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EDITORIAL COMMENTARY

In this issue we publish a theory of hypnosis which will be the focus of commentaries in a future issue. In a theory based on principles of conditioning and inhibition, with a strong focus on suggestion, Barrios provides an intriguing analysis that he first articulated three decades ago. Now that inhibition, conditioning and suggestion are concepts re-entering the discourse on hypnosis, and with physiological approaches regaining momentum, publication is timely as the work is overflowing with thoughtful ideas for research with potential to develop the field.

Pekala et al. present correlational data reinforcing the importance of fantasy-proneness, and by implication hypnotic susceptibility, in the underpinning of dissociative disorders alongside the primary role accorded to child abuse.

Finally, Val Heap pays tributes to Tony Gibson who died tragically in March. Tony was largely responsible for the founding of the BSECH and for many years played a central role in hypnosis in Britain, until in later years he turned provocatively, as always, to the concerns of the elderly. He will be remembered by many as a provocative intellect. In my case he was actually the first person to hypnotize me. This took place in a workshop at one of the BSECH's annual meetings in the 1980s, when as I recall, a 40-minute demonstration seemed at the time to have lasted ten minutes at the most. At the time of going to press we have also learned of the death of Jack Hilgard, a towering figure of twentieth-century hypnosis, who will be remembered in the next issue.

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A THEORY OF HYPNOSIS BASED ON PRINCIPLES OF CONDITIONING AND INHIBITION

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Abstract

A theory of hypnosis based mainly on principles of conditioning and inhibition is proposed, covering the hypnotic induction process, hypnotic phenomena and post-hypnotic phenomena. The overall explanation presented is delineated in a set of three initial postulates and seven subsequent hypotheses. Hypnotic induction is defined as the giving of a series of suggestions so that a positive response to a previous suggestion conditions the subject to respond more strongly to the next suggestion. This induction process is placed in a conditioning paradigm, with the condition stimulus (CS), unconditioned stimulus (UCS), conditioned response (CR) and unconditioned response (UCR), trials and reinforcement clearly delineated. Summarized in brief, hypnotic induction is explained as the conditioning of an inhibitory set, a set which increases responsiveness to suggestion by inhibiting stimuli and thoughts which would contradict the suggested response. The various hypnotic and post-hypnotic phenomena are explained in terms of this set. Post-hypnotic behaviour changes are further explained as produced through a process of higher-order conditioning; hypnosis facilitates such conditioning thanks to the inhibitory set which suppresses any interfering stimuli. The theory may be broad enough to cover not only hypnosis but also related areas such as persuasion, the placebo effect and faith.

Key words: conditioning, hypnosis, hypnotic phenomena, inhibition

Introduction

Throughout the years many extraordinary phenomena have been attributed to the effects of hypnosis and great claims have been made as to its efficacy in therapy. Yet, despite such claims, it seems there continues to be relatively little interest shown in hypnosis by the psychological and psychiatric community. It is felt that the reason for continued apathy towards hypnosis is not that the claims made for it are untrue, but that it is still virtually an unknown. This unknown quality has led to the arousal of fears (an innate response to an unknown), many misconceptions, various unjust criticisms and, consequently, rejection or avoidance of the area. What we need, then, is a rational theory or explanation of hypnosis, one that will tie it down to known laws and facts, and help us to make the most of this vast, unexplored area. The following theory is presented as an attempt to achieve this goal.

The proposed theory is divided into three major sections, one for each of what is felt are the three major aspects of hypnosis. Each section begins with a definition of terms and then the hypotheses and their corollaries are presented, with available evidence in support of them, followed by suggestions for further tests. There are a total of seven hypotheses making up the theoretical system. Hypotheses I–III deal with the first aspect — hypnotic induction. Hypothesis IV and Hypothesis V deal with the second aspect — hypnotic phenomena. Hypothesis VI and Hypothesis VII deal with the third aspect — post-hypnotic suggestion. The reason for dividing the theory into three aspects is to emphasize the fact that when attempting to explain hypnosis, we have to do more than just explain hypnotic phenomena. We also have to explain how the hypnotic state was produced and how hypnosis can produce post-hypnotic behaviour changes. Most previous theories have dealt only with hypnotic phenomena.

The overall explanation presented here is based mainly on principles of conditioning and inhibition, delineated in the postulates. In brief, hypnotic induction is explained as the conditioning of an inhibitory set, a set which increases responsiveness to suggestion by inhibiting stimuli and thoughts incompatible with a suggested response. The various hypnotic phenomena, including the phenomenon of post-hypnotic suggestion, are explained in terms of this set.

Basic postulates

Postulate I: Reciprocal inhibition

When an organism is attending or responding to one stimulus, there will be a reciprocal inhibition of incompatible stimuli and responses.

Sherrington (1906) was one of the first to discover the phenomenon of ‘reciprocal inhibition’. He found that:

... incompatible movements such as turning the eyes to the right and left are so controlled in their nerve centers that with increased activity of one muscle goes decreased activity of its antagonist. The same type of inhibition is observed in human attention and distraction, since in attending to one subject, you cease attending to another. (Woodworth and Schlosberg, 1954, p. 669)

The latter contention is supported in the work of Hernández-Peón (1959) who showed that when an organism is attentive to one stimulus, other stimuli impinging upon it tend to be inhibited. This centrifugal inhibition of afferent sources has been demonstrated for all sense modalities (Lindsley, 1961). Which stimulus will be most likely to be attended or elicit a response (and, therefore, which stimuli will be inhibited) in a given situation depends on a number of different factors, such as stimulus intensity, novelty of the stimulus, acquired significance of the stimulus, sense modality, etc. (Berlyne, 1960). Some types of stimuli have preference or dominance over others, and they, in turn, have dominance over others and so on, thus forming a ‘stimulus dominance hierarchy’.

