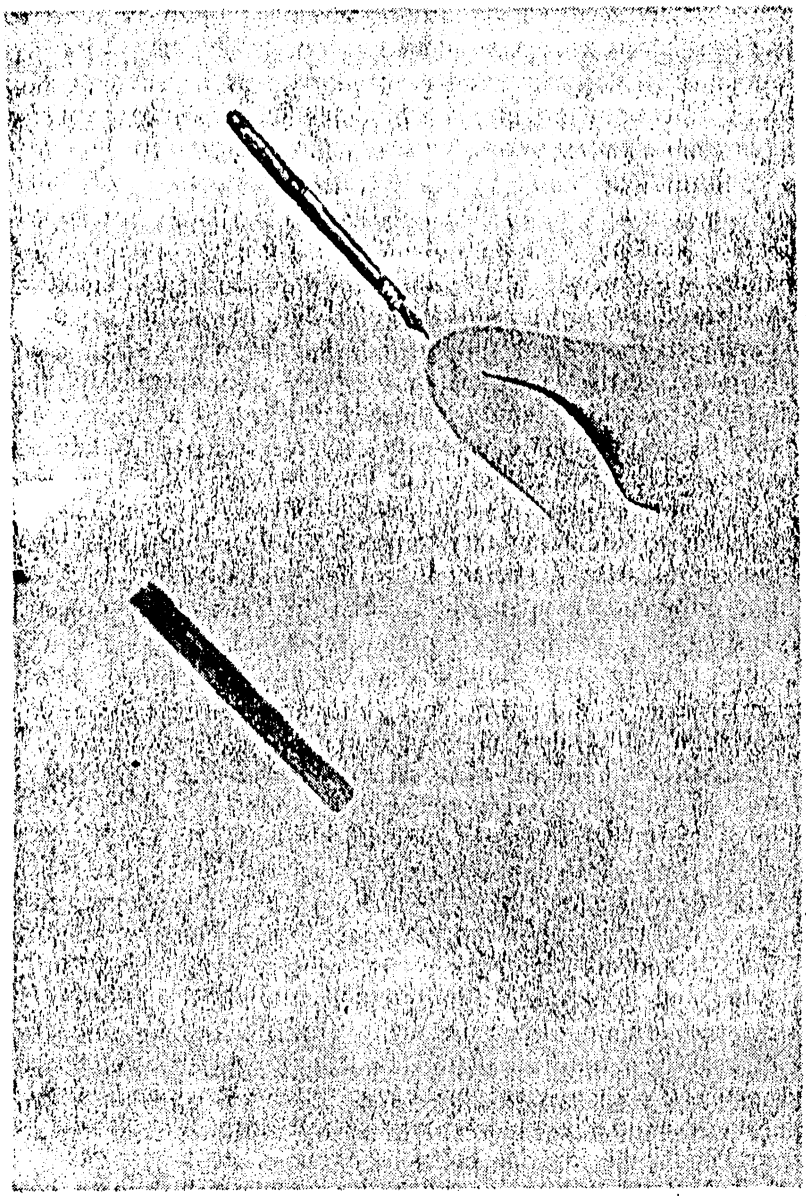


FIGURE 1. Experimental stimuli. The PEN/KNEE is the rebus (R) stimulus. Lower stimulus is abstract (D) stimulus. The actual stimuli are in color: the pen is dark gray with a gold nib, the knee is a light flesh tone.

been focused on certain verbal relationships and transformations. The two objects can be designated as a pen and a knee with the customary dictionary meanings of the words in mind. These words, however, can be treated in the associative process as concepts, clangs, or clang combinations. Thus, when they are treated as concepts, associations such as *ink*, *paper*, and *write* to pen, and *leg*, *calf*, and *body* to knee, may occur. When, however, they are treated as clangs, associations such as *pen*nant or hap*pen*, or *nei*ther or a*ny* may occur. Lastly, the words can be combined or "condensed" to form a new word, *penny*, totally unrelated in meaning to the objects themselves. This clang combination in turn may give rise to associations—*coin*, *round*, *poor*, etc. By obtaining association norms for these key words it is possible to score these association effects with a degree of reliability limited only by scoring error, which has generally been less than 3%. The conceptual associations, based on words referring to objects, are close to the secondary process, whereas the clang and clang-combination associations, based on words treated as "things" or auditory patterns, are close to the primary process. The stimulus is a rebus—a pictorial representation of a word; it is a little waking fragment of what we suspect happens on a grander scale in the formation of a dream. The three levels of association will be designated as *conceptual*, *clang*, and *rebus*.

A series of studies has been carried out with the PEN/KNEE rebus and other rebuses. In general, the findings are encouraging. With earlier versions of two rebuses (TIE/KNEE and BEE/GUN), we found that rebuses exposed subliminally can influence word choices in the expected direction (Shevrin and Luborsky, 1961). Moreover, at prolonged supraliminal exposures subjects could not identify the rebus level without broad hints, although many had already responded at this level following a previous subliminal exposure. This finding was interpreted to mean that primary-process thinking is not easily accessible in the usual alert, conscious, waking state. In another study in which the rebus method was used, we were able to show that the same subliminal input can enter into sleep consciousness in significantly different ways (Shevrin and Fisher, 1967). We found that penny associates were more numerous in associations following REM awakenings, and that pen and knee associations were more numerous in associations following NREM awaken-

ings. Both types of association occurred with greater frequency following their respective sleep stages than in the presleep waking state (see Figure 2). We interpreted these findings as showing

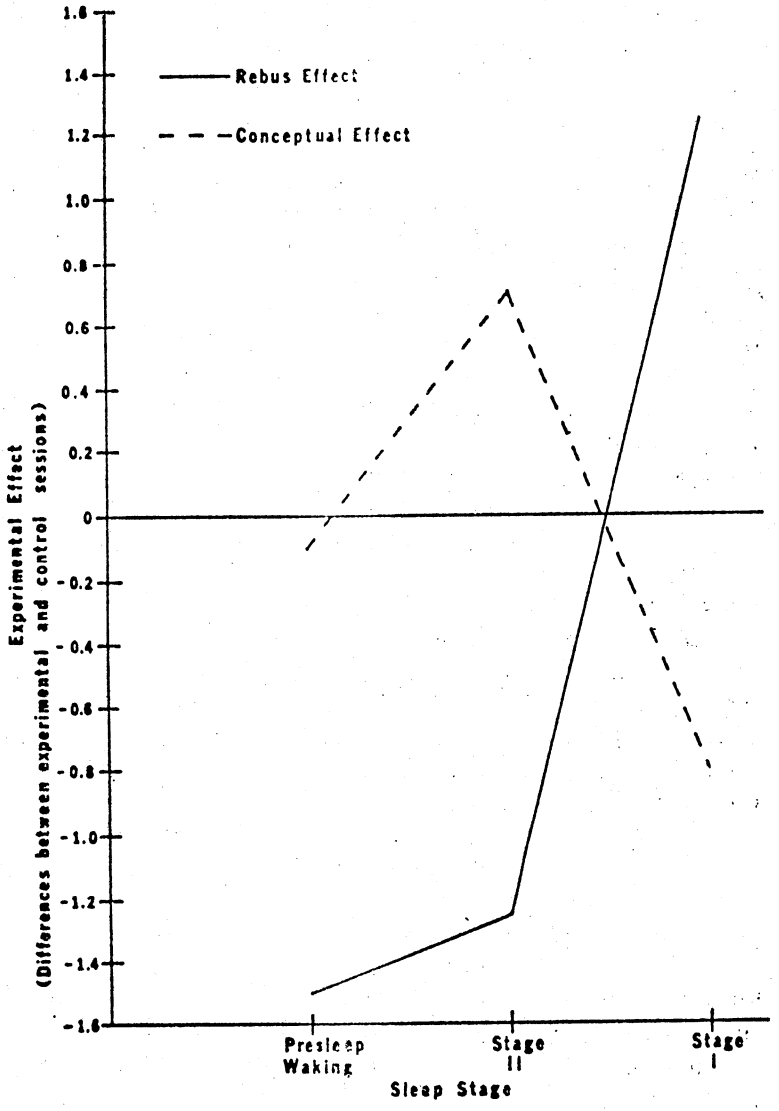


FIGURE 2. Rebus and conceptual subliminal effects as a function of sleep stages. (Median values; N = 10.)

that the primary-process reworking of a subliminal input occurred in REM sleep and that the secondary-process reworking of the same input occurred in NREM sleep. This interpretation is based on the assumption that the states of consciousness prevailing in sleep have a certain momentum: although to outward appearances the subject is awake as he gives his associations, they remain substantially influenced by the immediately preceding sleep stage. Fiss, Klein, and Bokert (1966) have reported a similar finding for TAT stories obtained after NREM and REM awakenings.

In a series of three experiments, we have shown that hypnosis will potentiate conceptual-level effects but that a dream is required if a rebus effect is to appear (Stross and Shevrin, 1968). A hypnotized subject's description of an image obtained after the TIE/KNEE rebus was flashed runs as follows (TIE associates are in capitals; *knee* associates are in italics):

Hypnotic Stimulus Description (TIE/KNEE rebus)

S: It was a rather orange square and a black dot in the center of it. It was quite blurry and that was all I could see.

Hypnotic Image #1

S: Two people are *sitting* on a park bench reading newspapers which are spread out on their laps. The bench is made of GREEN slats, has GREEN iron *legs* and big slabs of wood under the *legs*. It's set on a path, a gravel path, gray and *white* and blue gravel. They're both looking very intently at their newspapers and their heads are *bent* so that they're looking at them and they're HOLDING them open flat on their laps. They're both MEN and they're WEARING rather formal SUITS and bowler HATS and they have shoes with spats and the *white* of the spats stand out. Everything else is gray. There's grass beyond the path and a few bushes and no trees. There's a big iron fence behind the bushes and the street on beyond and some tennis courts beyond that. There are cars on the street and people *playing* tennis at the tennis courts. These two MEN are just *sitting* and frowning at their newspapers.

A hypnotized subject's recall of a dream obtained the day after the PEN/KNEE rebus was flashed reads as follows (*penny* associates are in italics):

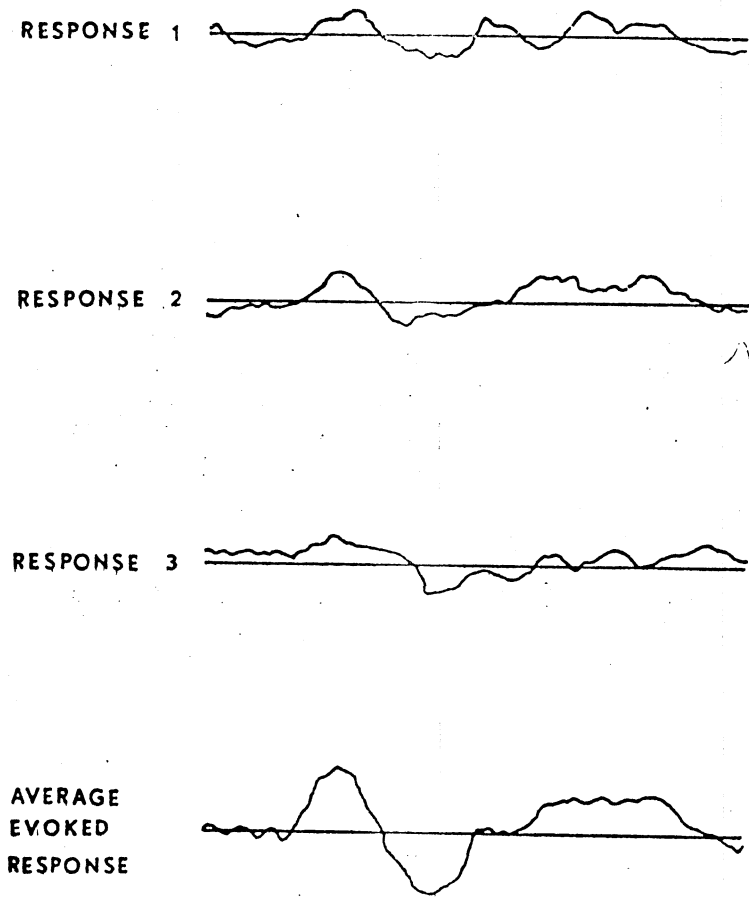
Hypnotic Stimulus Description (PEN/KNEE rebus)

S: It just looked like a couple of broad lines that moved horizontally across the picture. The top line being, sloping upward.

Hypnotic Dream Recall

S: I was carrying this suitcase and a violin and a bunch of other packages and I told her I been, just arrived in town from out of town. I had just traveled and I was just worn out so she apologized and got a colored lady from the ladies' room to come and help me and this lady was very help–, very kind but she picked up all, just a few of these little packages [laughs], the luggage and the violin and I took them out through the department *store* out to a lawn where we were, this *friend* then was out there waiting for a taxicab and she had other luggage there. I put down my packages there but this time the colored lady had taken these little parcels into the washroom and I had to go back after her and get them and come back to where the taxicab and luggage was and then I was confused because I didn't know how much to tip the porter that was putting our baggage in the taxicab and this *girl* who had helped and I finally decided I'd tip them both the same. I gave them a *quarter* and a *dime* and she was pleased because I had, she had felt I had tipped her quite a bit, rather tipped her as much as I had the man who had done much more.

On the assumption that the hypnotic state would be sensitive to primary-process thinking, we had hypothesized that hypnosis would augment both rebus and clang effects. We found, however, that dream work is necessary before these primary-process effects can appear. On the basis of clinical and theoretical considerations, Brenman (1949) reached a similar conclusion. The findings from these various studies demonstrate that the rebus method works and can bring some interesting relationships to light.



SCHEMATIC REPRESENTATION OF AVERAGING METHOD

FIGURE 3. Responses 1, 2, and 3 represent samples of EEG-recorded brain responses obtained immediately after a given stimulus has been presented. The bottom curve is the *average* of these three curves, showing how a component recurring in response to a stimulus will be clearly visible whereas random activity or noise will tend to "average out."

CORTICAL EVOKED RESPONSES

The second method on which the research is based is the average evoked response, or AER. Until this method was devised it was extremely difficult to detect the brain's response to a discrete stimulus. The EEG itself is a melange of interacting responses to a great variety of internal and external stimuli, and can show a discriminating response only if amplitudes are substantially high. With a small-sized computer, however, it is possible to "feed in" EEG data and to obtain in return a response pattern in the form of a curve which shows the brain's specific response to a discontinuous repetitive stimulus in any modality. Figure 3 shows schematically how this averaging is accomplished. In the upper three curves are the "raw" EEG responses to a given stimulus. One component, varying in amplitude and slightly in latency, is present in each curve. Much of the remaining activity varies considerably from response to response. The common wave component will remain in the final average curve (see bottom line of Figure 3), while the randomly varying waves will tend to cancel each other out. The common wave component thus represents the brain's specific response to a stimulus.

The new technique is based on one of the oldest scientific methods—what J. S. Mill referred to as the method of concomitant variation. In more modern terms, the signal-to-noise ratio is increased, so that the signal—the stimulus-related activity—can be detected, while the "noise"—the stimulus-irrelevant activity—is appreciably reduced. The signal which emerges has one intriguing property—it seems to be associated with attention. For example, if a subject is instructed to attend to *dim* flashes interspersed among bright flashes, the amplitude of the average evoked response within approximately the first 260 msec. will be greater for the dim flashes than for the bright flashes (Haider, Spong, and Lindsley, 1964). Intuitively, we would expect the bright flashes to induce a bigger wave; that is not what happens, however, because the amplitude is not a simple function of intensity but is also associated with a complex psychological event—attention. In a review of some 162 studies, Tecce (1970) concluded that the preponderance of the evidence favors the hypothesis that certain components that appear within 200–300 msec. poststimulus are concomitants of attention, although con-

siderably more work in clarifying certain variables needs to be done. From a psychological and psychoanalytic point of view, this is an exciting discovery: a complex psychological event like attention has been found to have a specific brain referent. Moreover, the method is objective and not difficult to master. A good deal of recent work (Donchin and Lindsley, 1969) shows that muscle artifacts cannot account for these waves and—more important—that there is a close morphological similarity between the evoked responses obtained with scalp electrodes and those obtained with implanted electrodes. It is doubtful that we are dealing with artifactual responses produced by muscle potentials, by interference from the skull and scalp, or by pupillary changes.

