Headache pain has been described as the most common medical complaint of civilized man (Diamond and Dalessio, 1973). The etiology of headache pain has been traced to vascular, muscular, psychological (conversion, delusional, and hypochondriacal) and organic disease factors by the Ad Hoc Committees on the Classification of Headache, 1962. Diamond and Dalessio (1973) have estimated that eight percent of all headaches seen by a general physician are migraine or one of its variants, and are vascular in nature. Diamond and Dalessio (1973) estimated that 90 percent of all headaches seen by a general physician are psychogenic in nature. Only two percent of headache pain appears to be traceable to organic disease, traction, or trauma.

Headache pain, of course, only one kind of chronic clinical pain. It has been shown that psychological factors can alter, very significantly, clinical pain in general, which is either acute or chronic in nature, regardless of whether the etiology of the pain is psychogenic or organic (Beecher, 1959; Sternbach, 1974; Melzack, 1973; Evans, 1974). Hence it is clear today that psychological variables can powerfully influence the course of clinical pain in general, headache pain in particular, and even to the point of masking pain of organic origin.

Currently psychological factors in pain control are regarded as non-specific and have been loosely lumped under the title of the "Placebo Effect." The placebo effect relates to those "non-specific" or inert variables that have reliably influenced the outcome of an intervention (drug, surgery, or psychotherapy). They are regarded as non specific because they are not found in controlled research to reliably and durably influence the outcome of an intervention. Nor are these "non-specific" variables logically related to the known etiology of the disease or condition. Further, both the nature of these "non-specific" variables and the mechanism of their action has been uncertain.

A "placebo" is defined as any therapy, or the component of any therapy, that is deliberately used for its non specific, psychological or psychophysiological effects, or that is used for its presumed specific effect on a patient, symptom, or illness, but which unknown to the patient and therapist is without specific activity for the condition being treated (Shapiro, 1971). At least three concepts appear to be important to this definition.

1. That the effect is psychological.
2. The belief systems of the patient and therapist are critical to the effect.
3. The effect can influence both the psychological and physiological variables. This may imply that the effect can influence both the symptoms and the etiology of the illness.

Placebos have been known to be more powerful than, and to reverse the action of, potent active drugs (Shapiro, 1971). Placebos can have powerful effects on organic illness, on malignancies and can mimic the effects of active drugs (Shapiro, 1971; Sternbach, 1964). For example, studies have found that dose--response and time--effect curves for an active drug and a placebo are similar and that the side effects of a placebo and an active drug may be similar (Evans, 1974). Further, the effects of a placebo and an active medication may interact and become additive. For example, Lasagna and Associates found in 1954 that for placebo non-responders a standard dose of morphine was only 54 percent effective, but for placebo responders, morphine was 93 percent effective.

Specifically with respect to the management of pain, Beecher (1959) reviewed 15 double blind studies of severe clinical pain. He found that a placebo reduced the pain by at least half of its original intensity in 35 percent of the patient population. Evans (1974) reviewed 11 double blind studies and found that clinical pain was reduced by half of its original intensity in 36 percent of the patients.

In 1974, Evans found that a review of seven studies indicated that a placebo was 56 percent as effective as a standard dose of morphine, which is a powerful analgesic. In a review of ten studies, he found that a placebo was 54 percent as effective as aspirin and 56 percent as effective as Darvon. The latter is, of course, an analgesic of intermediate strength. He concluded that the effectiveness of a placebo as compared to a standard dose of any analgesic is a constant under double blind conditions. In other words, if a therapist believes he is administering a strong drug, a strong placebo effect is obtained. If he believes he is administering a weak drug, a weak placebo effect is obtained. In other words, the strength of the placebo effect is, among other things, related to the therapist's belief system. The patient may infer from the therapist's verbal and non-verbal behavior how much confidence the therapist has in the medicine he is prescribing.

The following conditions have been investigated in relation to the placebo response:

**SUBJECT VARIABLES**

1. The subject variables, for example, age, sex, intelligence, religiosity, compliance, educational level, degree of psychopathology, depression, anxiety, dependency, extraversion, etc., have been studied in...
relation to the placebo response. The only two subject variables that have been shown to be reliably related to the placebo response are anxiety (Shapiro, 1971), or more specifically, trait anxiety (Evans, 1974) and depression (Shapiro, 1971).