Corollary 1: If a dominant stimulus is itself inhibited or eliminated, those stimuli below it in the hierarchy which it was reciprocally inhibiting will now be responded to more strongly.

Postulate II: Cognitive stimuli

Behaviour is determined by cognitive stimuli as well as sensory stimuli.

We know that the behaviour of an organism in a given situation can be determined by certain innate behaviour patterns. A pin-prick will evoke a pain response (withdrawal of the injured part, crying out, heart racing, palms sweating, etc.); salt on the tongue will elicit salivation; stimulation of the erogenous zones will evoke certain patterns of psychological responses, etc. Such stimulation seems to trigger 'built-in' or innate patterns of behaviour. But, organisms do not always make the same response to the same stimulus. Learning or 'conditioning' can — and does — play a very big part, especially with humans, in modifying behaviour. For example, the response resulting from stimulation of the erogenous zones will vary from individual to individual as a result of the individual's previous experience, that is, his or her previous conditioning.

If an individual has been taught that sex is something dirty or bad, he or she could easily respond with feelings of disgust or guilt rather than with the normal (built-in) sexual response. Thus, stimulation can also trigger 'acquired' or learned patterns of behaviour.

One way of conceptualizing this modification of 'behaviour by learning' is to think of the organism as reacting not only to sensory stimuli but also as reacting to what may be called 'memory', 'recorded' or 'cognitive' stimuli. A sensory stimulus may be defined as coming to the organism via the sensory pathways. A 'cognitive stimulus' will herein be defined as a stimulus emanating from 'engrams' (permanent traces or recordings of past experiences in the brain). It is postulated that this stimulus is potentially as capable of initiating and directing behaviour as any sensory stimulus. This means, for instance, that a stimulus dominance hierarchy can be made up of both sensory *and* cognitive stimuli.

These engrams are felt to be formed through a process of 'conditioning' (*see* Postulate III below) and are triggered by the conditioned stimulus. This conditioned stimulus can be either a sensory stimulus or another cognitive stimulus. For example, the thought of a steak (a cognitive stimulus) can be triggered by the smell of a steak cooking (a sensory stimulus) or the thought of a particular restaurant that specializes in steaks (a cognitive stimulus).

Under the heading of cognitive stimuli we would find things such as thoughts, images, beliefs, sets, values, attitudes, ideas, etc. A cognitive stimulus may also be look upon as the equivalent of Hull's (1933) 'pure stimulus act', Tolman's (1932) 'expectancy', Osgood's (1948) 'representational mechanisms', etc. The reason for use of the term 'cognitive stimulus' rather than terms such as 'expectancy', 'thought' or 'cognition' is that inclusion of the term 'stimulus' implies action more strongly.

Postulate III: Conditioning

If an organism attends to two stimuli occurring in close contiguity, these two stimuli will become associated so that upon later occurrence of the first stimulus the reaction to the second will occur.

This postulate is essentially the 'S-S contiguity' interpretation of conditioning, with the added stipulation that the organism must be aware of, or attentive to, the two stimuli. Guthrie (1959), Speilberger (1962), Dulany (1962), Maltzman (1966) and Trabasso and Bower (1968). Thus, according to this postulate:

- Association occurs between stimuli, and not a stimulus and response, as called for by the S-R approach.
- Contiguity of the attended stimuli is the necessary and sufficient condition for conditioning to take place, and not drive or need reduction, as called for by the 'Law of Effect' approach.

The evidence indicates that this is the more general and parsimonious of the three major systematic points of view that have dominated the psychology of learning (namely, the 'S-S contiguity', the 'S-R contiguity' and the 'S-R effect' approaches).

As pointed out, the S-S contiguity approach says, first of all, that association occurs between stimuli and not between a stimulus and a response. This does not mean that a stimulus cannot become associated with a response. The S-S position would explain an association between a stimulus, S_1 , and a response, R_2 , by positing that the association takes place between S_1 and S_2 , where S_2 is a stimulus which normally evokes R_2 . It is felt that the S-S position is more general than the strict S-R approach because, as well as explaining association between stimuli and responses, it can also explain the formation of associations between stimuli where no visible response is involved. (One of the major shortcomings of the S-R position has been that it is more difficult for S-R theorists to conceive of conditioning taking place when no visible response is known to occur.)

Evidence in support of the contention that associations can take place between stimuli without necessitating a response comes from a number of areas of study. Among them are:

- Sensory preconditioning.
- Perceptual learning.
- Learning without overt response (Kimble, 1961).

In addition to saying that associations take place between stimuli, Postulate III states that contiguity of the stimuli in the focus of attention is the necessary and sufficient condition for the association to take place. This is opposed to the 'Effect' position, which proposes that, in addition to contiguity, some form of drive or need reduction is necessary for the association to take place. Although there is no denying that reward or drive reduction can facilitate conditioning, there is considerable evidence to show that conditioning can still take place without the necessity of drive reduction.

The evidence against a strict 'Effect' position comes from several areas of study (reviewed in Kimble, 1961). These are:

- Latent learning studies.
- Saccharine studies.
- Exploration studies.
- Brain stimulation studies.

These are in addition to the sensory preconditioning and perceptual learning studies already mentioned.

Corollary 2: Whatever would raise the stimuli to be paired in the stimulus dominance hierarchy should facilitate the conditioning.