A series of experiments will now be described in which the subliminal and evoked response methods were combined.

The First Study: Cortical Response to a Tactile Stimulus during Attention, Mental Arithmetic, and Free Associations (Shevrin and Rennick, 1967). This experiment is in some respects a "warm-up." We wanted to see for ourselves whether the average evoked response was associated with attention, as others had reported. In addition, we wanted to find out (a) if the evoked response could be used to discriminate between different concomitant psychological processes, and (b) if the evoked response would vary with the effects of a subliminal stimulus. The latter question was in this experiment a secondary one.

The stimulus was a light touch to the index finger delivered by a delicately balanced stylus some 40 times at intervals ranging from two to six seconds. Subjects were asked to perform three tasks: selective attention, mental arithmetic, and free association. In selective attention, the subject was asked to pay careful attention to the stimuli and to estimate the varying time intervals between successive touches. In mental arithmetic, the subject was asked to subtract serially by sevens from some randomly selected high number (320, 410, etc.) while the tactile stimulus was being delivered. In free association, the subject was asked to let individual words come to mind for a period of two minutes while the tactile stimulus was being delivered. Each set was induced twice in a counterbalanced order. The electrode placement was bipolar: parietal-frontal. Before "hooking up" the subject, we flashed the picture of either a pen or a knee at 1 msec. The pen was

flashed for one group of subjects, and the knee for another group. The subliminal part of this experiment was secondary but nevertheless of interest. The rebus picture was split up to provide a control for other experiments: to see if rebus effects would appear even if the rebus segments were not combined. We found no such rebus effects. The influence of the two subliminal stimuli was to be detected in the free associations. The subjects were 12 pairs of twins, ranging in age from 13 to 19, borrowed from Gardner's (1964) longitudinal study of cognitive styles and defenses in twins. The reason for using twins will become apparent later.

Our hypotheses in this study were:

1. If the average evoked response is related to attention, certain amplitudes should be greater in selective attention than in either mental arithmetic or free association. These latter two tasks were in effect distracting conditions.

2. If the average evoked response can subtly reflect differences in concomitant psychological processes, then the average evoked responses for mental arithmetic and free association should differ.

From a psychological standpoint, mental arithmetic is decidedly different from free associating. Mental arithmetic requires the subject to concentrate on a pattern of mental manipulations, whereas free associating requires the opposite—attention to internal processes but no manipulation of them.

3. If the average evoked response is associated with attention and thus can reflect a shift between inwardly and outwardly directed attention, then the evoked response components associated with attention to the *external* tactile stimulus should be lower for subjects who show high sensitivity to the subliminal stimulus in their free associations. Here we are assuming that the subliminal stimulus evokes associations which become conscious in greater numbers if attention is directed to internal cues.

The findings are schematically represented in Figure 4. The first hypothesis was confirmed. The trough-to-peak amplitude, A-B, which peaks at approximately 107 msec., was greater in selective attention than in free association or mental arithmetic. Also, the two amplitudes measured from baseline to peak, B and D, were significantly greater in selective attention than in the

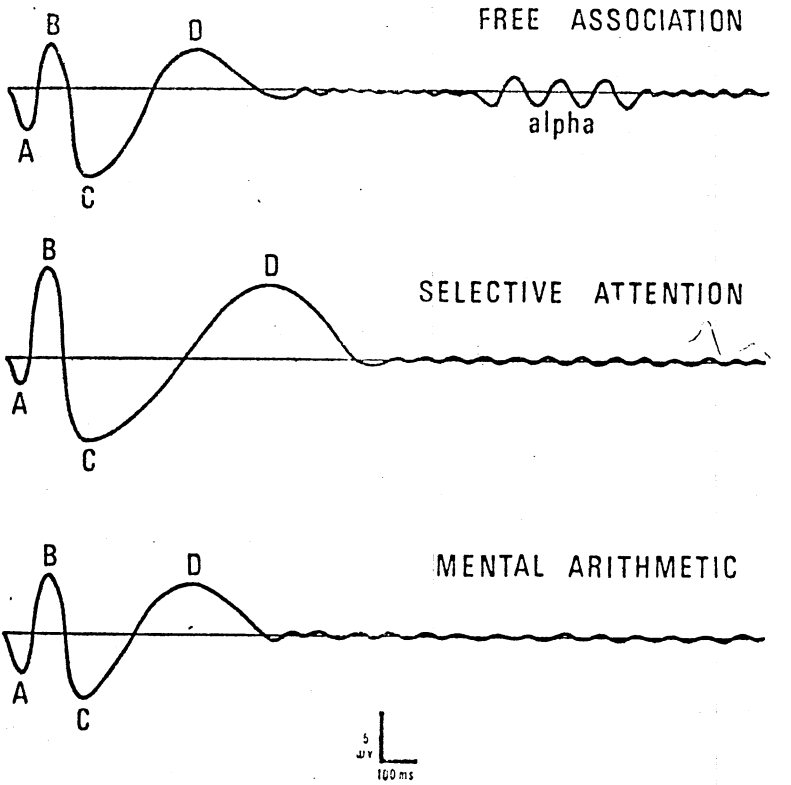


FIGURE 4. Curves represent typical conformations for each condition. Amplitudes and latencies at points A, B, C, and D were computed from the average of 48 measurements made in each condition. Incidence of α bursts is indicated schematically.

TABLE 1

AMPLITUDES OF AER COMPONENTS MEASURED FROM ESTIMATED BASELINE (WITH LAST 500 MSEC. OF 2-SEC. READOUT USED TO DRAW BASELINE THROUGH FIRST 1000 MSEC.)

Condition	A wave	B wave	A to b (trough to peak)	C wave	D wave
Free association	3.90	−4.52	8.43	7.71	−3.76
Selective attention	2.81	−8.54	11.38	8.23	−6.99
Mental arithmetic	3.74	−5.54	9.28	6.86	−4.77
		$>p<.001$	$>p<.05$		$>p<.01$
		$>p<.01$	$>p<.05$		$>p<.05$

The trough-to-peak amplitudes computed from point A to point B are included to provide a measu independent of errors in estimating the baseline. Significance levels less than .05 are shown.

other two conditions. A summary of these findings is presented in Table 1. The latency of peak D occurred significantly later in selective attention than in free association or mental arithmetic (670 msec. versus 492 msec. and 489 msec. respectively, $p<.01$ for both comparisons). In Figure 5 a set of actual curves from one subject is shown. In the second free-association curve there is a burst of alpha (synchronized brain activity in the 8–12 per second range) which is not found in any of the selective-attention or mental-arithmetic curves. The presence of alpha in free association significantly discriminated free-association curves from either the selective-attention or mental-arithmetic curves (χ^2 for correlated proportions $=9.00$, $p = .004$). The second hypothesis was to some degree supported in an interesting and unexpected way. The average evoked response did reveal a difference between free association and mental arithmetic in one particular parameter, alpha, often associated with drowsy, distracted states. Alpha is inhibited by problem solving and by attention to an external stimulus.

Lastly, we found that among the 12 subjects shown the pen stimulus there was a fortuitous split (six and six) between subjects who used pen associates and those who used none at all. When we compared these two subgroups we found that the B amplitude (the electrically negative portion of the A–B component) was *less* than half as great in the subjects who showed a subliminal effect as it was in the subjects who showed no subliminal effect (3.50 versus 7.22, $t = 2.287$, $p<.05$). A comparable effect could not be shown for the subjects shown the knee stimulus. The finding was thus limited to one of the two subliminal stimuli. For the pen stimulus it seemed that an inverse relationship existed between directing attention outward (to the tactile stimulus) and directing attention inward (to associations related to the subliminal stimulus). This finding is consistent with Rapaport's (1959b) assumption that attention is available only in a determinate quantity in a given state so that there is "competition for it . . . between internal and external excitations" (p. 782).

This first experiment was encouraging. The average evoked response was not only associated with attention but could reflect differences in psychological states, as well as *shifts* in attention with respect to a subliminal stimulus. One could be emboldened

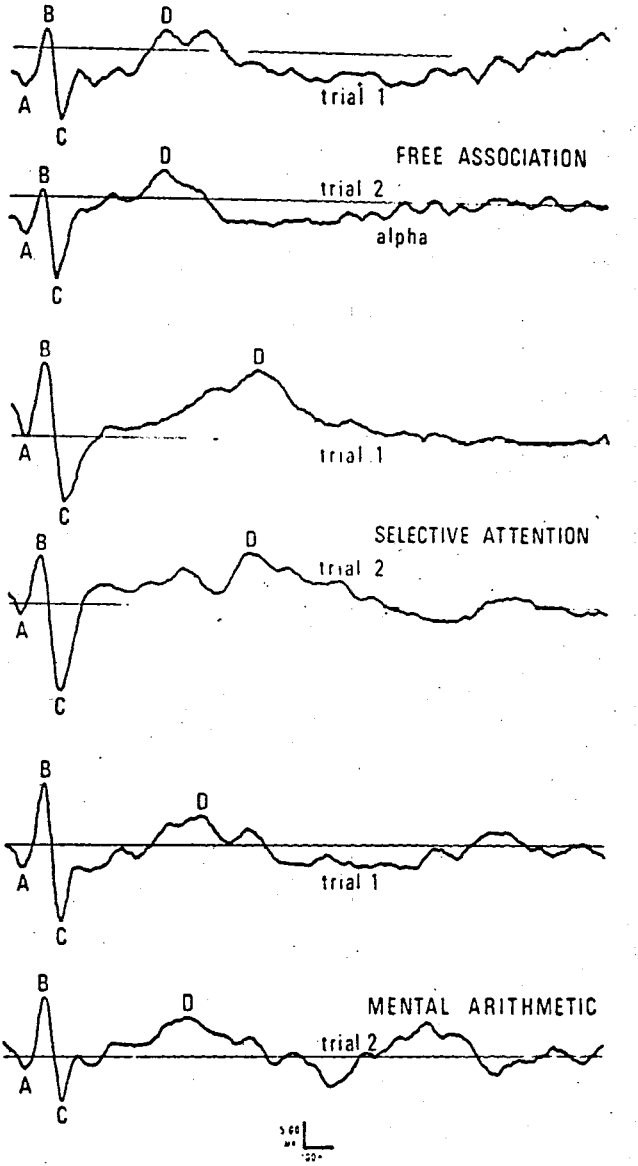


FIGURE 5. Set of 6 AER curves obtained from Subject A, 13-year-old male fraternal twin; each curve is based on 40 sweeps. Points A, B, C, and D mark peak amplitudes analyzed in study. Incidence of α bursts noted wherever present during last 1,000 msec. Baseline estimated from last 500 msec. of record.

to inquire if average evoked responses might reveal the presence of a brain response to a subliminal stimulus.

The Second Study: Visual Evoked Response Correlates of Unconscious Mental Processes (Shevrin and Fritzler, 1968a). This experiment was appealing not only because of empirical considerations but also because of an important theoretical consideration. Elsewhere I have hypothesized that the existence of subliminal perception forces us to assume that attention can be unconscious, and that a concept of neutral registration which does not involve attention and motivation is untenable (Shevrin, 1968). It was argued that perception implies attention, whether it be conscious, preconscious, or unconscious. No perceptual process is possible without a prior and concomitant act of attention. From this point of view, the "sense-organ" concept of consciousness as dispensing or withholding attention is too limited. Incongruous as it sounds, attention can be dispensed unconsciously as well, but the idea is no more incongruous than that of unconscious perception itself. In a posthumously published paper, Rapaport suggested something quite similar: "Nothing can be perceived—whether such perception is indicated by the consensually validated consciousness of the perceived or by the symptoms consisting of impingements upon other cognitive experiences—without its being so hypercathected. Thus *attention cathecting does not per se guarantee consciousness* or the form of conscious appearance of the internal or external excitation" (1959b, p. 781; italics added). Subliminal perception would be one class of perceptions whose presence is revealed by "impingements upon other cognitive experiences" and as such has been cathected with attention but has not become conscious.

The fact that the evoked response is associated with attention thus provides a means for testing this theoretical construction concerning unconscious attention. If the idea is valid, the average evoked response should show an increase in amplitude associated with attention whenever a subliminal stimulus had been attended to unconsciously. Furthermore, if we are dealing with something beyond a primitive sensing process, such as an orienting response, we should be able to find associates to the subliminal stimulus in free associations. If both hypotheses are

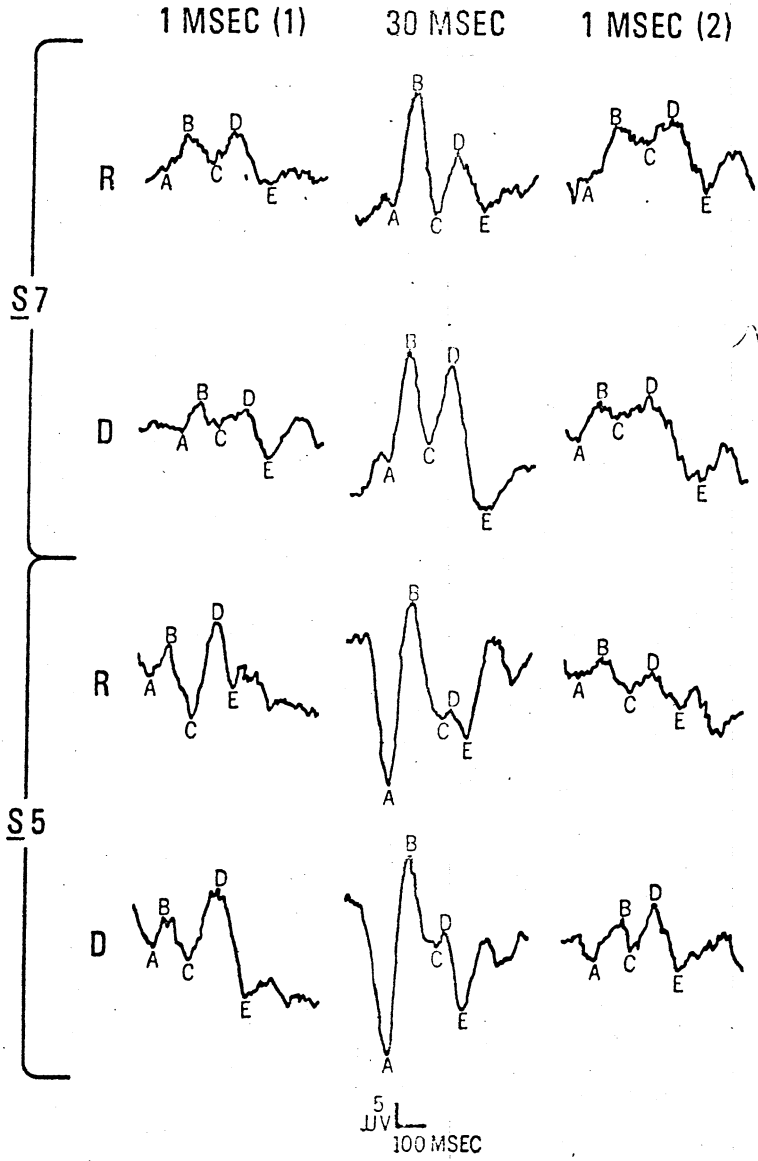


FIGURE 6. Average evoked responses (from Subjects 7 and 5 drawn from study by Shevrin and Fritzler, 1968a) as recorded from frontal-occipital electrodes for each exposure condition and for each stimulus, R and D. Average evoked responses are based on approximately 30 sweeps for each curve. Positive polarity downward.

confirmed, it could then be argued that the average evoked response is associated with an unconscious act of attention and perception which represents the starting point of an unconscious thought process revealed in free associations.