2. The patient's expectations generally appear to be significantly related to the outcome of both psychotherapy and drug therapy (Goldstein, 1962; Shapiro, 1971; Evans, 1974). Patient expectations also appear to be more specifically related to the placebo response (Shapiro, 1971; Evans, 1974).

3. No reliable relationship has been found between the subject variable, suggestibility or hypnotizability as measured by standardized laboratory tests of hypnotizability and the placebo effect. However, recently more clinical tests of hypnotizability suggest that some evidence for such a relationship may emerge (Moore, et al., 1976; Katz, et al., 1974). Tests of suggestibility done in a sterile laboratory will not necessarily predict the tendency to make those types of verbal--imaginal elaborations in the clinical situation that most saliently define the hypnotizable individual. It appears that under variable laboratory conditions some people are reliably hypnotizable (Hilgard, 1965) but there is no data presently to indicate that this reliability of response holds up in the clinical situation or cross situationally (from laboratory to clinic). Hence, the impressive reliability in the laboratory of hypnotic susceptibility scales does not necessarily imply that such reliability of response can be observed with a clinically stressed patient in a situation where hypnosis has intrusive implications for a patient's life style. Potent and complex subjective--imaginal factors which can mobilize autonomic and motor behavior in the emotionally charged clinical situation may be only minimally present in the relatively impersonal and non-intrusive laboratory situation. Hence, it would be hazardous to make predictions about verbal--imaginal control of behavior (hypnosis) from the laboratory situation to the clinical situation. Perhaps for a small sub-set of individuals modest cross-situational reliability of hypnotic responses may be observed but for the vast majority of people, the bulk of the variance of behavioral response appears to be more related to situational factors (Mischel, 1968).

THERAPIST VARIABLES

1. Physicians who routinely use medication get stronger placebo effects than those who do not (Evans, 1974).

2. The physician's attitude toward the patient and his attitude toward the treatment is related to the strength of the placebo effect. In general, a therapist who likes his patient, is confident, is warm, empathic, and is personally interested in his patient and his method of treatment, is more likely to get strong placebo effects. This observation is reliable across various clinical syndromes, clinical procedures, different types of therapists, different theoretical orientations and different treatment situations, laboratory or clinical (Shapiro, 1971; Goldstein, 1973; Evans, 1974; Truax and Mitchell, 1971). The above observation also fits the frequent clinical impression that therapists generally get better results early in their professional career (while they are still enthusiastic) than later. It also fits the statement by Trousseau that "you should treat as many patients as possible with the new drugs, while they still have power to heal". The fame, popularity, and prestige of the therapist and the treatment in the community also appears to be related to the placebo effect (Shapiro, 1971). Hence, one way of getting stronger placebo effects is to package and merchandise oneself more effectively. But packaging without product or "specific effects" will, in the long run, encounter placebo "sag" or extinction.

PROCEDURAL VARIABLES

1. Continued use of placebo medication is related to decreased effectiveness over time. Evans (1974) has suggested that episodic association with specifically effective ingredients may sustain the placebo's strength or prevent what I have called placebo sag.

2. As in the case with active medications, higher doses of a placebo are more effective than lower doses. Two pills are more effective than one pill.

3. The ritual of delivery also potentiates the placebo. For example, a placebo injection is more rapidly effective than an oral delivery of a placebo.

4. The verbal instructions associated with the delivery can also potentiate the placebo effect. For example, if the therapist and the patient believe that a powerful drug (morphine) has been used.

5. The color, shape, size, and the degree of unpleasantness of the placebo also affect its power (Shapiro, 1971). Foul tasting, painful and unpleasant treatments like bleeding, leeching, starvation, dehydration, emetics, etc., have been and are today cross-culturally popular remedies in primitive societies (Shapiro, 1971).

6. The general context in which the placebo treatment is administered, and the attitudes of the staff towards the placebo treatment can powerfully influence the placebo's effect (Shapiro, 1971). For example, one study (Volgyesi, 1954) found that the effectiveness of a placebo injection could be reduced from 70 percent to 25 percent if the nurse communicated a negative attitude toward the treatment procedure.