This follows from the postulate since the latter states that the conditioned stimulus (CS) and unconditioned stimulus (UCS) must be in the focus of attention to be paired. If there are other, more dominant, stimuli present this condition will not be met.* Thus anything that would inhibit competing stimuli should facilitate conditioning.

Corollary 3: Words can act as conditioned stimuli which can evoke cognitive stimuli mediating responses similar to those evoked by the original unconditioned stimuli.

Pavlov (1960) was one of the first to recognize that words could act as conditioned stimuli:

Obviously for man speech provides conditioned stimuli which are just as real as any other stimuli ... Speech, on account of the whole preceding life of the adult, is connected up with all the internal and external stimuli which can reach the cortex, signaling all of them and replacing all of them, and therefore it can call forth all those reactions of the organism which are normally determined by the actual stimuli themselves. (Pavlov, 1960, p. 407)

That words can act as conditioned stimuli is supported by a number of experiments. As pointed out by Platinov (1959), Vasileyva found that he could condition a stable defensive motor response to the word *bell*. Hudgins (1933) was able to condition the pupils of his subjects' eyes to contract upon thinking the word *contract*. Menzies (1941), by associating the word *crosses* with immersion of the hand in cold water, was able to condition his subjects so that when they said the word *crosses* a drop in the temperature of the hand resulted. Hull (1933) also concurred with this contention:

In the suggestion experiments the words of the experimenter presumably are merely performing the function served by the arbitrary sounds, temperatures, etc. (conditioned stimuli), in the conditioned reflex experiments. (Hull, 1933, p. 280)

That words can evoke responses similar to those evoked by the unconditioned stimuli for which they were a substitute is also supported by the available evidence. For instance, Max (1937), Jacobson (1938), Vandell, Davis and Uugston (1943) and Schultz (1950), among others, 'have shown quite satisfactorily that thought can give rise to specific patterns of muscular tension and activity, particularly in those muscles

*An interesting point to ponder is that the reinforcing effects of the drive reducers (such as food and sex) might themselves be subsumed under a stimulation explanation of reinforcement. This is the case if we consider the possibility that it is the drive reducer's resulting stimulation of arousal which plays the major role in reinforcement rather than reduction of a drive *per se*. This seems to fit in with the position taken by Sheffield's (1966) 'Drive induction' and Miller's (1963) 'Go-mechanism' explanation of drive reduction in conditioning. The reason that most drive reducers can be such effective reinforcers could be that they are stimuli which, due to their high arousal value, would be placed high in a stimulus dominance hierarchy, as well as place any stimulus they become associated with high in the hierarchy.

that are symbolically represented in the thought in question' (Weitzenhoffer, 1953, p. 246).

There are a number of experiments where it has been shown that various psychological and perceptual responses may be evoked by means of waking suggestion. These are best summarized in Barber's two review articles on the physiological effects of suggestion (Barber, 1961, 1965). Among the responses Barber reported evoked by waking suggestion were heart acceleration and deceleration, colour blindness, deafness, autonomic changes, salivation, analgesia and allergic dermatitis. (Heart acceleration, for example, could be produced by words associated with fear-producing stimuli.)

Corollary 4: A reciprocal inhibitory response can be conditioned like any other response if it occurs contiguously with the conditioned stimulus.

First of all, an inhibitory response may be conditioned just like any other response. For example, Pavlov (1960), referring to experiments in his laboratory by Volborth, concluded that 'if an inhibitory stimulus is applied simultaneously and repeatedly for short periods of time together with some neutral stimulus, the latter also develops an inhibitory function of its own' (Pavlov, 1960, p. 106; *see also* p. 404).

Under Postulate I, when an organism is responding to one stimulus there occurs a reciprocal inhibition of any stimuli that would lead to incompatible responses. The case in favour of the contention that this type of inhibitory response can be conditioned was presented by Wolpe (1958). Wolpe (1958) referred to Pavlov's experiment where a strong electric current was made the conditioned stimulus for a feeding response in a dog:

The current was in time gradually increased (with feeding) until it was extremely strong, but even then no defensive reaction was manifested. In other words, the pathways normally connecting the electrical stimulus with the defense reaction had become inhibited. It would appear that at every stage of the experiment the performance of the feeding response involved a reciprocal inhibition of the mild defense reaction aroused by the electrical stimulus ... After many repetitions of the procedure, in the course of which the current was gradually stepped up, so great a degree of conditioned inhibition of the defense reaction to the current was established that even very strong electrical stimuli were unable to evoke that reaction, but evoked only the feeding response. (Wolpe, 1958, p. 30)

The important thing to note here is that in conditioning the feeding response, the inhibitory response — inhibition of the defence reaction — was being conditioned simultaneously.

Wolpe (1958) also cited experiments performed on cats whereby neurotic anxiety reactions were overcome by opposing them with feeding reactions. To this evidence may be added Watson's (1957, pp 172–5) 'Peter and the Rabbit' experiments wherein a phobia of rabbits was gradually extinguished by having a child eat his meals in the presence of the feared rabbit. Wolpe's (1958) position was supported by Osgood's (1948) 'hypothesis of reciprocal inhibition of antagonistic reactions', which states that:

Simultaneous with every increment in excitatory habit tendency in the association of a given stimulus with a given reaction, there is also generated an equal amount of inhibitory habit tendency in the association of the same stimulus with the directly antagonistic reaction.

In other words, simultaneous with learning any response, the S [subject] is also learning not to make the directly antagonistic response. (Osgood, 1948, p.150)

Corollary 5: If a set to inhibit certain stimuli is conditioned to a given CS, the presence of this CS will facilitate the occurrence of any response that would ordinarily be interfered with by these stimuli.