In order to make the test as rigorous as possible, the average evoked response technique was given the task of discriminating between two stimuli matched for size, color, general configuration, and brightness, but differing in specific content (Figure 1 above). In this respect the procedure was different from that of Libet et al. (1967), who found average evoked response correlates for somatosensory stimuli of subthreshold *intensity*. Our interest was in the *content* and *quality* of thought processes. Pribram, Spinelli, and Kamback (1967), working with monkeys, had already reported that average evoked responses could discriminate between a circle and striations, each presented for 1 msec. In our study, the two stimuli were presented for 1 msec., for 30 msec., and again for 1 msec. In each condition the PEN/KNEE rebus (Stimulus R) was flashed for a total of 30 times and its matched control (Stimulus D) 30 times in a modified random order. Between blocks of 10 stimulations—5 Rs and 5 Ds—free associations of 2 minutes' duration were obtained for a total of 12 minutes for each of the three conditions. The two stimuli were both flashed within one block in order to control for possible habituation effects. Since the main purpose of the experiment was to see if a brain discrimination could be found, we were ready to sacrifice to some extent the possibility of establishing verbal effects, for both stimuli would have been flashed before obtaining each series of free associations. As will be shown later, however, it is possible to identify some subliminal verbal effects in this experiment, and we have in subsequent work established verbal effects following the *separate* flashing of the rebus and control stimuli. At 1 msec. subjects saw nothing of the stimulus; at 30 msec. they could distinguish between the two stimuli, although they still found it difficult to recognize them. The subjects were 11 male undergraduates. The electrode display was bipolar: frontal-occipital. The occipital electrode was placed 2 cm. to the left above the inion. The frontal electrode was placed close to the hairline at the midline.

We found that the average evoked response discriminated

between the stimuli with equal effectiveness whether the stimuli were subliminal or supraliminal, although the effect was strongest in the first 1 msec. condition ($F = 11.58$, 1/10 *df*, $p < .01$). Moreover, the main discriminating component was within the poststimulus time interval associated with attention in other studies (approximately 250–300 msec.). Average evoked responses for two subjects are shown in Figure 6. The main discriminating component is the positive-going amplitude from B–C.

Both rebus and conceptual verbal effects were found in the free associations for the first 1 msec. condition on the basis of the following method: the approach to measuring subliminal verbal effects was developed in a series of other studies in which it was found that more associates appeared to a stimulus which was not consciously discriminated than to the same stimulus when it was consciously discriminated (Shevrin and Luborsky, 1958, 1961; Spence, 1964; Spence and Holland, 1962). Spence has referred to this factor as the "restrictive effects of awareness." On the basis of these findings, we hypothesized that more associates would be given following the 1 msec. stimulus exposures than following the 30 msec. exposures. This comparison of verbal effects following two exposure conditions was made necessary by the fact that both stimuli (R and D) as mentioned previously were flashed within each block of trials before free associations were obtained. Both stimuli were presented within the same block in order to maximize AER discrimination between the two stimuli by minimizing habituation effects. When this method was used we found that there were significantly more knee and penny associates in the first 1 msec. condition than in the 30 msec. condition (Friedman Test, $p < .01$, knee associates; $p < .05$, penny associates).

For the first time to my knowledge, both electrocortical and linguistic effects from a subliminal stimulus had been obtained. Would there be any correlation between these two seemingly diverse indices? We found that the incidence of conceptual associates was positively correlated with both the B–C amplitudes for R and D for the first 1 msec. condition. The best estimate of both indices was provided by a combined conceptual effect (pen and knee associates) and a combined R and D amplitude score. The resulting rank-order correlation was .70 ($p < .05$). Neither rebus nor clang effect was significantly correlated with ampli-

tude. However, when the incidence of alphalike activity approximately 1.5 seconds poststimulus (comparable to the alpha found in the first study) was measured, it correlated significantly with both rebus and clang effects (.75, $p < .01$, and .73, $p < .02$, respectively). The correlations with the conceptual effects were now nonsignificant. It would appear that the parameter of the average evoked response associated with attention is also associated with a secondary-process subliminal effect, while another average evoked response parameter, alpha, is associated with a primary-process subliminal effect. The fact that these findings are present for both the R and D responses suggested that we may be dealing with a stable *state* rather than with specific transient effects.

The Third Study: Average Evoked Response and Verbal Correlates of Unconscious Mental Processes (Shevrin, Smith, and Fritzler, 1971). In this replication a number of refinements in measuring average evoked responses were introduced. The subjects were again 12 pairs of twins, a choice which was especially useful for the investigation of repressiveness to be described below. The main findings from this study confirmed what had been previously found. Moreover, this time all effects were specifically linked to stimulus R: (1) the B-C amplitude was significantly greater for Stimulus R than for Stimulus D in the first 1 msec. condition and in the 30 msec. condition; this difference was found on the basis of two different criteria for identifying the B-C amplitude, described in detail elsewhere (Shevrin, Smith, and Fritzler, 1971) (sequence method: $F = 6.033$, 1/10 *df*, $p < .05$; peak amplitude method: $F = 10.477$, 1/10 *df*, $p < .01$); (2) knee associates were significantly more numerous in the first 1 msec. condition than in the 30 msec. condition (Friedman Test, $p < .05$); (3) the incidence of knee associates was a function of the B-C amplitude for Stimulus R only (sequence method, Wilcoxon Signed Rank Test, $p < .05$); (4) the incidence of penny associates was a function of alpha for Stimulus R only.

RELATIONSHIPS WITH REPRESSIVENESS

From a metapsychological point of view my references to unconscious thought processes have been equivocal. It would be

more correct to say that the electrocortical and verbal effects thus far described are *descriptively*, rather than *dynamically*, unconscious. We do not know as yet if we are dealing with dynamically unconscious processes. The evidence that rebus effects are present does suggest that primary-process transformations of a sort associated with dynamic unconscious phenomena occur. However, there is no direct evidence of the kind of defensive activity associated with dynamically unconscious processes. Defensive activity might well be influencing the evoked response and subliminal effects, but we have no independent assessment of its presence. If we infer from the existence of clang and rebus effects both the existence of primary-process thinking and the operation of defenses, we are in danger of circularity.

However, there is a way in which an independent assessment of defensive activity can be made, although the approach still remains at some distance from the actual focus of such activity. I refer to the clinical assessment of defenses on the basis of psychological tests. At the heart of this diagnostic assessment are certain assumptions about the long-term effects of a defense upon thinking, reality testing, and character formation. For instance, a person who relies mainly on repression will show a pervasive lack of interest in ideation, know less about the world then his general level of intelligence would lead one to expect, and show a readiness to respond overemotionally to circumstances. When we have evidence for these traits on psychological tests we infer that the person characteristically relies on repression as a defense. It is important to stress that rarely do we have direct evidence of actual repression, that is, individual instances of repression. In effect, we make the inference on the basis of a probability model: given these characteristics, it is highly likely that the person relies on repression more often than on other defenses and more often than do people who are dissimilar in these respects. For this reason it is better to talk about *repressiveness*, that is, a *tendency* to repress, than about repression, that is, actual instances of repression. This is in principle no different from what any experienced clinician does in the course of a clinical examination. Tests make it easier to compare different people because they are administered and scored in a uniform and systematic manner.

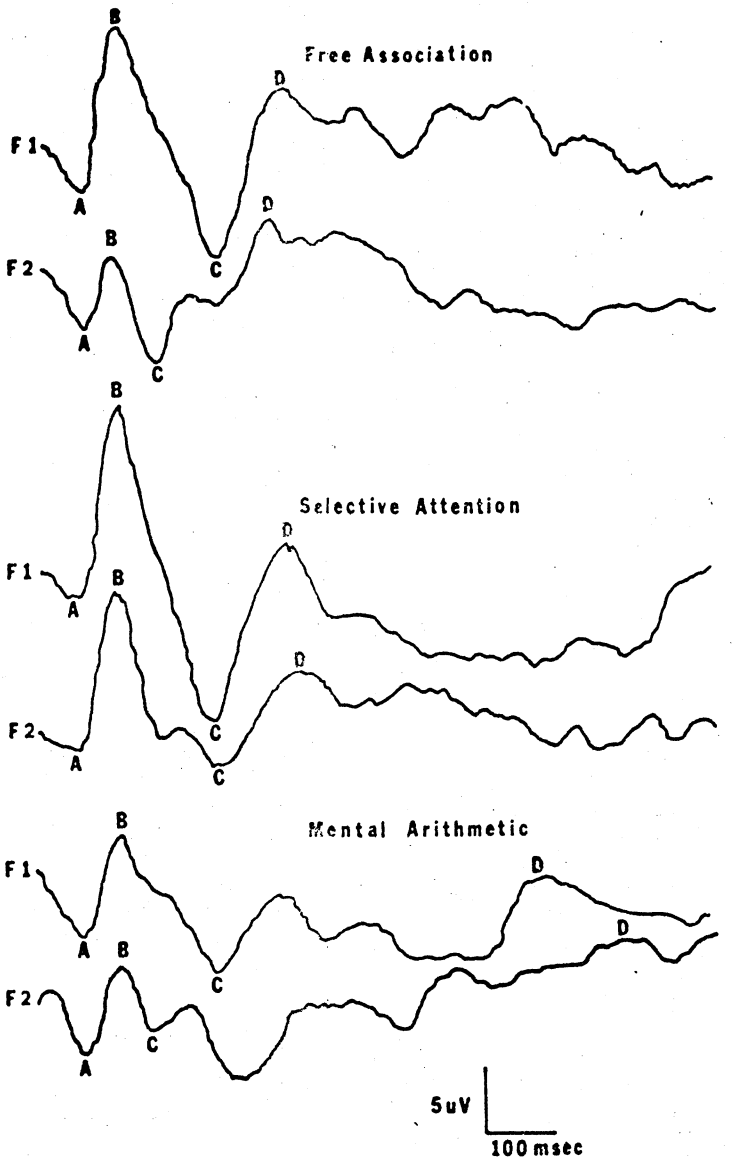


FIGURE 7. AERs for two nonidentical female twins, aged 16 years, 10 months. Upper curve in each pair is from the more repressive twin who was rated 8 for repressiveness as compared to her sister's rating of 5 (both ratings on an 0-10 scale). Components A-B and B-C are appreciably greater for the more repressive twin. Component D, which for the group as a whole is smaller in the more repressive twin, is not as clearly different in this particular pair. The differences between twins in amplitude for the early waves are approximately the same regardless of conditions; this is reflected in the absence of significant interactions of repressiveness and group with conditions.

38-833 O—84——11

As has been noted, the subjects in the first experiment were twins who had already been studied intensively by Gardner. They had been rated for repressiveness on the basis of the Rorschach, Wechsler-Bellevue, and several stories from the TAT. It was possible to select two groups of twins: one group of five pairs who were markedly different in repressiveness and another group of five pairs who were rated as identical in repressiveness. The discrepant pairs were of special interest and were designated as the experimental group. The electrocortical and subliminal verbal data were then analyzed on the basis of the repressiveness factor (Shevrin and Fritzler, 1968b). What we found was startling. In each case the repressive twin showed a *greater* amplitude of response in the early components than did the nonrepressive twin. However, for the later D component the reverse was true (Table 2). In Figure 7, average evoked response curves

TABLE 2
AER AMPLITUDE COMPARISON (IN μV) BETWEEN HIGH REPRESSIVE (HR) AND LOW REPRESSIVE (LR) TWINS

AER Components	A-B				B-C				D (to baseline)			
	HR	LR	t	p	HR	LR	t	p	HR	LR	t	p
Experimental Group (N=5 pairs)	12.64	10.92	2.73	.01	17.93	11.74	5.52	.001	4.50	6.86	2.95	.01
Control Group (N=5 pairs)	9.87	9.77	0.159	n.s.	11.20	11.87	0.598	n.s.	6.23	5.68	0.688	n.s.

for a pair of 16-year-old, nonidentical female twins are shown. The upper curve in each pair is from the repressive twin. In Table 2 the means and probability levels are summarized for the main average evoked response components.

It was also found that subjects who had shown the pen subliminal verbal effect were significantly less repressive than subjects who had shown no such pen effects. Subjects high in the subliminal verbal effect showed a diminished evoked response to the external tactile stimulus and were rated as relatively unrepressive. Or, we could say that these subjects could with relative ease shift attention from outside to inside. The repressive personality, on the other hand, finds this shift harder. In fact, we assume that

he shifts attention in the opposite direction—from inside to outside for dynamic purposes. This makes good clinical sense, and the combined evoked response and subliminal findings provide reasonably objective support for this clinical view.

However, the increase in some evoked response components and a decrease in a later component seemed at the very least puzzling. In our earlier study we suggested that the D component may be associated with brain processes underlying the verbal responses involved in judging a time interval between successive stimuli and thus may be closely related to judgment and discrimination, whereas the earlier waves might be more closely related to attention. The *decrease* in the D wave for the more repressive subjects may thus be a function of diminished ideational activity. The repressive person intensifies his attention to the stimulus at the expense of thinking about it. One consequence of this inverse relationship may be the concreteness of thinking usually associated with repressiveness. The repressive person may be "caught up" in the perceptual reality of the stimulus while ignoring its connotative implications. He is likely to miss the forest for seeing the trees.

In the Shevrin and Rennick (1967) study we were dealing with a neutral supraliminal stimulus. Subjects were aware of the tap to the index finger and it was by no means a highly charged or meaningful stimulus. What would happen if the stimulus were subliminal and meaningful?

The answer to this question could be obtained by correlating repressiveness ratings with electrocortical amplitudes and free-association verbal effects in the two subliminal studies previously described. In the first subliminal study (Shevrin, Smith, and Fritzler, 1969) repressiveness correlated *negatively* with the early amplitude associated with attention which had discriminated between the subliminal rebus and matched control stimulus. However, the correlations were equally negative for both the meaningful and neutral stimulus. At the supraliminal speed (30 msec.) the correlations became positive, although smaller: the correlation between repressiveness and the average evoked response amplitude for the rebus at the subliminal speed was –.59 ($p < .10$), and at the supraliminal speed it was .49 (*ns*). For the control stimulus the same correlations were –.62 ($p < .10$) and .31

(*ns*). Again we found that in this study R and D acted alike, as if some general factor were at work. All correlations between repressiveness ratings and the subliminal verbal effects were negative. For the first 1 msec. condition the rank-order correlation between knee associates and repression was –.90 ($p < .01$).

In the third experiment (Shevrin, Smith, and Fritzler, 1970), in which the same twin design was used as in the Shevrin and Rennick (1967) experiment, a negative relationship was found between repressiveness and the amplitude for the rebus stimulus only. The nonrepressive twin had a significantly greater response to R than to D as compared to the repressive twin in each pair ($t = 2.453$, df 15, $p < .05$, one-tailed test). Thus, the finding for the meaningful stimulus was replicated. Negative relationships between repressiveness and verbal effects were also present. For the first 1 msec. condition, nonrepressive subjects had more penny associates than repressive subjects (Wilcoxon Signed Rank Test, $p = .05$), and more pen clangs (Wilcoxon Signed Rank Test, $p = .05$). The rebus effect (penny associates) was significantly weaker in the repressive twins than in the nonrepressive twins. Although the relationship between repressiveness and amplitude became positive at 30 msec., it was weaker than in the other two studies. We were unable to obtain a clear replication of this finding at supraliminal speeds.