The mechanism through which the placebo effect exerts its influence on clinical pain is unknown, but there appears to be good consensus among authorities that the mechanism is psychological in nature. The following psychological mechanisms have been hypothesized to explain the placebo effect.

1. Suggestion Hypothesis

A suggestion and/or hypnotizability hypothesis appears to be favored by Shapiro (1972). Barber (1969) has demonstrated that instructional suggestions with or without a formal hypnotic induction procedure can alter pain threshold and tolerance. Hilgard (1975) makes a distinction between suggestion and hypnotizability and concludes from studies that for non-hypnotizable people, suggestion can reduce pain to a
point equal to that of placebo. But for subjects who are highly hypnotizable, pain reduction is significantly greater than that produced by placebo.

2. Anxiety Reduction Hypothesis

The role of anxiety in pain control has been stressed by Beecher in 1959, and more recently by Evans in 1974. Increasing anxiety appears to reliably increase rate of pain intensity for a constant nocuous stimulus. Evans (1974) distinguishes between state and trait anxiety. He concludes that changes in pain perception and suffering are related to changes in trait or chronic anxiety and not significantly related to state anxiety.

THE PLACEBO EFFECT AS A CONDITIONED RESPONSE

I propose that the placebo per se, the context in which it is administered and the individual administering it, may come to function for the patient as a conditioned stimulus for recovery from discomfort or pain. In other words, classical and operant conditioning occurring in the course of the individual's history of social and private learning may come to establish through association certain stimuli as conditioned stimuli for recovery from pain. For example, pills, injections, white coats, hospitals, surgery, doctors, nurses, etc., can become conditioned stimuli for the relief from pain, dysfunction, or illness. These conditioned or discriminative stimuli may have, in the past, been associated with events that were active or specific ingredients for the relief of pain (e.g., morphine) or illness (antibiotics). In terms of classical conditioning the specific or active ingredients may be conceptualized to function like unconditioned stimuli or from the operant conditioning viewpoint as healing biological and other consequences. These healing consequences and events may have been reliably associated with neutral or "placebo" events in the life history of the culture and individual. The nature of this conditioned response (placebo response) is uncertain. It is probably a patterned psychophysiological reaction (S. Schwartz, 1976) which is subjectively labelled emotion.

This conceptualization regards the placebo as a conditioned stimulus, which elicits the conditioned emotional response of hope (Hower, 1960). The learned cognitive components of this critical emotion can centrally trigger the psychophysiological alterations and stimulate the energy mobilization that reduces the probability of anxiety, depression, and guilt. As these inhibitory psychophysiological patterns recede the probability of expanding the patient's behavioral repertoire and making "well" or non-patient behaviors more likely increases. To the extent that "well" or non-patient behavior increases in frequency, the patient may be less preoccupied with his pain or with the magnitude of his illness. Hence natural healing based on inherent biological mechanisms can proceed unobstructed. Of course, the "well" or non-patient behaviors will have positive social consequences. Reinforcement of well behavior will elevate its probability and the well behavior may eventually "crowd out" the chronic sick behaviors (groaning, rumination, complaining, staying in bed, etc.). People who have something better to do suffer less.

Contemporary research on conditioning and learning demonstrates that inter-stimulus intervals are not immutable particularly with human subjects (Kimble, 1973). This conditioned response mechanism, once acquired, probably becomes increasingly abbreviated and automatic. At acquisition, the conditioned association may involve some degree of verbal mediation but with increasing association the verbal mediation may become so abbreviated as to be imperceptible.

Developmentally it may begin like what Spence and Taylor (1959) and others (Cereckwitz, Grant, and Porter, 1968; Grant, 1972) describe as a "V" form of classical conditioning, but it probably develops into a "C" form of conditioning. The basis of this distinction is the degree of verbal mediation and volition involved in the conditioned response. The mechanism of the placebo probably is most effective when in the "C" stage it increasingly involves a bypass of the dominant or verbal hemisphere and becomes a non-verbally mediated and short latency response or what can be labelled an "unconscious" response.

If the mechanism of the placebo response is conditioning and if conditioning is enhanced by the degree of bypass of the verbal--or dominant--hemisphere (Ell, 1973), then it is clear why good placebo responders will be able to flexibly inhibit the critical analytic functions of the dominant verbal hemisphere. Good placebo responders will tend to engage the non-dominant hemisphere. They are predicted to be individuals who are prone to "see" relationships between events which appear randomly distributed to others. They tend to embroider, or to elaborate out of their own repertoires, on the given stimulus properties of the impinging world.