This corollary, derived from postulates I and III, is supported by the work of Harlow (1959) on learning sets and error factor theory. In a number of experiments, Harlow (1959) has shown that when monkeys are given a series of different discrimination problems to learn, a 'learning set' is gradually established which facilitates the making of new, different, discrimination responses. (The CS referred to in the postulates in this case would be any stimulus or stimuli which are always present from problem to problem, such as the presence of the experimenter.)

Harlow (1959) explained this facilitation in terms of learned ('conditioned') inhibition. He proposed a hypothesis similar to that of Wolpe (1958) — that in learning to make a particular response the organism learns to inhibit all interfering or incompatible stimuli, or what Harlow (1959) called 'error factors'. In fact, Harlow (1959, p. 526) went so far as to say that 'learning is nothing but suppressions or inhibitions of EFs [error factors]'. According to Harlow (1959) when the monkey is asked to make a new discrimination response, this learnt inhibition of error factors facilitates the making of the new response. This is because many of the error factors inhibited in learning the previous problems are potential interferers of the new response as well.

Also in support of Corollary 5 is the fact (as pointed out by Harlow (1959)) that in most learning experiments investigators often find it quite advantageous to 'adapt' their animals to the experimental situation before the start of the learning:

... Psychologist have been doing this for decades, e.g. 'adapting' rats on a straight-away before training them on a multiple unit maze, thereby doubtless reducing error-producing factors in advance of the 'learning' situation. (Harlow, 1959, p. 526)

This adaptation procedure may be looked upon as the establishment of a conditioned inhibition of irrelevant responses. This conditioned inhibition is evoked in the learning situation by the stimuli that are common to both the adaptation trials and the learning trials.

Aspect 1: Hypnotic induction

The first step is to define the terms to be used, before attempting to fit hypnotic induction into a conditioning paradigm.

Definition of terms

Suggestion

One dictionary definition of 'suggestion' is as follows:

A suggestion is a stimulus, usually verbal in nature, by which an individual seeks to arouse activity in another by circumventing the critical, integrative functions. (Warren, 1934, p.267)

McDougall (1908) offered the following definition:

Suggestion is a process of communication resulting in the acceptance with conviction of the communicated proposition in the absence of logically adequate grounds for its acceptance. (McDougall, 1908, p. 100)

Hull (1933) defined 'suggestion' as follows:

A true suggestion response is one in which the subject's own symbolic process, instead of become active either in facilitating or resisting the tendency to action naturally arising from the experimenter's words, remains passive so far as the particular act suggested is concerned. (Hull, 1933, p. 397)

Lindzey (1954), summarizing a number of definitions of 'suggestion', stated:

In these and in similar definitions, attention is called to some arbitrary restriction in the determinants of behavior. The individual is not employing all relevant ideas, nor his full intelligence. Granted that suggestion proceeds according to the laws of association (conditioning), still we must allow for the *blocking* of normal associations, so that the end result in behavior is due to a selected field of determinants. (Lindzey, 1954, p. 27)

The definition of 'suggestion' used in the present paper is as follows:

A suggestion is a stimulus or set of stimuli, usually verbal in nature, by which one individual (1) evokes a cognitive stimulus in another, and (2) at the same time evokes an inhibitory set which tends to inhibit stimuli (sensory or cognitive) incompatible with the cognitive stimulus evoked.*

The only major differences between this definition and the previous ones mentioned is the addition in the parentheses — that sensory stimuli, as well as cognitive stimuli, tend to be inhibited by the inhibitory set. All the above definitions seem to stress the inhibition of cognitive stimuli and do not mention inhibition of sensory stimuli.

It should be stressed that both hypnotic *and* waking suggestion have an inhibitory set component. The only difference between hypnotic and waking suggestion is that, for a given individual, the former should have a larger inhibitory set component as a result of the hypnotic induction. The size of the inhibitory set for waking suggestion will vary from individual to individual depending on certain factors, such as prestige, for example (these are discussed later on). This means that for a particular suggestion, the response could be greater for one individual in the waking state than for another in the hypnotic state.

Hypersuggestibility

'Hypersuggestibility' is defined as a state where the cognitive stimulus evoked by a suggestion is responded to more readily or strongly than usual because the usually

*It should be mentioned that the evocation of the cognitive stimulus alone will cause a certain amount of inhibition of competing stimuli just as the evocation of any stimulus would. However, in a suggestion we find the *additional* inhibitory 'aid' of the inhibitory set.

competing stimuli have been reduced or inhibited. (The usual responsiveness to suggestion could be pre-determined for each individual.)

There are, of course, numerous ways other than hypnotic induction for bringing about a state of hypersuggestibility. For example, sensory deprivation is known to lead to such a state (Jackson and Kelly, 1962; Jackson and Pollard, 1962; Pollard, Uhr and Jackson, 1963). The hallucinogenic drugs (for example, LSD and mescaline) which act as inhibitors are also known to produce states of hypersuggestibility (Barrios, 1965; Sjoberg, 1965; Solursch and Rae, 1966).

Hypnosis

'Hypnosis' is defined as a state of hypersuggestibility arrived at by means of an hypnotic induction. It is a hypersuggestible state (that is, more suggestible than normal) because when a suggestion is given, the inhibitory set part of suggestion for a given individual is greater in scope that it is in the normal state.