The pattern of findings with respect to repressiveness is an interesting one: within a fraction of a second (by 260 msec.) the cortical evoked response is already influenced by a repressive factor which is associated with a reduction in the amplitude of a component related to attention. Moreover, the evoked response to a meaningful subliminal stimulus is more definitely influenced than the evoked response to a neutral stimulus. There is a tendency for repressiveness to be associated with an increase in amplitude for supraliminal stimuli. Finally, repressiveness is negatively related to subliminal verbal effects.

Although the evidence is not conclusive, this pattern of findings strongly suggests that specific acts of repression are involved. It is still conceivable that some other general factor, like a diminished responsiveness to stimuli, accounts for these findings. An explanation of this type would encounter difficulty in dealing with the findings from the first study in which an *in-*

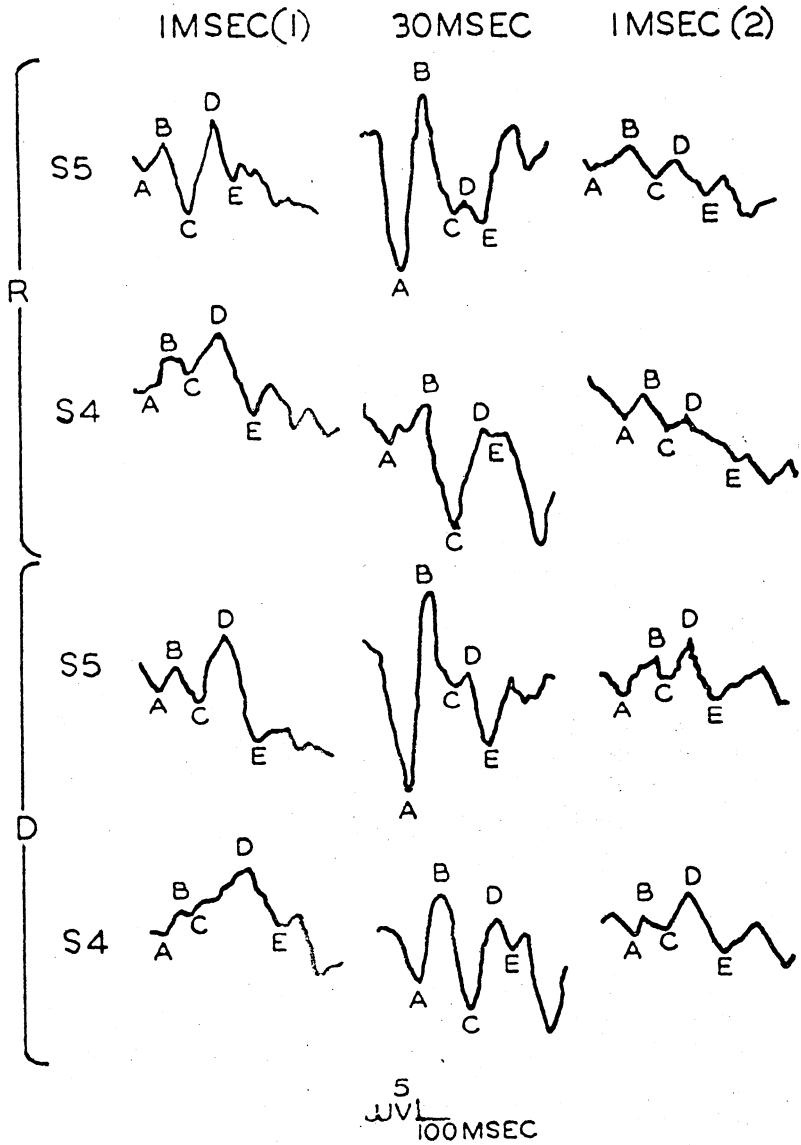


FIGURE 8. Subject 4 is a high repressive subject and Subject 5 is a low repressive subject. The BC component is lower for the PEN/KNEE rebus (R) for Subject 4 than it is for Subject 5 in the first 1 msec. series. The same BC component for the 30 msec. series is slightly larger for the high repressive as compared to the low repressive subject. For the stimulus D the BC component for Subject 4 is absent; the designations assigned on the curve are arbitrary, although they follow certain rules which are applied to all of the curves. Note that the effects diminish in the second 1 msec. series.

crease in responsiveness was present. This finding, however, was not cleanly replicated in subsequent studies. But, more important, an interpretation of this kind would be hard put to account for the relationships to the Rorschach ratings of repressiveness, which depend as much on certain kinds of *increased* responsiveness (e.g., to color) as on *decreased* responsiveness (e.g., fewer responses in general). This parallels the clinical view of repression as in general involving greater availability of affect than ideation.

The findings cited thus far hold true for groups of subjects at acceptable levels of statistical significance. These findings will now be illustrated by the responses of two subjects drawn from the first subliminal study. The curves of a high repressive (S4) and a low repressive (S5) subject are shown in Figure 8. Both are young men, undergraduates in their early twenties. The repressive set of curves is considerably reduced in amplitude for the first 1 msec. series as compared to that of the nonrepressive curves. There is also a tendency for a reversal to occur in these relationships for the 30 msec. condition.

The high repressive subject used considerably fewer pen, knee, and penny associates in the first 1 msec. series of free associations than did the low repressive subject. The high repressive subject's free associations were briefer and contained more references to affect. For example:

Joke . . . *frustration* . . . consistent . . . job . . . *strain* . . . nothing . . . time . . . curiosity . . . *crazy* . . . movement . . . chair . . . question . . . *laugh* . . . insight . . . head . . . others . . . reaction . . . panel.

The low repressive subject's associations were relatively impersonal and unemotional:

Money . . . science . . . sleep . . . bed . . . sheet . . . post . . . springs . . . radio . . . cigarette . . . Pepsi . . . glass . . . ice . . . magazine . . . hello . . . sweat shirt . . . pajamas . . . loafers . . . socks . . . picture . . . frame . . . cloth . . . metal . . . beer . . . can . . . pitcher . . . glass . . . cardboard . . .

Their Rorschachs were strikingly different. The high repressive subject gave half as many responses as the low repressive subject, yet he gave twice as many responses involving color. His performance was marked by much ready affect and a relative constriction of ideation. To Card II, which contains prominent red areas, he responded with laughter, saying, "Oh, I wish you didn't have to make everything so difficult in the morning!" His two responses to the card were: (1) "Two dancing bears" (said loudly and followed by laughter); (2) "A spaceship."

The low repressive subject was unemotional in his responses to the cards. He gave six responses to Card II: (1) "Two monks kneeling, pressing their hands together," (2) "The red part down here could be a butterfly," (3) "or someone's throat," (4) "and it could represent a jet plane being blown up from the rear with a heat-seeking rocket," (5) "and it might represent a Cheshire cat"; (6) "It might also be some sort of demon or devil—some fantastic creature—strange-looking."

A clinician might be tempted to consider the low repressive subject an obsessive-compulsive personality relying on such defenses as intellectualization, isolation, and reaction formation.

DISCUSSION

The combined subliminal and evoked response methods used in the experiments described in this paper may make it possible to investigate a number of issues heretofore not readily amenable to laboratory study: (1) primary- and secondary-process thinking; (2) the relationship between attention and defenses; (3) psychodiagnosis; (4) psychotherapy research.

1. PRIMARY- AND SECONDARY-PROCESS THINKING

The potential usefulness of the method is nowhere better illustrated than in the findings showing that primary- and secondary-process thinking are associated with different AER parameters. The capacity to discriminate between these two levels of thought organization opens up exciting prospects for studying the psychopathology of thinking. This prospect is especially inviting because the method does not depend on complex levels of

clinical inference or intuition (as do therapy records or psychological tests), while staying close to the nature of the phenomena themselves. Apparently, the same subliminal input may be "processed" in a rational, veridical way and in an irrational, unrealistic way. High amplitude of evoked response in a component occurring within the first 260 msec. poststimulus is associated with conceptual-level effects, whereas bursts of alpha occurring at 1.5 sec. poststimulus are associated with clang and rebus effects. Shevrin and Fisher (1967), in their study of the relationship between subliminal stimulation and the sleep-dream cycle referred to earlier, also reported findings which require the assumption that the same subliminal input can be processed on different levels of thought organization which then become conscious in either REM or NREM sleep. If we put the findings from this sleep-dream study together with the findings described in this paper, we can hypothesize that shortly after the subliminal stimulus is flashed the stimulus content is processed and stored in two memory banks, one organized on the basis of secondary-process thinking and the other on the basis of primary-process thinking. Subsequently, when the sleeper enters into stage 1 REM sleep, the "primary-process" memory bank is mainly drawn upon, whereas during stage 2 NREM sleep the "secondary-process" memory bank is mainly drawn upon. The two conditions of thought are apparently separated into different systems of information processing, although in most naturally occurring behavior the two forms are intermingled. For example, in the free associations collected in the experiments, conceptual, clang, and rebus-related words occur in the same stream of thought. The subject might explain (we might say, rationalize) these associations, having such different origins in thought, on some reasonable basis; yet before their appearance in the stream of associations they have been processed in different ways.

2. ATTENTION AND DEFENSES

This topic is much too complex to examine fully in this context. Comments will be limited to the role of attention with respect to repressive defenses. First, the evidence presented makes sense if it is assumed that attention is not limited to conscious-

ness. In the "sense-organ" conception of consciousness, attention is controlled by this superordinate structure: when attention is withheld, a content is presumably kept out of consciousness; when attention is invested in a content, it attains consciousness. But once it is assumed that attention itself can be in the service of *non*conscious structures, the "sense-organ" conceptualization must be radically transformed. For example, when attention is in the service of conscious structures, as in the study involving a supraliminal tactile stimulus, repression is supported by an *intensification* of attention to an external stimulus and a *diminution* of thinking about the stimulus. When attention is in the service of unconscious structures, repression is supported by a *diminution* of attention associated with an *inhibition* of ideation related to the subliminal stimulus. The repressive personality does not uniformly withhold attention in the service of repression. But attention is withheld or invested depending on whether the repressive aim can best be served by *intensification* or *diminution* of attention (H. Schlesinger, 1964). This distinction could perhaps be expressed by referring to the intensification of attention with respect to supraliminal neutral stimuli as *avoidance*, and reserving the term *repression* for the diminution of attention to subliminal inputs. Although the subject may be aware of intensifying his attention to the supraliminal tactile stimulus, one important reason for doing so—to avoid anxiety-arousing ideas—remains unconscious. With respect to subliminal inputs, the entire process is unconscious. According to this view, attention is available to unconscious ego structures, and drive-organized motivational structures can directly mobilize unconscious attention for purposes of subliminal perception. Moreover, at the very start of this subliminal perceptual process, defensive factors may already be at work. Within a fraction of a second a repressive damper is placed on the developing attentional and perceptual processes. Thereafter the consequences in thought are further controlled by repressive or ideational defenses. All of this can take place with awesome rapidity, although the final outcome in some overt response may be considerably delayed. Fisher (1956) suggested this possibility early in the work on subliminal perception.

From an empirical standpoint, one significant weakness of this formulation is that the method does not permit the independent

assessment of *unconscious motives.* We do have an independent assessment of subliminal attention, perception, ideation, and repressiveness, but we do not have any idea about the prevailing motives at work which necessitate avoidance and repression. We can, of course, speculate that they must be related to the sexual and/or aggressive implications of the stimulus, but this approach does not provide an *independent* assessment of unconscious motives. We can fall back on the tests, but there too it is not always easy to distinguish between the defense and what specifically is being defended against. We are in need of a methodological innovation which would most likely involve the manipulation of drive states—a hazardous undertaking.

3. PSYCHODIAGNOSIS

We are always in search of refinements in diagnosis, especially those that offer either more efficient or more unambiguous alternatives to what we have. It is not proposed that the method described here is ready for diagnostic application. The Rorschach, the other psychological diagnostic tests, and a good clinical examination are still our best means. But it is conceivable that, with further work and increased understanding, the evoked response method linked with subliminal stimulation will provide a useful adjunct to diagnosis, especially with respect to such part processes as attention, perception, and their interactions with personality factors.

4. PSYCHOTHERAPY RESEARCH

Related to diagnostic issues is the assessment of change as a result of treatment. In the absence of reasonably reliable and objective indications of change, it is difficult to convince the scientific community of the value of expressive psychotherapy and psychoanalysis. It is, of course, necessary to rely on the best methods we currently have, which are mainly clinical evaluations, psychological tests, and ratings of various kinds. At some point in the future, however, it may be possible to assess shifts in defensive organization from a more to a less repressive orientation by evoked response and subliminal stimulation methods.

The advantage of these methods would be in providing a means for assessing defensive shifts entirely independent of clinical evaluation and judgment. This development still lies some distance in the future, but perhaps the distance is less than we have heretofore imagined.

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BRAIN WAVE CORRELATES OF SUBLIMINAL STIMULATION, UNCONSCIOUS ATTENTION, PRIMARY-AND SECONDARY-PROCESS THINKING AND REPRESSIVENESS

Howard Shevrin

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52

EVOKED POTENTIAL EVIDENCE FOR UNCONSCIOUS MENTAL PROCESSES: A REVIEW OF THE LITERATURE*

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This review will draw together a small, scattered but theoretically significant group of evoked potential studies bearing on the evidential base for the psychoanalytic concept of the unconscious and its relationship to consciousness. These studies, most of which were not undertaken with the psychoanalytic concepts of the unconscious in mind, nevertheless speak to its possible neurological correlates. It will first be necessary to sketch the main outlines of the psychoanalytic idea of the unconscious and its relationship to consciousness, following which the experimental studies will be described and evaluated. The paper will conclude with a discussion of the implications of this research for the psychoanalytic concept of the unconscious.

The Psychoanalytic Concept of the Unconscious

Every science is defined by its interest in a particular phenomenon whose understanding comprises its fundamental task. In physics, the phenomenon is matter in motion; in chemistry, the transformation of physical substances; in biology, the activity of living organisms. Psychoanalysis began with a series of observations on behavioral, emotional, and cognitive changes following emotionally significant reminiscence. The subsequent history of psychoanalysis can be characterized as an elaboration of these observations on the basis of a clinical method developed to explore the conditions under which this phenomenon occurs and the conditions which impede its emergence or modify its character. For example, Freud discovered that the patient's way of experiencing his relationship to the analyst (transference) often signalled the nature of the experiences affecting his current life of which he was unaware and which were related to childhood events. By calling the patient's attention to this relationship and «interpreting» its significance, which meant demonstrating its current impact and its genetic roots, the patient was then

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led to recall heretofore forgotten experiences which marked the beginning of the particular maladaptive pattern under scrutiny.

For our purposes it makes sense to return to the earliest observations because they are least influenced by subsequent conceptualizations and theories and we may thus gain a clearer idea about the nature of the phenomenon itself. In the case of Anna O. Breuer reported that odd behavior, appearing sporadically in the course of her daily preoccupations, often disappeared following the recall of certain experiences. This recall was made possible by an altered state of mind in which she had remarkable access to memories apparently unavailable to her in her normal state (Breuer and Freud, 1895). To Breuer this altered condition appeared similar to hypnosis and he referred to it as a state of autohypnosis. The account of his largely improvised treatment contains many illustrations of this process. At one time, Anna O. complained to him that a dress she was wearing looked blue to her although she knew it was in fact brown. Later that day in her altered, or autohypnotic state, she recalled that a year before she had made a dressing gown for her ill father out of the same material as her dress except that the material for the dressing gown was blue. Her relationship to her father was of considerable emotional significance to her and had already been implicated in other symptoms. Once this recall occurred the false perception disappeared. How can we account for this phenomenon? A cognitive disturbance in one state is altered by a reminiscence in another. Breuer hypothesized that the memory of the blue dressing gown was somehow active during the normal state and produced the cognitive disturbance: it was in a condition of unconsciousness, but nevertheless actively creating a disturbance.