Shapiro (1973) describes placebo non-responders as "rigid and stereotypic and not psychologically minded." There is a striking similarity between the above description and that of a poorly hypnotizable subject. There is increasing evidence (Bakan, 1969; Orn and Orn, 1974; Graham and Hernan, 1976; Lachman and Goode, 1976) that hypnotizability or suggestibility is a right hemisphere (non-dominant or minor hemisphere) function for right handed people. Minor hemisphere functions include holistic and imaginative mentation with diffuse, relational and simultaneous processing of information (Sperry, 1964; Delsken, 1971; Ornstein, 1974). The tendency to "see" some relationship or "meaning" even in data however randomly generated would appear to be an aspect of creative mentation which is related to non-dominant hemispheric function, good placebo responding and good hypnotic susceptibility.

There is a high probability that under low arousal (Aronen, 1976; Schacter, 1976) and stress conditions most people will inhibit or bypass the critical analytic functions of the dominant verbal hemisphere. They will tend to shift to more holistic, diffuse, simultaneous or "primary process" modes of mentation. In other words, conditions of low or high arousal tend to increase the probability of resonant or less filtered thinking.

The above analysis assumes that mechanism of the placebo is conditioning and leans heavily on an association between the non-dominant hemispheric mode.
of mentation (hypnotizability) and conditionability. There is growing evidence the hypnotizability and conditionability (Pavlovian and operant) are related when even minimally appropriate and sensitive measures of the variables are used (Das, 1958; Weiss et al., 1966; Webb, 1962; Wickramasekera, 1970; King and McDonald, 1976). There are also several early studies (Hudgins, 1933; Menzies, 1941; Ellson, 1941; Corn-Becker, Welch and Fischell, 1949; Waters and Kodman, 1962) which support a conditioned response theory of hypnotic behavior. If the mechanism of change in psychotherapy is learning or conditionning, then it has been shown that highly hypnotizable people (who are also postulated to be the placebo responders) are also the most rapid psychotherapy responders (Nance et al., 1976). It is known that change in biofeedback is learning (Wickramasekera, 1976), then there is some direct evidence that people who are more hypnotizable are more likely to profit from biofeedback training (Andrychuk and Shriver, 1975).

It is known that trait anxiety is related to the facility with which conditioned responses are formed (Spence, 1960). The conditioned response conceptualization of the placebo effect easily accommodates the trait anxiety extinction hypothesis of Evans (1974) and the supporting data (McGlashan, Evans, and Orne, 1969). A study by McGlashan, Evans and Orne (1969) showed that highly hypnotizable subjects did significantly better than low hypnotizable subjects in a placebo condition. The failure of the highly hypnotizable subjects to sustain their superiority in the placebo condition may have been due to the failure to use strong specific instructions which may have more fully mobilized the verbal control potential of highly hypnotizable subjects.

The above analysis has shown how the conditioned response model of the placebo comfortably accommodates the previous suggestibility and anxiety reduction hypotheses. Next we shall show there are some controlled experimental observations in animal preparations to support the view that neutral stimuli, through association, elicit complex biological and biochemical changes, as postulated by the conditioned response model of the placebo effect. Pavlov (1927) himself suggested that the administration of a drug can be viewed as a conditioning trial with environmental cues present at the time of drug administration as the conditioned stimuli and the active pharmacological stimulation as the unconditioned stimulus. A study by Siegel (1976) indicates that tolerance to the analgesic effects of small doses of morphine is highly dependent on the pairing of a drug administration with systemic effects of the drug, rather than merely the frequency of opiate stimulation. Studies by Goldberg and Schuster (1967, 1970) indicated that after several pairings with nalorphine injections, initially neutral stimuli (red light and injection procedure) acquired the ability to elicit conditioned suppression of fixed ratio responding for food, emesis, salivation, and heart rate decrease. "Stimuli that acquired conditioned properties in morphine-dependent monkeys retained their ability to elicit conditioned suppression of fixed ratio responding and heart rate decrease after 60-120 days of complete morphine abstinence." (Goldberg and Schuster, 1970). Other studies (Drumbaugh and Lai, 1974; Schuster and Thompson, 1969; Wilker, Martin Pesar, and Endes, 1963; and Wilker and Pesor, 1970) also support the above hypothesis.