Hypnotic induction

'Hypnotic induction' is defined as the giving of two or more suggestions in succession so that a positive response to one increases the probability of responding to the next one. That the author is not alone in his feelings that a positive response to a series of suggestions leads to a state of hypnosis is illustrated by the following statements made by Skinner (1957):

With respect to a particular speaker, the behavior of the listener is also a function of what is called belief (a term very similar to suggestibility) ... Our belief in what someone tells us is similarly a function of, or identical with, our tendency to act upon the verbal stimuli which he provides. If we have always been successful when responding with respect to his verbal behavior, our belief will be strong ... (pp 159-60)

The listener reacts to the behavior of a given speaker to an extent determined by the consequences of past reactions. The speaker can build confidence or belief by saying many things which are obviously true or quickly confirmed or by resorting to rhetorical devices ... (p. 365)

Various devices used professionally to increase the belief of a listener (for example by salesmen or therapists) can be analyzed in these terms. The therapist may begin with a number of statements which are so obviously true that the listener's behavior is strongly reinforced. Later a strong reaction is obtained to statements which would otherwise have led to little or no response. Hypnosis is not at the moment very well understood, but it seems to exemplify a heightened 'belief' in the present sense. (p. 160)

From the definition of hypnotic induction used in the present paper, then, the reader can begin to see the fairly broad scope of the theory of hypnosis presented. It cannot only be used to explain the phenomenal effects of hypnosis, in the accepted sense of the term, but also the hypnotic effects ('persuadability') of salesmen, lawyers, politicians, etc.; the hypnotic effects (placebo effect) of psychotherapists and doctors of medicine, and even the hypnotic effects (faith) of ministers and faith healers.

This definition of hypnotic induction does not differentiate between waking suggestions and trance or sleep suggestions. That is, we can conceive of the 'formal hypnotic induction' suggestions of eyelid closure, drowsiness, sleep, etc., as just so many more waking suggestions.

'Sleep suggestions', however, may also further aid hypnotic induction since the sleep-like state thus produced may provide for even greater inhibition of stimuli competing with the suggestions.* As Hull (1933) put it:

It is a very general custom of hypnotists to give suggestions of relaxation while inducing the trance ... The present hypothesis assumes that this relaxation has the effect more or less completely of suppressing the spontaneous activity of the symbolic thought processes. With this suppression should disappear the control normally exercised by symbolism over the lower levels of activity. This should leave the latter more completely exposed to the influence of suggestive stimuli from outside sources . (Hull, 1933, p. 310)

Hypnotic induction in a classical paradigm

This section is an attempt to show how hypnotic induction is actually a conditioning process.

Understanding the conditioning paradigm

Before we show how hypnotic induction fits into the conditioning paradigm we must first be sure we understand the conditioning paradigm. First of all, as indicated in the conditioning postulate, for a process to be called 'conditioning' it must involve two stimuli presented together contiguously and in the focus of attention. In classical conditioning the two stimuli are usually referred to as the 'conditioned stimulus' (CS) and the 'unconditioned stimulus' (UCS). The CS is usually some neutral stimulus (that is, no observable response is evoked or at least not the response to be conditioned) and the UCS is a stimulus which evokes some innate response (for example, food — salivation; shock — withdrawal). However, and this is an important point to keep in mind, there is nothing that says that the UCS has to evoke an innate response. The UCS, or second stimulus in the pair, can be one that evokes a learnt or previously conditioned response. In classical conditioning, this is referred to as 'higher-order conditioning' and, as Hebb (1949) has pointed out, most conditioning in the mature organism is of this higher-order variety.

Another issue is the nature of the 'conditioned response' (CR). In a conditioning situation, experimenters are not always interested in the entire response to the UCS. They usually focus on one component of the 'unconditioned response' (UCR) which they are interested in associating with the CS. Usually, this component is some positive response (for example, salivation, eye-blink, withdrawal, etc.). However, it follows from the reciprocal inhibition postulate that occurring with each positive response is a reciprocal inhibitory response. Now, when applying the conditioning paradigm to hypnotic induction, the focus will be on the inhibitory component rather than the positive one.

Finally, a third issue is that the CS need not be something as obvious as a bell ringing, but can also be the very presence of experimenters *and* any action on their part which is repeated before each presentation of the UCS.

Now, let us indicate specifically what the CS, UCS, CR, UCR, the trials and reinforcement are.

*It should be stressed that, in the present theory, sleep suggestions are not a necessary condition for hypnotic induction. Thus, the use of the term 'hypnotic', which means 'tending to produce sleep', is perhaps misleading and eventually it might be appropriate to change it.

The various classical conditioning components in hypnotic induction

The CS is the following general stimulus situation: the hypnotist making a suggestion during an hypnotic induction.

The UCS is the particular words of the hypnotist evoking the cognitive stimulus which leads to the particular suggested response. This UCS, of course, is a 'second-order' UCS in that it evokes its response as a result of previous conditioning and not innately.

As an illustration of the distinction between this CS and UCS (since at first glance they appear indistinguishable), let us take the suggestion, '*You will now feel your arm pulled up*'. The CS would be the first part of the suggestion, that is, the hypnotist saying the words, '*You will now ...*', which essentially precedes each suggestion in the hypnotic induction series. The UCS would be the specific suggestion, '*... feel your arm pulled up*'. The CS is always the same. The UCS varies with each suggestion.

The CR is the following response: inhibition of stimuli incompatible with the previous suggested responses. This CR is evoked upon the presentation of the CS, that is, when the hypnotist makes a suggestion* and can be measured directly (*see* Hernández-Peón, Dittborn, Berone and Davidovitch, 1960) or it can be measured indirectly by measuring the increase in strength of the suggested response, since according to the stimulus dominance hierarchy postulate, by inhibiting competing stimuli the inhibitory set would increase response to the suggestion.