Once this hypothesis is entertained it raises new questions: 1) Why is the memory not available to normal consciousness especially if it is emotionally significant?, 2) What happens to a memory when it is unconscious?, 3) How does it affect conscious experience? Efforts to answer the first question led to the concept of repression and its more general form, the defense mechanisms; efforts to answer the second question led to the concept of primary process ideation: the mental life that is kept from becoming conscious follows different principles of organization than mental life readily available to consciousness; efforts to answer the third question led to models for symptom formation, dreams, parapraxis, humor, and psychotic thinking.

As Rapaport (1967) has pointed out the concept of the unconscious in psychoanalysis is a corollary of a basic assumption: the existence of psychic continuity. Anna O's misrecognition was not simply a random, non-psychological event; rather, it could be u n d e r s t o o d once we become aware of all that was involved for her psychologically, which was supplied by her in her altered state. Psychic continuity is by definition individual and historical: it is always one particular individual's continuity unique to him and made up of a unique sequence of events. What is d i s c o n t i n u o u s in conscious experience (e. g., a brown dress «looking» blue) is actually c o n t i n u o u s once we become aware more completely of the individual's

38-833 O—84——12

experience. Therefore, the concept of the unconscious follows from this assumption of psychic continuity: it refers to those mental events not currently available but which must be assumed to exist in order to account for the underlying continuity.

There can be different conceptions of the nature of psychic continuity. For example, Breuer believed that what was unconscious were d i s s o c i a t e d altered states, much as he observed in his patient, and that hysteria could be accounted for by the examination of these etiologically significant h y p n o i d s t a t e s. By contrast, Freud emphasized m o t i v e s, insisting that a person had to have a «reason» for keeping something out of consciousness and that this «reason» was a m o t i v e. He would have supposed that for Anna O. it would have been disturbing to acknowledge the nature of a close relationship to her father; therefore, she had to keep the memory of the dressing gown out of consciousness but that it persisted in some way and influenced at one point her conscious experience. From Freud's point of view, a motive was a necessary but not sufficient condition for repression. It made repression necessary, but repression itself required a mechanism of some kind for bringing about unconsciousness.

The assumption of a psychological unconscious is a distinctive and unique characteristic of psychoanalysis. However, psychology has done without this assumption before psychoanalysis and in many quarters still does. William James (1890) was scathingly critical of the notion of an unconscious and suggested a point of view involving rapidly alternating states of consciousness as in multiple personalities. Further, he denied the postulate of psychic continuity by asserting that what appears nonsensical and unaccounted for by the usual rules of thought (e. g., seeing a brown dress as blue) was likely due to some temporary aberration in the nervous system. In fact he accounted for the bizarre connections in dreams as due to deficiencies in the nutrition of the underlying neurophysiological processes. There was thus no p s y c h i c c o n t i n u i t y, but an intrusion of physical events directly on the mental; at best there is a complex psychophysiological continuity in which different principles, working independently (e. g., nutrition of the nervous system), randomly interfere with each other. In this system there is no place for an individual, historical consideration of mental events. Modern behaviorism is essentially the heir of this viewpoint: the way to modify behavior is to e x t i n g u i s h a response. Extinction is a neurophysiological concept having to do with a property of the nervous system not unlike James' «nutrition». In this system there is no need for a psychological continuity. It is thus of central importance to see if the psychoanalytic assumption of an unconscious rejected by other psychological systems can receive support from other quarters not concerned necessarily with issues of psychopatholgy or psychic continuity itself. For the psychoanalyst the unconscious is an intrinsic part of his method and as such untestable by the method istelf. It would be significant if there were independent support for the existence of unconscious mental phenomena. In addition, the use of other methods may throw a new

light on the nature of unconscious processes of which the psychoanalytic method itself is incapable.

Unconscious Processes and the Evoked Potential

In 1967, Libet et al., reported that a somatosensory evoked response can be obtained at the cortex when the subject is stimulated by a subthreshold electrical current to the skin. Although the subject consistently reported no sensation the evoked potential revealed a decided cortical response (Libet, Alberts, Wright and Feinstein, 1967). The brain could show cortical responsiveness in the absence of awareness. Libet and his colleagues believed their findings showed an early, p r i m a r y evoked potential which they hypothesized was associated with the subthreshold stimulus. They further speculated that consciousness as such was associated with a later, s e c o n d a r y component. The exact nature of the findings and the investigators' interpretation is best captured in their own words:

> With subdural recordings at a point on postcentral gyrus and with the locus for the skin stimulus matched to the referral from this cortical point, it was found that an average evoked potential could be detected with stimulus strengths that were distinctly below the lower limit for threshold-c (e. g., consciousness). That is, evoked potentials could be detected with skin stimuli which were well below the range of uncertainty and which never elicited any conscious sensory responses.... the evoked potentials produced by such single subthreshold-c pulses of the skin consist mainly of an initial or primary surface positive component... (1973, pp. 769-770).

It was also discovered by these investigators that a single pulse of relatively high current delivered to the thalamic postero-ventral nuclei will not produce a conscious sensory experience although a large evoked potential appears in the appropriate area of the somatosensory cortex (Libet et al., 1967). Libet concludes:

> It follows from these considerations, that the presence or amplitude of an evoked potential, particularly of the primary component, cannot be assumed to be an indicator of the occurrence or intensity of subjective sensory experience without other validation under the conditions of study... (1973, pp. 770-771).

Below we will consider other theoretical implications of Libet's work with respect to the conditions for conscious sensory experience itself.

In the same year as the Libet findings appeared, Riggs and Whittle (1967) published some provocative observations which have been largely ignored in the interim. The investigators were interested in finding out what accounted for the subjective disappearance of a stabilized retinal image. When eye movements are prevented experimentally from shifting the retinal image from one set of receptors to another there is a gradual fading and often a complete disappearance of a previously clear pattern. Their intent was to discover if disappearance of the visual pattern would be accompanied by a loss of electrical responses at the retina and at the occiput. The cortical evoked potential was obtained by the use of bipolar occipital electrodes, each placed 2.5

cm. to the right of the midline, one at the level of the inion and the other 6 cm. higher on the head. The stimulus was made up of black and white stripes alternating 47.4 times per second. Their surprising finding was that both the retinal and occipital EP's revealed *no* differences in latency, amplitude or rate under stabilized and unstabilized viewing. Peripheral and central electrical activity remained constant whether or not the subject was aware of the stimulus. As with Libet's finding, awareness and cortical evoked activity are not necessarily correlated. Riggs and Whittle summarized their findings as follows:

> The results with image stabilization may be summarized with a statement that no diminution was found to occur in the electrical responses evoked in either the retina or the occipital cortex. This generalization holds despite the fact that the subject reported a marked difference in the subjective appearance of the stripes under the two conditions. The stabilized condition produced a fading of the image that sometimes amounted to virtually complete disappearance. The persistence of the electrical activity was also found under a variety of conditions of stimulation with respect to frequency, intensity and wavelength (p. 445)... it is... natural to suppose that... signals are blocked at levels higher than that from which we record (p. 449).

Some years later Riggs (1976) speculated that these results pointed to a higher centre for consciousness. His speculations took him back to Descartes and the pineal gland. In an amazing leap over the centuries, Riggs vaulted over the Freudian concept of the unconscious for which the notion of cortical activity without consciousness would constitute no surprise.

In an earlier investigation of the stabilized retinal image relying, however, on the EEG and not on evoked potentials Lehmann et al., (1965) found convincing evidence that the subjective disappearance of the image was very likely brought about by a centrally paced signal taking the form of bursts of alpha. Just prior to the time the subject reports the image as faded or disappeared, there are bursts of alpha occurring in the EEG. The investigators conclude that «periodic fading of the stabilized retinal image is the result of central changes» (1965, p. 342). When we combine the findings from these two studies dealing with the stabilized retinal image, we can hypothesize that movement of the stimulus across the retina is a necessary condition for awareness of the stimulus but not of its information processing.

In a series of studies bearing directly on the relationship between the evoked potential and the psychoanalytic idea of the unconscious, Shevrin and his co-workers have reported a number of findings in which the VEP was used (Shevrin and Rennick, 1967; Shevrin and Fritzler, 1968a, 1968b; Shevrin, Smith, and Fritzler, 1969, 1970, 1971; Shevrin, Smith, and Hoobler, 1970; Shevrin, 1973). The paradigm for this research was based on the phenomenon of subliminal perception (Dixon, 1971). A pair of visual stimuli matched for area, color, shape and contour but differing in attributable meaning was presented to subjects at subliminal speeds (1 ms; 3mlam luminance). It was hypothesized that the experimental stimulus, a picture of a pen pointing at a knee, would evoke a subliminally greater amplitude of response than the matched control, which was made up of abstract shapes lacking any meaning-

ful characteristics. This hypothesis was based on the assumption that an intrinsically interesting stimulus would excite greater attention; a number of evoked potential studies had already shown that attention was associated with increased evoked potential amplitude (Hillyard, 1977). It was found that a bipolar electrode display, occiput (2.5 cm. to the left and above the inion) to frontal (at the midline close to hairline), revealed a consistent difference at subliminal levels in the hypothesized direction. The differentiating amplitude was a positive going component peaking at approximately 160-180 ms. poststimulus. Note should be taken of the fact that this component is a late, secondary amplitude and does not fit with the Libet finding of an early primary component as the one associated with subthreshold stimulation. Nevertheless, in the absence of any awareness of the stimulus the subject showed a clear, differentiating evoked potential.

In addition to the subliminal findings the same stimuli were presented at 30 ms. under the same illumination. Subjects were able to differentiate the stimuli; although amplitudes and latencies were greatly increased, the same difference between the two stimuli was found. Thus at both sub- and supraliminal exposure times consistent amplitude differences were found that accorded with previous findings on attention.

The experimental paradigm employed by Shevrin and his colleagues was distinguished by a unique assessment of associative thought processes instigated by the subliminal stimuli. This was important for two reasons: 1) the psychoanalytic concept of the unconscious was not simply a physiological one, but distinctly psychological — unconscious m e n t a l processes were involved, 2) as Uttal (1965) has pointed out the mere presence of a neurophysiological response may or may not be of cognitive relevance: the evoked potential may simply s i g n a l the existence of a process but not actually be related to its encoding. For both of these reasons it was necessary to show that the experimental stimulus elicited subliminal cognitive effects.

Fortunately, a considerable body of research on subliminal perception (Dixon, 1971) had already established that associations can be used to demonstrate subliminal cognitive effects. In particular, it has been found that the association networks activated by a subliminal stimulus are broader and more loosely connected than the networks activated by the same stimulus presented supraliminally. It was thus possible to hypothesize that the picture of the pen and knee would elicit m o r e associations subliminally than supraliminally, while no such difference should be found for the control stimulus. A reliable standard procedure for identifying such associations was developed. The hypothesis was supported in several experiments (Shevrin and Luborsky, 1958; 1961; Spence and Holland, 1962; Spence, 1964). More associations related to the experimental stimulus appeared sub- rather than supraliminally. Thus, it was demonstrated that the subliminal stimulus was not only s i g n a l l e d by a differentiating evoked potential but that the evoked potential was associated with cognitive effects related to the meaning of the stimulus.

As described in the opening section of this paper, the psychoanalytic concept of the unconscious requires that a) there be evidence of some difference in the nature of the unconscious thought processes as compared to conscious thought, b) that there be evidence of repression or defensive activity. With respect to the first point the Shevrin investigations already showed, consistent with other subliminal studies, that the association networks would be broader and looser in the subliminal condition. The experimental stimulus was constructed to permit another level of thought organization to be identified: this new level was based not on the conceptual use of language but on the concrete, phonemic use of words. Luria and Vinogradova (1959) have demonstrated that the semantic field changes from the conceptual to the phonemic under the influence of a mild sedative in normal subjects and in the usual functioning of the mentally retarded. Freud long ago posited that in a variety of conditions, psychological and normal, (dreams, the formation of neurotic symptoms, psychotic thinking, in early childhood, slips of the tongue, humor) the conceptual character of language is often lost and is replaced by concrete, phonemic association links. These phonemic links were instances of what he referred to as the primary process in ideation. In the picture of the pen and knee it is possible to trace in the association process words conceptually related to the stimulus (e. g., pen: ink, paper; knee: leg, bone), but also phonemically related (e. g., pen: pennant, happen; knee: any, neither). Furthermore, the two words (pen and knee) form a new word (penny) unrelated conceptually to its constituents. It was found that conceptual and phonemic associations correlated with different parameters of the subliminal evoked potential. Conceptual associations correlated with a differentiating amplitude, while the clang level associations correlated with bursts of alpha-like activity approximately 1500 ms. post-stimulus. Primary process and conceptual or secondary process cognitive activity appear to be related to different parameters of the subliminal evoked potential. It was tempting to interpret this difference as paralleling the psychoanalytic distinctions between preconscious and dynamically unconscious mental processes insofar as the former are considered to be more characterized by conceptual thinking and the latter by primary process ideation.

One last finding from these investigations of some relevance to the distinction between a descriptive unconscious (preconscious) and dynamic unconscious remains to be described. It was found, as hypothesized, that subjects rated as highly repressive on the basis of the Rorschach had smaller subliminal evoked potentials to the experimental stimulus and associated fewer stimulus related words. There was thus some reason to believe that repressive forces may have been at work although the evidence was still indirect and inferential (Shevrin and Fritzler, 1968b; Shevrin, Smith, and Fritzler, 1969; 1970).

In an effort to replicate the Shevrin findings Schwartz and Rem (1975) introduced a number of differences from the original experimental paradigm: 1) the exposure time was increased to 3 ms. above the absolute threshold, 2) stimuli were presented in pairs rather than in blocks, 3) the stimuli within

the pairs were presented in a fixed time interval, one second apart, 4) no association data were obtained, 5) the task was changed from one requiring attention to a single stimulus presentation and description of what was seen to a discrimination task in which the subject was asked to judge whether the stimuli within a pair were the same or different. Subjects were presented with four different types of pairs: experimental-control; control-experimental; experimental-experimental; control-control. The same stimuli were used as in the Shevrin experiment. There were two findings, one negative and one positive. Schwartz and Rem did not find the amplitude difference reported by Shevrin and his co-workers. However, they did find that cross-correlations between the stimuli within pairs showed that the evoked potentials were significantly smaller for the experimental-control, control-experimental pairs than for the control-control, experimental-experimental pairings. These findings indicated that even though subjects were not making a better than chance discrimination (at 3 ms.), the evoked potentials were still differentiating between the experimental and control stimuli. Schwartz and Rem interpreted these differences as likely due to the minor structural differences between the stimuli rather than to the differences in content or meaning. In the absence of any means for determining meaning (i. e., no association method) this interpretation was open to doubt.