There is evidence that both electrical stimulation of certain sub-cortical centers (Medial Forebrain Bundle) and morphine produces analgesia by common mechanisms involving endogenous neuronal processes (Nayer and Hayes, 1975; Reynolds, 1969; Cox and Valenstein, 1965). It may eventually be shown that stimulation of such sub-cortical centers can also be initiated cognitively by way of the non-dominant hemisphere which appears to be involved in hypnotic analgesia.

The conceptualization of the placebo as a conditioned response is consistent with certain empirical observations on the behavior of placebos in both clinical and experimental situations. For example, it is known (Evans, 1974) that physicians who routinely use medications get stronger placebo effects than those who do not. This procedure is equivalent to frequent pairings of the unconditioned stimulus (active medication) and the conditioned stimulus ( inert or neutral substances). It has also been shown that continued use of placebo medication alone results in decreased effectiveness over time (Evans, 1974). This is equivalent to an extinction procedure, because repeated presentations of the conditioned stimulus (placebo) alone will be associated with reduction in the strength of the conditioned response (placebo response). An elaborate study of experimental pain by Stern, et al. 1977, compared the relative effectiveness of morphine, valium, hypnosis, acupuncture and placebo. This study found an overall placebo response rate which was unusually small (the usual rate of placebo response is 33%). The design of the study involved a large number of repeated presentations of the placebo under conditions of experimental stress. The conditioned response model of the placebo would regard these presentations as extinction trials, productive of a low overall placebo response rate. The conditioned response model would predict that a re-analysis of the data would show a higher rate of placebo response on early presentations as compared to later presentations of the placebo. A recent double blind study by Basmajian (1977) comparing the relative effectiveness of Valium, Lisseral, and placebo reported an unusually high rate (52%) of placebo response. Analysis of the study demonstrated that the involvement in the study of much impressive hardware (computers, testing device, etc.), professional personnel, and screening appeared to be related to the inflated placebo response. This observation of an inflated placebo rate is predictable from the conditioned response model of the placebo. It is known that when two or more conditioned stimuli (e.g., impressive hardware, and professional personnel, etc.) are presented together, the strength of the conditioned response if often greater than to either stimulus alone. This phenomenon is called summation and refers to the additive properties of conditioned stimuli. The observation that the placebo response rate is higher under double blind conditions is also consistent with the conditioned response model of the placebo effect and the conditioning phenomena of stimulus and response generalization and response differentiation.
Various types of psychological mechanisms have been hypothesized including suggestibility, anxiety, reduction, and the present concept of the placebo as a discriminative stimulus or conditioned stimulus for recovery and healthy behavior. What is common to all the above hypothesized mechanisms is mediation through cognitive-verbal events or expectancies. Under certain conditions, to be detailed later, cognitive-verbal events about a placebo therapy can have high credibility (strong and durable expectancy properties). If such a high credibility set for recovery can be induced in the "therapeutic unit" (patient and therapist) then the patient's anxiety and depression will decline. The placebo itself and the ritual of its administration, can become discriminative or conditioned stimuli for the emotion of hope. The expectant-hope oriented emotional arousal can trigger a resuscitation of dormant adaptive resources and a remobilization of them in challenging and risk-taking ways, that propel the patient's behavior forward, and out of the zone of illness.

The strength of the placebo response is hypothesized to be primarily a function of the following variables:

1. Credibility of the therapist.
2. The credibility of the placebo per se.
3. The credibility of the setting in which the placebo is administered.
4. The credibility of the administration ritual.
5. The level of emotional arousal of the patient.
6. The patient's level of attention to the placebo elements.
7. The baseline suggestibility of the patient.

The field of clinical biofeedback owes its origin to the disciplined imagination of eminent investigators like Thomas Bodzynski, Barbara Brown, and Elmer Green. None of the following is intended to detract from the significance of their pioneering work.

In addition, biofeedback instruments are slightly modified versions of EEG's, EKG's, etc., used daily in medical settings. It is not unlikely that such instruments have traditionally been associated in the lives of headache patients with accurate diagnosis and consequent healing events for pathology unconnected with headache pain.