The UCR is the reciprocal inhibition of stimuli incompatible with the particular suggested response. This inhibitory response occurs automatically when the suggested response occurs. Three of the major classes of stimuli inhibited would be the following:

- Specific stimuli in direct contradiction to the suggested response, for example it is suggested that the subject sees a water melon on a table that is actually empty, the sensory stimulus 'empty table' would be in direct contradiction to the image 'water melon on table'.
- General irrelevant but attention-catching stimuli, such as a door slamming or an itch.
- Certain general negative attitudes (for example, skepticism) and fears (for example, fear of the unknown) which interfere with the conditioning during hypnotic induction in a number of ways. (These are discussed further in a later section.)

A 'trial' would be considered that period during which a suggestion is made and the suggested response occurs. Each trial need not necessarily be thought of as involving a different type of response. When a suggestion is repeated (and each suggestion is usually repeated a number of times in most hypnotic inductions), a trial may be thought of as taking place with each repetition. Each repetition would be expected to lead to a stronger response and thus a greater inhibitory set.

*It could very well be that this conditioned inhibitory response will not appear to be a discreet one, that is, evoked only when the hypnotist makes a suggestion, but may instead appear to be a continuous one, present even between suggestions. This would best be explained in terms of generalization. The inhibitory response, rather than become associated specifically with the CS we have designated (that is, the hypnotist making a suggestion), may also become associated with other components of the whole hypnotic setting as well.

'Reinforcement' is regarded here in terms of a contiguity point of view. As pointed out in the conditioning postulate, all that is necessary for conditioning to take place is that the two stimuli (the CS and the UCS) occur contiguously and in the focus of attention.

Analysis of hypnotic induction in terms of the classical conditioning components

First suggestion (first trial)

When the initial suggestion is responded to (that is, when the first presentation of the UCS leads to its response), a certain proportion of stimuli incompatible with the suggested response are 'reciprocally inhibited' (the UCR). This inhibition is conditioned to the hypnotist making a suggestion (the CS) so that when the hypnotist makes his next suggestion (when the CS is presented again) a conditioned inhibitory response (the CR) is evoked, that is, those stimuli inhibited during the response to the first suggestion are now automatically inhibited before the response to the second suggestion.

Second suggestion (second trial)

Since a certain proportion of competing stimuli will now automatically be inhibited when the hypnotist makes a suggestion, the probability of evoking the next suggested response is increased. When this second suggestion is responded to positively, another proportion of incompatible stimuli will be inhibited. As in the first trial, this inhibitory response becomes conditioned to the CS so that on succeeding trials an even greater proportion of competing stimuli are now inhibited, thus further facilitating the response to suggestion.

Succeeding suggestions (succeeding trials)

Each succeeding suggestion responded to positively will now add to the proportion of incompatible stimuli until, conceivably, a point is reached where all incompatible stimuli are automatically inhibited when the hypnotist makes a suggestion. (It is as if the subject's focus of attention were gradually being narrowed more and more until the only stimuli reacted to were the cognitive stimuli evoked by the hypnotist.) This would be called a 'deep' state of hypnosis.

The hypnotic induction is ended by suggesting that the subject will 'awaken' or come back to normal, whereupon the inhibitory set that has been developed during the induction becomes inhibited itself. That hypnotic conditioning can be 'extinguished' so quickly by such a suggestion should not be so surprising to those who are familiar with the part that cognitive factors can play in extinction (*see* Spence, 1963).

It should be mentioned that very often in hypnotic induction, after obtaining a positive response to a suggestion, the hypnotist will then remove the suggestion. For example, after obtaining a positive response to the suggestion, '*Your arm will become as stiff and rigid as a steel bar*', the hypnotist usually follows with, '*Your arm will now loosen up and is now no longer rigid*'. Knowing this, we may think that such removal or reversal of the suggestion would undo the conditioning of the inhibitory set accomplished by that suggestion. Actually, this apparent paradox can be explained if we realize that most of the stimuli that would have to be suppressed in order for the first suggestion ('stiff arm') to be responded to would be the same as those that would have to be suppressed for the second suggestion ('loose arm'). For example, there is the attitude of skepticism (a cognitive stimulus), the suppression of which would facilitate both responses.

This paradox of reversal learning has been explained in a similar manner by Harlow (1959) and his 'error-factor' theory. As Harlow (1959, p. 522) points out, 'discrimination learning and reversal are not antithetical processes. So far as EF [error factor] elimination is concerned, the two learning problems have more in common than at variance'. If we understand Harlow (1959) correctly, error-producing factors may be looked upon as what we refer to as 'incompatible stimuli' or stimuli that lead to wrong responses. Thus, he is saying that the discrimination and discrimination reversal problems, although involving apparently opposite responses, require suppression of many similar incompatible stimuli.

Instant hypnosis

Very often we see or hear of hypnotists putting a subject under hypnosis instantaneously by merely snapping their fingers or whispering certain key words in the subject's ear. This type of 'instant hypnosis' occurs most often as a result of subjects being hypnotized previously and being given the post-hypnotic suggestion that they will return to hypnosis upon a given cue. The inhibitory set developed during hypnotic induction is conditioned to this cue by means of this post-hypnotic suggestion (see the later section on post-hypnotic suggestion) and thus re-evoked when the cue is presented.

Instant hypnosis, however, can also occur without subjects directly being hypnotized previously by a hypnotist. This can happen when subjects have heard of or seen the hypnotist's great effectiveness and believed it. In a sense, such subjects are already hypnotized or conditioned by having heard or seen the positive responses achieved by the hypnotist. (This is discussed further in the section on prestige.)

Self-hypnosis

Self-hypnotic induction can be explained in much the same way as the hypnotic induction above. The only major difference in this case is that subjects play the part of both hypnotist and subject. To put this in terms of the conditioning paradigm, the only major difference is that in self-hypnosis the CS is the following stimulus situation: 'the subject giving himself a suggestion during hypnotic induction' rather than 'the hypnotist making a suggestion during hypnotic induction'.