Shevrin (1975) pointed to a number of difficulties in the Schwartz and Rem experiment: in addition to significant differences in procedure, there were also some statistical difficulties that might account for the failure to find an amplitude difference. Schwartz and Rem, in a subsequent re-analysis of the data, found that indeed there was an amplitude difference between the experimental and control stimulus but that it was in the o p p o s i t e direction from that reported by Shevrin: the amplitude for the control stimulus was l a r g e r than for the experimental stimulus. It is of some interest to note that Rietveld (1966) has reported that with visual stimuli attention may have an anomalous effect on evoked potential amplitude depending on the difficulty of the task: when the task is difficult the evoked potential associated with the attended to stimulus d i m i n i s h e s, while in the simpler task it i n c r e a s e s over the evoked potential to the unattended to stimulus. By presenting the stimuli in pairs, one second apart, Schwartz and Rem may have significantly increased the difficulty in the attentional task and thus reversed the amplitude relationships found by Shevrin for the experimental and control stimuli. In any case, the null hypothesis cannot as yet be rejected that n o d i f f e r e n c e exists between the visual evoked potential amplitudes for the experimental and control stimuli presented either below the detection threshold (1 ms.) or below the discrimination threshold (3 ms.).

There is another group of visual evoked potential studies that cast some light on the relationship between the VEP and consciousness, although none of these studies was undertaken with this end in mind. Begleiter, Porjesz, Yerre, and Kissin (1973) employed an ingenious experimental paradigm to investigate the effect of e x p e c t e d stimulus intensity on the VEP. Following a training session in which subjects were asked to anticipate a bright

dim flash signalled by a different tone, medium intensity flashes were ibuted randomly among bright and dim flashes depending on the prepa- y signal. Half the medium flashes were preceded by the «bright» flash al and half by the «dim» flash signal. Electrodes were placed at the mid- 2.5 cm. above the inion and at the vertex. The left earlobe was used as rence. It was found that the evoked potentials recorded at the vertex were elated in amplitude with the e x p e c t e d stimulus intensity (bright lim) and not with the actual stimulus intensity (medium); while n o f e r e n c e was found at the occiput. The investigators interpreted these ılts to mean that a m e m o r y of a previous stimulus may be released by expectation. Why this was not found at the occiput was left unexplained. e difference between vertex and occiput is of more than passing inter- : it appears that at the occiput, that is, at the sensory receiving area an curate evoked potential is obtained, while at the vertex an expected (and accurate) EP is obtained. What was the subject «seeing» — the accurately corded stimulus at the occiput or the expected stimulus at the vertex? Unfor- nately no data is provided as to what the subjects actually reported seeing. he entire context of the experiment leads one to believe that they «saw» ıe expected stimulus. If so, then the occipital EP remained inaccessible to wareness and thus unconscious.

In a subsequent experiment, Begleiter and Porjesz (1975) employed a pro- edure that left little doubt that the subjects s a w a bright or dim light nd that their vertex evoked potentials were correlated with this perception ven though they were responding to a flash of medium intensity. Subjects vere rewarded for correct discrimination of actual bright and dim lights among which the medium flashes were interspersed although subjects were led lo expect only bright or dim flashes. Thus, they reported s e e i n g a bright or dim flash when only a medium flash was presented. In this experiment no occipital electrode was employed so that replication of the occipital finding was not possible.

Three other experiments support the interpretation that evoked potential activity in the front of the brain is associated with what the stimulus «means» to the subject and what he may in fact be aware of. Johnston and Ches- ney (1974) presented subjects with a visual stimulus which could be seen as the number thirteen or the letter B depending on the context (e. g., flanked by the numbers 17 and 12 or by the letters P and E). Following a familiariz- ing series in which either letters or numbers were presented in random or- der, in an experimental session subjects were told that they would be seeing either numbers or letters and that their task was to name the numbers or letters as rapidly as possible. With the exception of one subject the remaining subjects had electrodes either 2.5 cm. above the inion at the midline or 2.5 cm. above the nasion. For one subject electrodes were placed at both locations. Differences between the same stimulus perceived as either letters or numbers were only found at the frontal location. Again, correct information available occipitally had no effect on what the subjects reported. Some process must

keep this information from affecting higher levels of cognition and apparently awareness as well.

Brown, Marsh and Smith (1973) found that the same word, «fire» evoked a different auditory potential over the speech area when it was used as a noun (e. g., «Sit by the fire») as compared to when it was used as a verb (e. g., «Ready, aim, fire!»). No such difference was found over the right hemisphere.

In an earlier study Weinberg, Walter, and Crow (1970) investigated the evoked potential to actual and imagined stimuli with the use of electrodes implanted in orbito-frontal and cingulate cortex as well as on the surface of the superior frontal cortex. They found that the evoked potential to actual flashes and clicks were similar to the evoked potentials when the subjects expected the stimuli but were in fact not stimulated. There was some evidence that what the investigators called the e m i t t e d (as contrasted to e v o k e d) potential had a shorter latency by some 25 ms. They conclude:

> From what we know about the nervous system there is no reason to assume that the experience of an image depends on the establishment of those processes originally involved in the registration and coding of the stimulus. However, an interesting implication of our observations is that an assumption of this nature might be a reasonable working hypothesis. The fact that emitted potentials correlate well with potentials which are evoked by stimuli suggests that the underlying electrophysiological processes which are initiated by stimulus presentation may be re-activated under appropriate conditions of motivation and set even in the absence of those stimuli (p. 8).

Again in this study no electrodes were placed in the sensory receiving areas, so we do not know if there would have been *no* emitted potentials found there.

There are two reports in the literature dealing with the evoked potential and hysteria. Hernandez-Peòn, Chavez-Ibarra, and Aguilar-Figueroa (1963) obtained evoked potentials from a fifteen-year-old girl suffering from a glove and sleeve analgesia and thermoanesthesia of the left arm. Electrodes were located in the midline of the vertex and one each in the parietal region at a midpoint between the ear and the midline. Whereas the unaffected right arm showed a clear evoked potential response to a pin prick, the hysterically affected left arm showed no clearly evident evoked potential, (although inspection of the curves [see figure 2, p. 890] supports a more ambiguous interpretation insofar as some low amplitude activity appears to be present in the evoked potential for the left arm). Nevertheless, activity in the right arm evoked potential is considerably greater in amplitude. Following the administration of a mild barbiturate (Kemithal) the left arm evoked potential now showed a large amplitude. Unfortunately, it is not noted in the article whether the evoked potential was from the parietal, vertex or both electrode sites. In view of the finding reviewed above concerning the difference between vertex and occipital leads it would have been good to know from which electrodes the findings were reported. If the potentials were recorded at the parietal electrodes (paralleling the occipital electrodes for visual stimuli) then it would mean that the inhibition was at an earlier point in the afferent pathway.

If the inhibition were at the vertex it would mean that the inhibition occurred between the sensory receiving areas and other cortical areas. Further it might clarify with what aspect of the evoked potential consciousness itself is associated. Shevrin, for example, found that a subliminal stimulus in normal subjects with mild repressive tendencies elicited a r e d u c t i o n in amplitude of a later secondary component. The electrode display was bipolar — occipital to frontal —and thus makes it difficult to separate out contributions from the different cortical areas. All that can be said is that in both studies a r e d u c t i o n in evoked potential activity was found in the presence of repressive characteristics.

Of special importance is a question concerning the subject's awareness of the stimulus when the mild barbiturate lifted the e l e c t r i c a l inhibition. The answer to this question is of some importance because of Libet's findings that a primary amplitude is associated with an a b s e n c e of awareness for a somatosensory stimulus, leading Libet to hypothesize that a secondary component may be associated with awareness; on the other hand, Shevrin found that a s e c o n d a r y amplitude was present in the a b s e n c e of awareness for a visual stimulus. Further, a number of investigations (Johnston and Chesney, 1974; Begleiter et al., 1973; Begleiter and Porjesz, 1975; Weinberg et al., 1970; Brown et al., 1973) indicate that a late secondary component in the anterior of the brain is associated both with meaning a n d awareness. If Hernandez-Péon's hysterical subject was u n a w a r e of the pin prick in a mildly sedated state while her evoked potential showed a clear secondary wave this would then be comparable to the Shevrin finding that a secondary component can be present in the a b s e n c e of awareness. Note should also be taken of the fact that in the Shevrin repression studies for repressive subjects the secondary component did not disappear but was d i m i n i s h e d relative to less repressive subjects. We may be dealing with a threshold factor: a secondary amplitude below a certain strength would not elicit consciousness, or the secondary component must last for some critical t i m e d u r a t i o n. This latter alternative would fit well with the Libet findings (to be discussed below) on the existence of a cortical factor in consciousness that is a function of stimulus d u r a t i o n. The tentative hypothesis would be that the presence of a secondary component in and of itself may not coincide with consciousness, but that its persistence needs to be of a certain critical duration. In the studies on EP correlates of meaning the stimuli were all supraliminal and thus the time duration of the secondary amplitude would be beyond the critical time postulated.

In a second study Potts and Nagaya (1969) investigated the visual evoked potential in three cases of hysterical amblyopia. They found that the visual evoked potential to a red stimulus subtending a visual angle of 0.6 degrees elicited a normal evoked potential in both the normal and the hysterically affected eye. From the context it would appear that the visual evoked potentials for the hysterical subjects came from the occipital to parietal electrodes although this is not clearly indicated either in the accompanying

figure or in the text. Here again it would have been interesting to have a reported data from the F_z and C_z electrodes which were also employed in this study. In the actual amblyopic patients their frontal leads showed less difference between the normal and amblyopic eye than at the more posterior leads, suggesting that what little sensory input was received at the occiput was nevertheless relayed forward to the frontal regions and underwent some further processing there. Would the hysterical patients have shown little such frontal activity for the pseudo-amblyopic eye?

This review will conclude with a consideration of Libet's intriguing findings concerning the adequate cortical stimulus for a conscious experience. Libet (1973) has been able to demonstrate that in order for a subject to experience a somatosensory stimulus a critical stimulus p u l s e d u r a t i o n is necessary. For most subjects it is in the 0.5 to 0.6 second range although the pulse duration may be as little as 0.4 seconds and as long as 1.0 seconds. Further, the pulse duration value is relatively constant for a given subject. Since Libet had already demonstrated that a somatosensory evoked potential can be detected at the cortex with single pulses well below the threshold of conscious experience, it would appear reasonable to suppose that a peak duration is necessary for consciousness itself to appear. The interesting paradox emerges that a single pulse lasting 0.1 second delivered to the skin can evoke a conscious experience while it takes a pulse lasting at least 0.4 seconds to elicit a conscious experience at the same sensory site with direct cortical stimulation. Is it possible that a natural stimulus has a different requirement for consciousness as compared to the artificial stimulus delivered directly to the brain? Libet has demonstrated that this is not the case. First, he cited the well-known fact that even though the peripheral stimulus may be brief its central effects may be measured in hundreds of milliseconds. Secondly, he employed a novel application of the masking technique to show that indeed the later activity evoked by the peripheral stimulus is necessary for conscious experience to occur. The masking procedure is based on a well-known phenomenon that when a second stronger stimulus follows a previous weaker stimulus within a certain critical time interval the first stimulus will not be perceived although it is above threshold strength for conscious experience when presented alone. Libet used as his first stimulus a single pulse delivered to the skin which was at threshold strength for conscious experience. A second or masking stimulus was delivered directly to the somatosensory cortex in the region including the area stimulated peripherally. The direct cortical stimulus has the advantage of not confounding peripheral and central factors as is often the case in the usual masking experiment where both stimuli are delivered peripherally. The direct cortical stimulus consisted of a brief train lasting about 0.5 seconds of pulses presented at 60 pulses per second. The peak current was 1-1.5 times the strength needed to elicit a conscious experience. Libet found that for most subjects if the interstimulus interval was between 125-200 ms., and for one subject up to 500 ms., consciousness of the first stimulus was absent. The subject was only aware of the second stimulus.

Further, the cortical stimulus had to last a certain minimum duration; single cortical pulse did not work. Libet concluded:

> Retroactive masking of the peripheral (S_1) sensation by a later stimulus (S_2) directly to somatosensory cortex, with S_1—S_2 intervals of up to 200 ms. or more, could only be due to interference with some late components of the brain responses to S_1 that are necessary for the mediation of a conscious sensory response.... the extent of retroactive masking that could be demonstrated provides powerful support for the hypothesis that a relatively long period of suitable cerebral activations is a necessary feature of the experiences (1973, p. 775).

If we combine Libet's two findings, the first showing that a cortical primary response is present for a subliminal stimulus and the second that a cortical pulse train is necessary for conscious experience, we can conclude that somatosensory stimuli can register cortically without consciousness and that conscious experience itself is a function of some additional system having its own properties. Of critical importance for consciousness is the train duration. As suggested above, this train duration may be more critical for consciousness than the presence of a secondary amplitude which persists for less than the critical time.

Summary and Conclusions

Although the studies reviewed are few and replication is largely absent, the evidence is generally favorable for the psychoanalytic concept of the unconscious and, in particular, supports, the following propositions:

1) As predicted by psychoanalytic theory, cognitive activity can go on without benefit of consciousness. Between conscious experience and neurophysiological processes there is no leap as assumed by James, for there are u n c o n s c i o u s cognitive processes that can be detected by a neurophysiological indicator, the evoked potential. The assumption of unconscious thought processes helps us to explain phenomena presented to the psychoanalyst from the early observations of Breuer and Freud in the S t u d i e s o n H y s t e r i a to the modern application of the free association method in psychoanalytic treatment.

2) Unconscious cognitive activity can be divided into two classes: cognitive activity that is no different in organization from conscious cognitive activity, referred to in psychoanalysis as the preconscious; and cognitive activity that is characterized by a different organization from conscious cognitive activity, referred to in psychoanalysis as the dynamic unconscious. There is some evoked potential evidence to support this proposition; namely, the work of Shevrin and his colleagues on the differences between conceptual and clang associations which apear to be related to quite different parameters of the VEP.

3) The dynamic unconscious implies the existence of defenses that actively inhibit the appearance in consciousness of certain contents. Here too there is support from evoked potential studies. Shevrin and his colleagues have shown that repressive subjects had a smaller VEP to subliminal stimuli and

associated fewer stimulus related words. Hernandez-Peon et al., were able to demonstrate a comparable reduction in the somatosensory evoked potential in the left arm of an hysterically anesthetized girl. Potts and Nagaya have demonstrated that in hysterical amblyopia the occipital evoked potentials were indistinguishable for the affected and non-affected eyes, strongly suggesting that the inhibition occurred anteriorly, very likely in frontal areas.

4) Finally, the psychoanalytic view leads to the conception of consciousness as a separate system having its own conditions of activation. The full range of cognitive activity can go on without benefit of consciousness. Consciousness itself is activated under certain special conditions. Libet's work speaks directly to this point. Only when a stimulus can activate a central cortical process lasting a certain minimal time will consciousness occur. Further, that the presence of a later secondary component need not be accompanied by consciousness unless it lasts a certain critical time. It need only be added that a variety of factors may keep this activation from taking place: a) a second stronger stimulus interfering with the later activity of a previous stimulus, very likely a common and normal occurrence, b) a subliminal stimulus too weak to elicit the necessary central activity but capable of activating the full scale of cognitive activity, c) some centrally controlled inhibition likely based on motivation as in hysterical repression. Investigations of the latter condition should make it possible to discover the nature of such defensive mechanisms as repression.

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The Psychological Unconscious

A Necessary Assumption for All Psychological Theory?