Hence, it is very likely that both patients and therapists will approach each other, and biofeedback rituals today with positive expectancies, with interest, warmth, and strong motivation to make the therapy work. In addition, the biofeedback instruments themselves, and the rituals of graphing and charting, recall the hard physical and medical sciences; which, of course, increases the probability that they will be discriminative or conditioned stimuli for hope and even recovery. In the sense that conditioned stimuli or discriminative stimuli, can come to elicit conditioned responses for healing. This is not to imply that biofeedback procedures do not have specific or active ingredients, but it is important to recognize that they also have the active ingredients for a powerful placebo. In one sense, arranging the active ingredients for a powerful placebo, is equally important in changing the pre-conditions for high motivation in clinical subjects. Patient compliance is an essential pre-condition for the activity of "specific effects".

2. In 1971, Wickramasekera demonstrated that EMG feedback training significantly increased the hypnotizability of previously unresponsive subjects. In 1973, again in the context of EMG feedback, I replicated my previous observations in a double blind study. I hypothesized that the induction of a state of low arousal was the mechanism through which the enhanced instructional control was produced, or through which hypnotizability was increased. In 1974, in two studies, the former dealing with chronic rheumatoid arthritic pain (unpublished) and the second, a published case study dealing with cardiac neurosis, we elaborated the hypothesis that low arousal training increases the pliability or plasticity of cognitive-imaginational events and potentiates the instructional control of complex human behavior. In 1975, Melzack and Perry reported a study of severe chronic clinical pain in which a combination of instructional and feedback variables was found to be more effective than the feedback variable alone.

The instructional control of behavior or hypnotizability can also be potentiated through sensory restriction procedures. In 1969, and again in 1970, I demonstrated, in two studies, that subjects who were initially unresponsive to hypnosis or instructional control, were rendered more responsive after a period of sensory restriction. In other words, a prior period of sensory restriction increased hypnotizability on post testing.

There are some clear similarities between the EMG feedback training procedure and the sensory restriction procedure. For example, in biofeedback training, the subject sits immobile with eyes closed while subjected to a monotonous and relatively invariable feedback tone. Hence, in respect to immobility, the restriction of visual stimuli and the input of a monotonous auditory stimulus the subject in a sensory restriction study and the subject in biofeedback training are in apparently similar situations.
Hence we have demonstrated that low EMG levels and sensory restriction both appear to increase the probability that human beings become more hypnotiz-able or that the verbal-imaginal control of their behavior is potentiated. It is known that at EMG levels around three micro-volts, and also during sensory restriction there are EEG changes that increase the probability of observing temporal lobe theta activity. There is a large body of psychophysiological literature (Budzynski, 1973; Arons, 1976; Schacter, 1976) suggesting that the study of low arousal states may have utility in the investigation of creativity, suggestibility and "twilight learning" (Budzynski, 1973). I hypothesized in 1972, in a paper on Nightmares, Tension Headache and EMG Feedback, that hypnotizability will be potentiated to the degree that instructional inputs are delivered in a brain state characterized by increased theta activity and low arousal. These instructional-imaginal inputs may originate from outside the individual (hetero-suggestions) or from within the individual, in the form of self-statements, inferences or private cognitive elaborations (homosuggestions).

In all medical or psychological therapy with human subjects, compliance with treatment procedures is critical to positive outcome. Even active or specifically effective ingredients in our treatment will be ineffective if the patient does not follow treatment procedures. For example, if he does not take his medicine at the right time, in the right quantity, etc. in the medical literature this has been termed the patient compliance problem.

The importance of the patient's attitude towards therapy is also documented in the placebo literature. The placebo literature has shown that the known properties of active or specifically effective medications can be negated or reversed through the use of negative suggestions (hetero or homo suggestions) and negative context clues. The biofeedback literature has, also, produced evidence of the critical importance of patient compliance with home practice of relaxation for the reduction and continued remission of headache pain (Budzynski, 1970 and 1973; Wickramasekera, 1972 and 1973; Epstein and Associates, 1974; Cox and Associates, 1975; Reikning and Associates, 1976).