There is also instant self-hypnosis. This is explained in the same way as the first type of instant hypnosis, except that the cues subjects are given are self-induced. Subjects are also told that in this state they will be able to give themselves suggestions in the same way as the hypnotist, including the suggestion to awaken.

Explanation of hypnotic induction in three hypotheses

The above explanation of hypnotic induction may be condensed into three major hypotheses. In this section the evidence in support of these hypotheses is considered and further tests suggested.

Hypothesis I: Hypnotic induction is a conditioning process

Hull and co-workers provided a good portion of the evidence bearing on the validity of this hypothesis. In his chapter, 'Hypnosis regarded as habit', Hull (1933) proposed that if hypnosis results from a conditioning process or is a 'habit phenomenon', as he prefers to call it, it should display certain characteristics common of habit phenomena. (It is assumed that 'habits' are types of conditioned responses.)

Hull (1933) points out six such common characteristics:

- Practice in an act facilitates its subsequent performance.
- The rate of facilitation in the practice activity is more rapid early in the practice than later.
- A period of disuse is followed by a partial loss of the facilitation resulting from practice.
- Other things being equal, the loss of facilitation following disuse is less where the original repetitions were widely spaced than where closely spaced.
- With the resumption of practice this is recovered, the new practice curve shows a picture of negative acceleration.
- The amount of loss resulting from disuse is recovered with less practice than was required for its original acquisition.

In two experiments by Kreuger (1931), one of Hull's associates, it was found that hypnotic induction did indeed display the above characteristics.

Hull (1933) presented as corroborative evidence a number of experiments showing that waking suggestion (which in the present paper is held to be essentially equivalent to hypnotic suggestion) has 'habituation effects parallel to those shown by Kreuger to be characteristic for the process of hypnotization' (Hull, 1933, p. 343). These include the experiments of Hull and Huse (1930), Williams (1930) and Patten, Switzer and Hull (1932). In concluding his chapter 'Hypnosis regarded as habit', Hull (1933) states:

Such a remarkable and detailed conformity of the phenomena hypnosis to the known experimental characteristics of ordinary habituation can hardly be accidental and without significance. The indications would seem to be that whatever else hypnosis may be it is — to a considerable extent, at least — a habit phenomenon and that quite possibly this hypothesis may furnish the basis for an ultimate understanding and explanation of its hitherto largely inexplicable characteristics. (Hull, 1933, p. 347)

The reader might question the use of Hull's (1933) evidence in support of Hypothesis I on the grounds that the latter hypothesis is referring to the conditioning of 'an inhibitory set', not a particular response as proposed in Hull's (1933) postulate. Actually, there is no real discrepancy here. The author is of the opinion, like Harlow (1959) and Osgood (1948), that:

Simultaneous with every increment in excitatory habit tendency in the association of a given stimulus with a given reaction, there is also generated an equal increment of inhibitory habit tendency in the association of the same stimulus with the directly antagonistic reaction. (Osgood, 1948, p.150)

and, thus, that both are directly related.

Hypothesis II: The response conditioned during hypnotic induction is an inhibitory set, a set which tends to inhibit stimuli incompatible with the response suggested by the hypnotist

This hypothesis is, of course, founded to a great extent on Corollary 4 of the postulates, which states that inhibitory responses can be conditioned.

There are a number of corollaries to Hypothesis II; we shall look at three of them.

Corollary 1: Reactivity to competing stimuli should decrease as hypnotic induction progresses This is what we would expect if hypnotic induction involves the conditioning of an inhibitory set, and consequently the gradual increasing of the inhibitory set as hypnotic induction progresses.

The results of an experiment by Hernández-Peón et al. (1960) appear to support this corollary. These investigators found that hypnotic induction resulted in the diminution of the forearm flexor response elicited by tactile stimulation. (This tactile stimulation may be looked upon as a competing stimulus.) It is interesting to note their interpretation of the results:

All procedures for inducing hypnosis require the focusing of attention upon the experimenter's verbal stimuli with obliteration of irrelevant stimuli (competing stimuli) ... It does not seem unreasonable that during the hypnotic state itself, the thresholds of perception for modalities other than the auditory are raised by the postulated centrifugal sensory inhibition at lower levels of the central nervous system ... Our results fall in line with the above mentioned hypothesis although sometimes the size of the skin reflex remained unchanged during hypnosis, in most of the experiments a more or less intense diminution was induced by the hypnotic state *per se* ... Our results agree with those of Sears (1932), Dynes (1932), and Douple et al. (1939) who recorded during hypnotic anesthesia partial, but significant reduction of non-voluntary physiologic reactions to pain such as the psychogalvanic reflex, respiratory, cardiac, and vasomotor responses. (Hernández-Peón et al., 1960, pp 37 and 40)

Corollary 2: Increasing the inhibitory response paired with the CS on each trial should facilitate the conditioning (facilitate hypnotic induction) This corollary should help to explain how sleep suggestions facilitate hypnotic induction. Sleep suggestions produce an added inhibitory response which would summate with the one produced by a positive response to a suggestion, resulting in stronger inhibitory responses with each suggestion.