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ABSTRACT: *The notion of complex psychological processes operating outside of awareness has traditionally been associated with the concept of the unconscious used by psychodynamically oriented clinicians; it has never found an equivalent place in the mainstream of American experimental psychology. However, mounting evidence from several rather diverse fields of empirical research (e.g., selective attention, cortical evoked potentials, subliminal perception) provides support for such a concept, and, in fact, explanatory constructs of a similar nature have been embodied in several current models of perceptual processing. While there clearly remains an enormous gap between the clinically based conception and the experimentally based conception of the nature of these unconscious processes, they nevertheless seem to provide an interface between two seemingly disparate approaches to the understanding of personality.*

In a section entitled "Can States of Mind Be Unconscious?" William James (1890), in his classic *Principles of Psychology*, presented 10 arguments in favor of unconscious processes and 10 refutations of these arguments. The arguments in favor of unconscious states of mind ranged from unconscious inference, as in perceptual constancy, to unconscious motivation, which has since become so closely identified with psychoanalysis and Freud. To most of the arguments in favor of unconscious processes, James replied that a more parsimonious approach could be based on the assumption of neurophysiological processes unassociated with any psychological counterparts (e.g., "activated braintracts") or on the assumption that a psychological state could be briefly conscious and quickly forgotten, a fate suffered by many dreams. He also advanced the argument of a "split-off" cortical consciousness, as in multiple personalities, which sounds very much like a position recently taken by Hilgard (1977). James (1890) warned that "the unconscious is the sovereign means for believing whatever one likes in psychology and of turning what might become a science into a tumbling ground for whimsies" (p. 163).

Historically, American psychology since James has taken extreme positions on the issue of unconscious mental processes. Behaviorism, reacting against the methodological deficiencies of introspection, not only rejected the unconscious but also rid itself of consciousness, a direction hardly agreeable to James, for whom consciousness was the very subject matter of psychology. Psychoanalysis, as reflected in much clinical practice, has continued to base itself on unconscious mental processes, no matter what its particular school—classical Freudian, neo-Freudian, Jungian, Sullivanian, and so forth. Recent popular variants, such as transactional analysis, primal-scream therapy, and gestalt therapy, also share the assumption of unconscious mental processes. In more recent years, the "black box," into which no Skinnerian would peer, has tempted the voyeuristic impulses of not a few behaviorists. A growing number of behaviorists have begun thinking about thinking, finding it necessary to hypothesize about cognitive factors mediating between stimulus and response. Shallice (1972) has argued against the behaviorists' rejection of consciousness as a pseudoconcept, contending that "concepts such as strategy and rehearsal are . . . used as explanatory concepts. Such concepts depend on the theorist reflecting on conscious experience" (p. 383). Others, such as London (1972), Bandura (1974), and Lazarus (1977), have described their own evolution from radical behaviorism, in which cognitive mediating factors play no role, to a view of psychology in which subjective and conscious events are important. As cognition and consciousness have returned to psy-

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chology, the concept of unconscious mental processes has received increasing attention (Erdelyi, 1974; Neisser, 1976; Nisbett & Wilson, 1977; Posner, 1973).

It is the purpose of this article to show that in a number of different research areas, investigators have developed explanations that incorporate concepts akin to psychological unconscious processes. In fact, the variety and extent of such explanations, touching on several significant areas of investigation, suggest strongly to us the likelihood that no psychological theory can do without the assumption of a psychological unconscious.

Before presenting the models referred to, it will be necessary to offer a definition of unconscious psychological processes.

The Psychological Unconscious: Description and Definition

The clinical phenomena that led to the assumption of unconscious processes often take the form of a patient describing a bothersome condition that the patient can neither account for nor control (e.g., a phobia, a self-destructive pattern of behavior, a depressive mood) (Rapaport, 1944/1967; Sherwood, 1969). The patient's report in effect conveys a discontinuity in his or her ability to make sense out of some important aspect of experience.[2] Thus, a discontinuity is inferred when the apparent (i.e., consciously accessible) causal factors for a particular thought, feeling, or act are not, in and of themselves, sufficient to explain its occurrence. The psychodynamically oriented clinician then assumes that the disturbance can be accounted for by the existence of certain psychological processes unknown and unavailable to the patient. Underlying the concept of a psychological unconscious is the axiomatic belief that psychological factors are not epiphenomenal but can be causative agents. The psychological unconscious is simply that class of psychological events that are at the time unknown to the patient but that actively affect the patient's behavior. Furthermore, this impact on behavior reveals itself as a discontinuity, in which illogical or irrational relationships are often involved. Thus, the psychodynamic concept of the unconscious can be defined in terms of three characteristics: It is *psychological*, it is *active*, and it can be *different* in character from conscious psychological processes.

By *psychological* we mean simply that all categories of descriptive terminology applicable to conscious experience can also be applied to unconscious processes: perception, judgment, thought, affect, motivation, and so forth.[3] Thus, personally significant, cognitively abstract, and highly idiosyncratic experiences can be unconscious. Moreover, inasmuch as conscious processes are correlated with brain events, the same may be assumed for unconscious processes.

By *active* we mean that unconscious processes affect ongoing behavior and experience, even though the experiencer may be unaware of this influence. From this point of view, a memory trace, indicating some structural modification of the nervous system, would not be considered to belong to the psychological unconscious until such time as it actively influenced psychological events.

By *different* we mean that unconscious processes may follow different principles of organization than those that characterize psychological processes occurring during the normal, waking state of consciousness.

On the basis of this definition, we arrive at two postulates—a weak form and a strong form—for which we shall venture to adduce a range of relevant theory in psychology at large. In the *weak* form of this postulate, we shall assume that psychological unconscious processes exist and actively affect conscious psychological processes. In the *strong* form of the postulate, we shall add only that these psychological unconscious processes follow different laws of organization. It is worth noting that the view of unconscious processes held by psychodynamically oriented clinicians includes an important feature that we have not incorporated into either of the above postulates: We make no reference at this point to the special role of mo-

[2] The reader is referred to Rapaport (1944/1967) for an extended discussion of the concept of discontinuity and its relationship to psychodynamic concepts.

[3] We are defining the term *psychological* on the basis of an ostensive definition, comparable to defining the color red by pointing to a series of red objects. In this way we are essentially using a common sense approach, drawing on readily available experience shared by most people. We chose this type of definition rather than an analytic type (e.g., red is defined as that color experience associated with a physical stimulus having the property of so many angstrom units) to avoid getting into a "mind–body" quagmire. For our present purposes, we propose to leave open the question whether by such terms as judgment, thought, affect, and the like we are talking about "mind" or "body." We are simply talking about identifiable and reportable phenomena.

38-833 O—84——13

tivational factors (e.g., drives, impulses), which are so important to the psychodynamically oriented clinician. However, in the course of our discussion, we shall attempt to point out the ways in which motivational factors fit within our conceptual framework.

Evidence and Theory in Support of the Psychological Unconscious

We shall now consider a number of different sources of evidence and a variety of theories, all of which appear to involve an implicit assumption of psychological unconscious processes. These areas of research and theory are (a) selective attention, (b) subliminal perception, and (c) certain visual phenomena involving perceptual processing, namely, retinal image stabilization, binocular rivalry, and backward masking. We do not consider these areas to be exhaustive of the areas in psychology that would provide support for our thesis; rather, we consider these particular areas to be of special importance because of the diversity of the methods on which they are based and because of their theoretical significance.

SELECTIVE ATTENTION

An individual, at any given time, is confronted with more stimulation from within and from without than can be managed adaptively. Some degree and kind of selection must occur. What is the nature of this selection process? In recent years some interesting answers have emerged, based on a body of highly ingenious experimentation. We shall focus on the general theories that have been advanced to account for the findings emerging from this area of research, rather than reviewing the specific studies themselves. For detailed reviews of selective-attention research, see Moray (1969) and Kahneman (1973).

Inherent in all the major models of attention is the assumption that at least part of the cognition related to attention takes place outside of awareness. Six such models will be described briefly. These models are based on extensive experimental research that has given rise to a literature marked by sharp controversy. For our purposes, however, we need rely only on the noncontroversial and broadly accepted findings, while identifying the controversial issues wherever they are relevant.

The earliest of these models was proposed by Broadbent (1958). In Broadbent's original "filter theory" of attention, signals enter the perceptual system through a number of parallel sensory channels. These parallel sensory inputs feed into a memory store, where they are retained for a few seconds. Beyond this memory store is a single channel that has a much smaller capacity than the combined capacity of all the input channels. A filter, lying between the memory store and the limited-capacity channel, selects one of the input lines and allows the signals that enter through it to gain access to the limited-capacity channel. Signals feeding in from the other channels are held briefly in memory and then lost. Thus, an initial sensory analysis of the stimulus input does occur prior to awareness of the nature of that input. Broadbent indicates that the determination of which signals are allowed access to the limited-capacity channel is based not only on the properties of the stimuli but also on the state of the organism (e.g., its drive state).

While a filtering mechanism of the sort described does involve perceptual processing outside of awareness, it should be noted that the analysis that occurs prior to awareness is a very rudimentary one inasmuch as only sensory information is involved—*meaning* is not a factor. Moreover, there is no provision for those stimuli that do not achieve awareness to be stored in any form. However, because Broadbent uses terms like *memory* to describe processes occurring prior to awareness, it appears that he considers them to be psychological; because they precede awareness, they are unconscious; lastly, because the filtering that occurs outside of awareness affects what will become conscious and because it interacts with the state of the organism at the time, these unconscious psychological processes are not simply latent but are active in our sense. There is also a hint that these unconscious processes work on a different principle from that of conscious processes—input is organized along multiple channels, as contrasted with the single channel for conscious processes. On the whole, however, Broadbent's (1958) model is more consistent with the weak postulate for unconscious processes than with the strong postulate.

Treisman's (1964) theory of perception is similar to Broadbent's in that information enters the system through multiple parallel channels. Treisman's model incorporates two stages of perceptual processing. The initial filter analyzes the incoming signals only on the basis of simple physical

properties, such as intensity or frequency. All signals pass through this filter and are processed further; however, this first filter attenuates the signal strength of the nonattended channels to a level below that of the attended channel. The signals then proceed through a second screening process based on more complex characteristics. In this higher order screening process, thresholds differ for different types of signals, so that even though a signal may have been attenuated by the earlier filter, it can still pass through this later screening process if it is of a type for which the threshold is low. In this second-level screening, the mechanisms that respond to biologically (or emotionally) important signals have permanently lowered thresholds; the thresholds for other types of signals may vary, depending on circumstances. In this model, the full import of a signal reaches awareness only after it has passed through the higher order second-stage screening process.

For Treisman, the processing that occurs prior to awareness involves far more complex attributes of the stimulus than is the case in Broadbent's (1958) model. Furthermore, these complex unconscious processes are concurrent (going on in parallel channels), whereas conscious processes are serial (single-channel in nature). Thus, Treisman's (1964) model is strongly consistent with the weak postulate and moderately consistent with the strong postulate.

Deutsch and Deutsch (1963) have propounded a theory of attention similar to Treisman's except that it does not posit an initial analysis on the basis of simple physical characteristics. Instead, all signals reach the higher order analyzers and then undergo complex perceptual analysis. Each signal increases the output of some mechanism for perceptual discrimination to a certain level; only the highest level output enters awareness. Conscious perception, in this scheme, is a response to the output of the higher order analyzing mechanisms; thus complex processing must occur outside of awareness. This model is, for our purposes, essentially similar to the Treisman (1964) model, and the same considerations apply to it as to the latter model.

The fourth model of attention to be discussed is that of Neisser (1967). Neisser's model is similar to the others described in that it posits parallel input processes that feed into a single mechanism of awareness. Neisser differs from the other theorists, however, in his conception of the nature of the processing that occurs without awareness and also in the degree to which he concerns himself with the explication of these perceptual processes in cognitive terms.

According to Neisser (1967), attentive mechanisms come into play only after preliminary processes have already ordered the stimulus field into coherent figural units, because these attentive mechanisms cannot operate on the whole field simultaneously. The preliminary, or preattentive, processes must of necessity be global and holistic in nature, since their function is to separate each figure or object as a whole from the rest of the stimulus field. Attentive processes, in contrast to the preattentive ones just described, are sequential, proceeding in a logical fashion on the basis of what is appropriate in terms of past experience.

Neisser's model allows for the possibility that a crude percept resulting from the preattentive processing may receive no further elaboration within consciousness. He raises the possibility that such elaboration may be deliberately avoided in certain areas and suggests a similarity between this notion and the clinician's concept of repression.

Neisser's (1967) model is clearly consistent with the weak postulate of a psychological unconscious: Complex psychological processes are carried on unconsciously, and there is an active commerce between these unconscious processes and conscious ones. But unconscious psychological processes are also qualitatively different from conscious ones in this scheme. Neisser's model is thus consistent with the strong postulate for unconscious processes as well.

In the fifth model to be described, offered by Posner (1973), a single-channel central-processing capacity is the aspect of attention most closely associated with consciousness. Consciousness, in this view, involves such mental operations as rehearsal and choosing a response. At least two stages of perceptual processing, encoding and comparison with long-term memory, occur outside of consciousness; that is, they occur before the subject becomes aware of the stimulus.

It would appear that the first stage of processing in Posner's scheme consists in the encoding of the stimulus. There is, in Posner's (1973) view, "simultaneous registration and retention of multiple codes of the same event" (p. 41). The different ways in which a given stimulus can be encoded (e.g., visually, symbolically) represent "isolable subsystems," which develop independently of each

other. The later, rehearsal phase (associated with consciousness) is code specific and tends to select one of the codes for dominance. However, even when attention is directed (because of the nature of the task) to only one of the ways in which a stimulus can be coded, the stimulus may nonetheless be coded other ways as well. Posner (1973) gives an example of this phenomenon, drawn from the visual-search literature:

> When the subject is presented visually with a list of letters, the names are also activated although they may not be conscious. Similarly, when the subject hears a list of letter names, the visual code is increased in availability. (p. 59)

The next stage of analysis after encoding involves comparison of the stimulus with the contents of long-term memory. According to Posner, the processes involved here also take place outside of awareness. In the studies Posner draws on most, the subject is first presented with a "target" stimulus (e.g., a digit) and is then told to search through a stimulus array to locate that particular stimulus. This stage of processing, in Posner's view, involves a comparison of each stimulus in the array through which the subject is searching with the previously presented stimulus (now stored in long-term memory). This comparison takes place outside of awareness. Posner (1973), reviewing research bearing on this point, concludes,

> The data suggest that both the target and non-target items are subject to a memory search process but only the target item gives rise to the phenomenological experience of jumping out at the subject. Thus, the phenomenal experience occurs rather late in the sequence of processing. (p. 41)

Posner believes that in the course of perceptual processing the stimulus makes contact with long-term memory prior to the point at which awareness occurs. He also argues that the fact that a limited-capacity channel exists in the sequence of perceptual processing does not restrict the range of associations that can be activated by a given stimulus outside of awareness. "Indeed," suggests Posner (1973), "it might require more effort to inhibit such associations than to produce them" (p. 41). This notion fits in well with the strong postulate because it suggests that processing outside of awareness is qualitatively different from processing within awareness.

For Posner and his colleagues, then, consciousness is bound up with those processes that involve the limited-capacity system. "This mechanism," they state, "serves to impose a serial order upon what are essentially widespread parallel processes initiated by a stimulus" (Posner, Klein, Summers, & Buggie, 1973, p. 11). They even go so far as to suggest a physiological correlate (an event-related brain potential) for this central processing mechanism: "The mechanism whose activity we have been detecting by interference [i.e., the mechanism of consciousness] is also the one which releases the late positive wave (P_{300})" (Posner et al., 1973, p. 11). Posner's model is consistent with the strong postulate for unconscious psychological processes.

Although not primarily dealing with attention, Sternberg's (1975) research on memory in visual processing is of some relevance. The basic paradigm in Sternberg's studies involves two steps. First, the subject commits to memory a set of stimuli (e.g., letters, digits, figures), which are called the *positive set*. He is then presented with a single test stimulus and must indicate by pressing one of two switches whether or not the test stimulus is a member of the positive set.