In the typical biofeedback studies in which relaxation instructions are used, we have some indication of what types of verbal instructions are given to patients about their therapy. But we have no information about their baseline suggestibility, hypnotizability, or susceptibility to instructional control either within or outside a hypnotic induction procedure. In addition, we also have little or no systematic information about what type of verbal-imaginal activity occurs privately within patients before, during, and after therapy in terms of self-statements, inferences, images, and treatment-related phantasies.

I suggest that more careful attention to the placebo and hypnosis literatures and to the isolation of the conditions which potentiate the context of treatment of the rituals of treatment, the instructions that accompany treatment, and the relationship within the therapeutic unit, will significantly increase the reliability and the power of biofeedback effects. It will do this by a more systematic arrangement of conditions for motivated patient behavior. The mobilized motivation can be channeled into task-relevant activities, that will increase the probability of patient compliance with critical therapeutic components like changes in type A life style and extra laboratory practice of relaxation. Thus, to the probably "active" ingredients in biofeedback training will be added the active ingredients for a reliable and powerful placebo effect. Hence, the pre-therapy social learning from the mass media that the patient brings to the therapist about a new "sheek" and popular treatment will be channeled and cultivated, before it dissipates as placebo sag, into a set of potentially effective behavioral sub-goals. For example: (1) Learn to recognize muscle tension in your body. (2) Practice working patiently to reduce EMG levels or to increase skin temperature in consulting room. (3) Practice relaxation at home. (4) Develop an early warning system to detect encroaching tension. (5) Initiate relaxation practice when you recognize the onset of tension. (6) Rehearse in your mind several times a day in relaxed state gradual and progressive phantasies of recovery. The achievement of these behavioral sub-goals will, in turn, further potentiate the achievement of instructional control and discrimination of those muscular and vascular events that appear to constitute the underlying biological basis of muscle contraction and migraine headache.

In conclusion, the above review of the placebo effect in relation to biofeedback treatment of muscle contraction and migraine headache has indicated the power of psychological variables to arrange the conditions for patient compliance with specifically effective treatment components. It has further indicated the powerful effect that psychological variables, through mechanisms incompletely understood, can come to exert on biological response systems like EMG activity, heart rate activity, blood pressure, electrical activity of the brain, skin resistance and other visceral events. In the past the medical model has regarded psychological events as super-territorial or less "real" than physiological events. What the above review has hopefully indicated is that the placebo variable does, itself, contain some active ingredients which can be arranged to increase patient motivation. To do this patients must be compliant with treatment procedures, and to increase the reliability and potentiate the specific effects of physiological ingredients in therapy. Without a positive relationship in the therapeutic unit (therapist and patient) even "active" therapeutic ingredients may be incompletely effective with some patients and totally ineffective with another subset of patients. Relationships with patients which are totally devoid of placebo components can frequently deteriorate into an overt or covert "name calling" transaction in which the physician rationalizes his ineffectiveness and frustration by calling the patient a "crock" and patient retaliates by calling the physician a "quack."

Specifically this implies that the medical model needs to be expanded to incorporate interventions which are: (1) Essentially psychological in nature or initiated by psychological variables like home or hetero instruction or suggestions. (2) The medical model needs to recognize that these psychological variables may not merely operate on outward symptoms, like the verbal report of pain, but may, also, operate on the underlying pathophysiology. On mechanisms like contracted muscles or dilated cranial arteries, and that they may operate through physical produces like reducing muscle tension, altering blood flow, or influencing autonomic balance. Hopefully, the above
review would also have developed a differentiated and complex way of looking at headache pain. Pain is more than a matter of autonomic responsivity to a noxious stimulus or to tissue damage. Pain is at least a composite of changes in three response systems: psychiatric, somatic, and motor (Sternbach, 1968; Melzack, 1973; Hilgard, 1975). Cognitive-affective reactions to pain include anxiety and depression. In fact, Diamond and Dalesio (1973) implicate depression at the major cause of psychogenic or tension headache. Autonomic reactions to pain include changes in blood pressure, heart rate, muscle tension, and biochemical changes. Motor reactions to pain may include grimacing, flinching, avoidance, or withdrawal. This is a complex view of headache pain as a composite of different response systems, which may change at different rates and may be influenced by different interventions (drug therapy, biofeedback, psychotherapy and the manipulation of reinforcers). These response systems may, at times, be poorly correlated or in different states of desynchrony or disassociation.

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