The results of Sternberg's reaction-time studies led him to hypothesize that the subject goes through the positive set, comparing each member with the test stimulus, at a rate of about 30 comparisons per second. Sternberg (1975) states specifically that "judging from what subjects report, the search is not accessible to introspection" (p. 5). Furthermore, Sternberg cites evidence that this rate is substantially faster than the rate of covert speech (which might be taken as one index of the rate of conscious processing). And he also states that "even when introspections include a search, it is reported to be slow and self-terminating" (p. 10), by which Sternberg means that the subject stops the search as soon as he or she finds the counterpart of the test stimulus among the comparison stimuli. In other words, there is a qualitative difference between conscious and unconscious processing. Sternberg's model is consistent with the assumption that unconscious psychological processes exist and do, in fact, obey different laws from those governing conscious processes, and thus his model is consistent with the strong postulate.

Summary. All six theorists assume that an initial phase of cognitive activity occurs outside of awareness, and each uses psychological terms to describe the processes involved. Second, these processes outside of awareness interact with and influ-

ence ongoing and subsequent conscious psychological processes, at the very least insofar as they determine what enters consciousness. For these reasons, these models are consistent with the weak postulate for unconscious psychological processes. But there is more. All six models posit that cognitive processes outside of awareness are based on a different mode of cognition from that of conscious processes. For five of these models, unconscious processes are multichanneled, whereas conscious processes are single channeled. In the sixth model (Sternberg, 1975), at least one kind of unconscious process is considered to be exhaustive in nature and much more rapid in execution, as compared with conscious processes. For some theoreticians there are even greater differences. For Neisser (1967), preattentive cognition is global and gestalt in character, though lacking in symbolic significance; for Posner (1973; Posner et al., 1973), multiple codes can be activated outside of awareness even though only a single code may enter consciousness. Posner raises the possibility of the inhibition of associations existing prior to consciousness as well as of a physiological index for consciousness itself. All of these models are based, not on clinical data, but largely on experimental investigations. There is still a considerable gap between the conception of unconscious psychological processes offered by these theorists and the view of the same processes held by psychodynamically oriented clinicians. For instance, none of these theoreticians discusses the possibility that percepts can be stored in long-term memory and can exert an active influence on simultaneous conscious processes, even though they may never enter into awareness or may not do so until long after they were originally perceived. The conception of unconscious motivation and memory held by most psychodynamic theorists, however, does in fact encompass such a possibility.

We shall now turn our attention to the literature on subliminal perception, in which some of these possibilities are considered.

SUBLIMINAL PERCEPTION

In selective-attention research, the stimuli are either fully conscious or can become conscious once attention is directed to them. In dichotic-listening experiments, for example, on which a considerable amount of attention research is based, stimuli are usually presented separately to each ear. Subjects are instructed to attend to the stimuli in one ear and to repeat them out loud to insure continued attention. Of interest is the finding that, generally, subjects are unaware of the stimuli in the unattended ear, although these stimuli exercise an influence on various response parameters of the attended stimuli. The unattended stimuli remain outside awareness only as long as a subject is attending to the other ear.

There is also an extensive literature on the investigation of stimuli that cannot be consciously perceived, even when attention is directed to them. These are stimuli that are presented so quickly that no matter how alert and focused a subject's attention, the stimuli remain unreportable. Nevertheless, effects of the subliminal stimuli are detectable. Dixon (1971), who has written an extensive evaluation of the subliminal-perception literature and has offered an interesting neurophysiological model, has suggested that selective attention and subliminal perception represent "end points on a single continuum of information processing" (p. 306). At any given time, an individual is presented with a broad array of stimuli of varying intensities and of varying relevance to adaptive tasks. Selection on some basis must occur. Subliminal stimuli are those stimuli that do not become conscious simply because they are too weak in intensity, even though they may be highly relevant.

Subliminal-perception research is relevant to our thesis because this research suggests that complex effects of stimuli that do not enter awareness can persist well beyond a few seconds or minutes, which is the span that the effects of stimuli in selective-attention experiments have thus far been determined to persist. At the same time, subliminal-perception research has been a source of controversy in psychology. In fact, Dixon's (1971) book is subtitled *The Nature of a Controversy*. The same book presents a strong case in favor of subliminal perception as a valid phenomenon, based on converging evidence from eight bodies of supporting research. More recently, Nisbett and Wilson (1977) have argued,

> The basic question of whether people can respond to a stimulus in the absence of the ability to report verbally on its existence would today be answered in the affirmative by many more investigators than would have been the case a decade ago . . . largely because of better experimental methods and the convincing theoretical argument that subliminal perception phenomena can be derived . . . from the notion of selective attention and filtering. (p. 239)

These comments are of special relevance because much of the controversy has centered on methodological difficulties.[a] Our emphasis in this article, however, is not primarily on the actual research investigations but on the explanations developed to account for a variety of findings. As with the selective-attention literature, controversies within the field may challenge one or another experimental hypothesis, but it can be shown that there is an underlying commonality in the explanations offered that does not depend on any one particular finding. Unlike selective-attention researchers, who did not set out to study unconscious psychological processes but were increasingly compelled to take such processes into account, researchers in the area of subliminal perception have often been interested in such processes from the start and have purposefully studied them experimentally.

Before briefly describing a number of models for explaining subliminal-perception findings, some of which parallel the models just presented for selective attention, we think it may be helpful to formulate what we consider to be the key issues bearing on our thesis for which subliminal-perception studies provide support:

1. Subliminal-perception research is concerned with stimuli too weak to become conscious immediately, no matter how much attention is directed to the stimulus field. No amount of shifting attention, as in dichotic-listening experiments, can bring the stimulus into consciousness.

2. Nevertheless, these stimuli have detectable effects on conscious processes, both immediately and, in some cases, after an interval of time.

3. These effects emerge in changed states of consciousness, as in dreams. By contrast, selective-attention research thus far has been concerned exclusively with one state of consciousness: the usual waking, alert state that most psychological subjects are paid to maintain.

4. Subliminal stimuli can be used to explore differences between unconscious and conscious processes.

The subliminal-perception literature provides an additional line of converging evidence for the necessity of assuming the existence of unconscious psychological processes.

We shall now describe five models developed to explain the various findings in the subliminal-perception literature.

Klein and Holt (1960) postulated that the effects of subliminal stimuli persist only briefly and have to be incorporated quickly into some ongoing cognitive activity or else they will disappear and leave no trace of their presence. They argued that inasmuch as the subliminal stimulus is never cognized as such but is only detected by its indirect effects on conscious processes, it will remain ineffective unless it can be assimilated into some ongoing cognitive activity. This model was based largely on an experimental paradigm in which subliminal stimuli were interspersed among conscious stimuli. The subliminal stimulus was either the word *angry* or the word *happy*, while the conscious stimulus was an ambiguous face that could be judged either way. The investigators determined that the face was seen as happy or angry depending on the particular subliminal word presented (Bach & Klein, 1957; Sackeim, Packer, & Gur, 1977; Smith, Spence, & Klein, 1959). Klein and Holt's model follows closely the findings derived from their particular method. Interestingly, this model is comparable to Broadbent's (1958) view: Stimuli enter a short-term memory system, and unless they become conscious immediately, they have no further effect. The main difference from Broadbent's model is the fact that this interaction between short-term memory and attention concerns subliminal stimuli exclusively. Klein and Holt's model is consistent with the weak postulate for unconscious psychological processes.

On the basis of an interesting series of experiments, Spence arrived at a model that is at variance with the model proposed by Klein and Holt: In his research Spence determined that a subliminally presented word can evoke a series of associations based on its meaning (Spence, 1961, 1966; Spence & Holland, 1962; Spence & Smith, 1977). He found that associations could be elicited at some point after the subliminal stimulus had been presented. On the basis of his findings, Spence posited what he called the "restricting effects of awareness." According to Spence, when a stimulus is presented subliminally, as compared to when it is presented supraliminally, a greater

[a] One important controversial issue has centered around the use of threshold measures in subliminal research, which, according to signal-detection theorists, confounds sensory sensitivity with response parameters. Dixon (1971) has taken up this issue, discussing the theoretical implications as well as citing subliminal-perception research based on signal-detection techniques that have yielded positive results. Nisbett and Wilson (1977) also discuss signal-detection theory and subliminal perception.

variety of associations are elicited. Awareness of the stimulus appears to limit or restrict the range of associations elicited by the stimulus word. This concept appears to be quite similar to the one offered by Posner (1973) when he proposed that stimuli are multicoded (i.e., elicit multiple associations) even though we may be consciously aware of only one of these codes or associations. Again, the significant difference is that Spence is concerned solely with subliminal stimuli, which in themselves never become conscious. Spence's model is consistent with the strong postulate for unconscious psychological processes.

Perhaps the most comprehensive model for subliminal perception has been offered by Fisher (1956). A pioneer in subliminal-perception research, he suggested that it would be useful to assume that all cognitive processes of whatever kind have to start in an unconscious phase; some become conscious almost immediately, while others remain unconscious for longer periods of time and may then appear in various altered states of consciousness such as dreams. Moreover, Fisher interpreted his findings to support the view that unconscious cognition is qualitatively different from conscious cognition. His model is consistent with the strong postulate for unconscious psychological processes.

Dixon (1971) proposed one of the first neurophysiological models attempting to account for subliminal perception. He argued that although certain instances of subliminal perception may involve temporal or spatial summation at the level of peripheral receptor neurons, for complex stimulus arrays the processes involved must lie at higher levels of the nervous system. As evidence for this hypothesis, Dixon cited a study done by Libet, Alberts, Wright, and Feinstein (1967) demonstrating that cortical responses can be evoked by stimuli below the awareness threshold. He also described an experiment by Shevrin and Rennick (1967) which indicated that subliminal stimuli influence both cortical evoked potentials and the subject's free associations. And he discussed a study by Begleiter, Gross, and Kissin (1969) which suggests that it may be the meaning rather than the structure of the subliminal stimulus that determines both the cortical response and subsequent behavior.

Dixon's (1971) proposed physiological model is consistent with these findings and also with results of studies of perceptual defense which suggest that the threshold (in terms of intensity) for emotionally significant stimuli, such as words or pictures, tends to be either higher or lower than the threshold for emotionally neutral stimuli. Dixon argued that the most important mechanism underlying these phenomena probably involves corticofugal influences on the reticular activating system. According to this view, the classical afferent fibers transmit the information that forms the specific content of consciousness, but these fibers do not per se mediate awareness. For awareness to occur, there must be not only sensory input through these afferent fibers but a simultaneous activation of the nonspecific reticular system.

In subliminal perception, then, the intensity of the stimulus is great enough to elicit activity in the sensory fibers but lacks sufficient energy to activate the nonspecific reticular system. Thus information reaches the cortex without awareness of the stimulus itself.

Subliminal perception, according to Dixon, is made possible by the fact that the primary, classical afferent lemniscal system (which conveys sensory information to the cortex) conducts faster than the secondary, nonspecific extralemniscal system (which is involved in reticular activation). As a consequence of this disparity in conduction speeds, it is possible for information to reach the cortex and for the cortex to exert inhibitory control over the reticular system prior to the arrival of the neural impulse that would normally have activated that system and thereby produced awareness of the stimulus.

Inasmuch as this suggests that the underlying neural processes are different for subliminal and supraliminal processes, Dixon's (1971) model is consistent with the strong postulate for unconscious psychological processes. And, whether this particular model is correct or not, the most important contribution Dixon has made with regard to the physiological basis of subliminal perception (as he himself has pointed out) is simply to demonstrate that such a phenomenon is plausible in terms of current neurophysiological knowledge. Such a demonstration, in turn, can serve as a spur to further investigation of the neurophysiological underpinnings of unconscious psychological processes. To the extent that such future research can firmly establish that such neurophysiological measures as cortical evoked potentials index unconscious psychological processes in the same way that evoked potentials have been shown to index conscious per-

ceptual processing, it will provide investigators with an additional tool with which to study these unconscious processes.

On the basis of findings from a series of evoked-potential studies employing a pair of visual stimuli presented sub- and supraliminally, Shevrin (1973) proposed that the evidence strongly suggests that (a) complex unconscious psychological processes have identifiable neurophysiological correlates, (b) these neurophysiological processes are associated with attention to the meaning of the stimulus, (c) different parameters of the evoked potential are associated with different thought processes related to the subliminal stimulus, and (d) subjects characterized as repressive, on the basis of psychological tests, show reduced evoked potentials to the subliminal stimuli but show augmented potentials to the same stimuli when they are supraliminal. Moreover, Shevrin (1978) has suggested that there may, in fact, exist an evoked-potential correlate of consciousness. This correlate may take the form of a critical duration of a late positive evoked-potential component occurring sometime between 150 and 250 msec poststimulus. This model is based in part on Libet's findings demonstrating that a certain critical duration of cortical excitation ($\frac{1}{2}$ sec in actual time) is necessary before consciousness of a stimulus is activated (Libet et al., 1967). Thus, the "weakness" in subliminal stimulation may not be the failure to activate the reticular activating system but may be a failure to activate it for a critical duration. Shevrin's explanation, in particular the point noted in (d) above, is consistent with the strong postulate for unconscious psychological processes.

In partial confirmation of Shevrin's work, Kostandov and Arzumanov (1977) have reported that the average evoked potential associated with emotionally significant verbal stimuli showed systematic changes in latency and amplitude as a function of consciousness.[4] When neutral and emotionally meaningful words were present in consciousness, a positive wave at 300 msec poststimulus (P_{300}) tended to be greater in amplitude for the emotional words at the occipital region and also shorter in latency; no differences were found at the vertex. When neutral and emotionally meaningful words remained unrecognized, latency differences disappeared, but significant amplitude differences were present in favor of the emotional words at both the occipital site and the vertex site for P_{300}. Kostandov and Arzumanov (1977) concluded that "the difference in the amplitude of the evoked potential for neutral and emotional words suggests . . . that even if the verbal stimulus is not recognized, the analysis of its semantic content occurs at the cerebral cortex" (p. 321). They have hypothesized that "unspecific impulses" from the limbic system must undergo a different fate depending on whether the emotional stimulus is conscious or not. When it is conscious, the effect of these impulses is restricted to the occipital region; when the stimulus is unconscious, their effect appears to spread to the vertex as well. The possible psychological effects of this spread are not specified, although one can speculate that they may be related to Spence's "restricting effects of awareness" and the "single-channel" conception of consciousness embodied in a number of cognitive models of selective attention. It is also important to note that, as in previous perceptual-defense studies, the recognition threshold for the emotionally meaningful words is higher than the threshold for the neutral words for most subjects but lower for some subjects. Nevertheless, the evoked-potential difference is found regardless of threshold. Thus we can see that there is indeed a prior cognition of semantic properties, as evidenced by the evoked potential, to which the individual responds with either a raising or a lowering of recognition thresholds. The defense or vigilance is subsequent to actual cognition. Insofar as there are differences for unconscious stimuli, we can consider this study to support the strong postulate for unconscious processes. It is also of interest, in view of Posner's (1973) hypothesis concerning the P_{300} amplitude as a possible correlate of consciousness, that the Russian investigators found that the P_{300} amplitude was the critical correlate. For the Russian investigators, however, P_{300} appears to be associated with unconscious processes, whereas Posner has hypothesized that P_{300} might be a correlate of consciousness. Further research will be needed to reconcile this difference.

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[4] It is of considerable interest that a growing number of Russian investigators have been conducting investigations on subliminal and other unconscious processes. The Russians have sponsored an international conference on unconscious processes; three volumes of the proceedings of this conference have been published, containing articles by Russian, American, French, German, and other investigators (Prangishvili, Sherozia, & Bassin, 1978).