The point that sleep suggestions could evoke sleep-like responses was brought out by Pavlov (1960) when discussing methods of hypnotic induction:

At present the more usual method consists in the repetition of some form of words, describing sleep, articulated in a flat and monotonous tone of voice. Such words are, of course, conditioned stimuli which have become associated with the state of sleep. In this manner any stimulus which has coincided several times with the development of sleep can now by itself initiate sleep or a hypnotic state. (Pavlov, 1960, pp 404–5)

It should be mentioned that there are at least two possible difficulties with the use of sleep suggestions in hypnotic induction. First, there is the possibility that the sleep suggestions might be too effective, that is, the subject might literally fall asleep, which would mean a loss of contact between the hypnotist and the subject. One possible way to avoid this is for the hypnotist to suggest that subjects will continue to hear his voice, even though going into a 'deep sleep'. The other difficulty is that the sleep-like state produced might interfere with the responsiveness to other suggestions, especially any requiring an alert, awake state. This difficulty might be avoided if, before such suggestions, the hypnotist suggests that subjects will be wide awake and very much alert, although in deep state of hypnosis.

Corollary 2 would also explain why devices which focus subjects' attention facilitate hypnotic induction. As Hernández-Peón (1959) and others have shown, a major component of the attention response is the inhibition of competing stimuli. Any means, then, whereby the hypnotist can get subjects to focus their attention (such as having subjects look at a shiny crystal or a spinning spiral) should add to the inhibitory response and thus aid hypnotic induction.

Corollary 3: The more stimuli brought under the control of the inhibitory set with each succeeding trial (with each suggestion) the more effective the hypnotic induction and thus the greater the increase in general suggestibility From this at least two predictions follow:

- The greater the overlap among the stimuli incompatible to two suggestions, the greater will be the increase in responsiveness to the second suggestion when the first one has been responded to positively. This, of course, may be stated another way — the more similar the second suggestion to the first, the greater the increase in responsiveness to the second when the first suggestion has been responded to positively.
- An hypnotic induction which only involved obtaining a positive response to the same suggestion over and over again, or to a series of similar suggestions, would not lead to as great an increase in general suggestibility as an hypnotic induction that involved obtaining a positive response to a series of different suggestions. (Increase in suggestibility would be measured by the increase in responsiveness to a set of suggestions different from those used in the induction.)

Parenthetically, it should not be inferred from this corollary that for a suggestion to be responded to positively all the stimuli competing with the suggested response must be covered by the inhibitory set. One should not forget that it is a combination of the inhibitory set *and* the strength of the cognitive stimulus evoked which determines the probability of a positive response to a suggestion. Also, there can be degrees of positive response, depending on how many competing stimuli have been inhibited.

Hypothesis III: A positive response to a suggestion will induce within the responding person a more or less generalized increase in the normally existent tendency to respond to succeeding suggestions

Hull (1933) cites two studies in support of this hypothesis (Caster and Baker, 1932; Jennes, 1933). Caster and Baker (1932):

took with a stop-watch the suggestion times required to produce lid-closure in ten subjects, (1) preceding positive response to arm suggestion and (2) following such response. Under these conditions the hypothesis demands that the trance induction time following the arm movement should upon the whole be less than that preceding the response to arm suggestions. (Hull, 1933, pp 313–14)

This hypothesis was confirmed in seven out of ten subjects. Jennes (1933), repeating this experiment with some improvements, confirmed the hypothesis in eight of nine subjects.

The above findings seem to fit in with the reports of a number of investigators:

Schilder and Kauder (1927), for instance, have pointed out that a number of earlier investigators as well as they themselves had found it efficacious to give their subjects some waking suggestions easy of execution before attempting to hypnotize them. This appeared to facilitate the process. (Weitzenhoffer, 1953, p. 40)

Opposed to Hypothesis III we find the results of two of Hull's own experiments (Patten et al., 1932; Hull, Patten and Switzer, 1933). In these experiments Hull attempted to see if a positive response to one waking suggestion would increase the responsiveness to a second waking suggestion. His results indicated no such increase, thus contradicting the hypothesis. In commenting on the apparent contradiction between these two experiments, and the experiments of Caster and Baker (1932) and Jennes (1933), Hull (1933) states:

It is difficult to reconcile the results of the two groups of investigations. The problem involved is of such central importance that the experiments should be repeated with judicious variations to make certain whether or not some hidden defect of technique may not have produced this seeming inconsistency, particularly between the study of Jennes (1933) and that of Hull et al. (1933) ... No question in the whole subject of hypnosis and suggestibility is in such urgent need of critical experimentation. (Hull, 1933, p. 393)

A thorough analysis of the two negative experiments by Patten et al. (1932) and Hull et al. (1933) uncovered what might well be a 'hidden defect of technique'. Both experiments used the following two suggestions:

- That the head would fall forward on the chest.
- That the arm, which was suspended by a special device, would sway forward (from side to front).

The order of these suggestions was, of course, alternated. In both the experiments of Pattern et al. (1932) and Hull et al. (1933) it was found that giving the head suggestion first actually seemed to interfere with the response to the subsequent arm suggestion rather than facilitate it. This was in direct contradiction to the hypothesis that positive response to direct suggestion evokes a generalized hypersuggestibility. The possible 'defect of technique' that might explain such contradictory results is the distinct possibility that arm movement might *naturally* be interfered with more when the head is in the 'bent-over-on-chest' position than when straight up. To illustrate this, readers need only try it themselves. If they hold the arm extended then let the head come down they will notice that, as the head comes down, the arm will also come down a bit as the centre of gravity is shifted. This greater pull downwards on the arm might explain the longer time taken for it to sway forwards in response to the arm suggestion. This possible explanation is given further support when we see that no such interference with the head suggestion was reported by Hull et al. (1933) when the arm suggestion was given first, and what is more, Pattern et al. (1932) found that when the arm suggestion was given first, the head suggestion tended to be facilitated (seven out of ten subjects).

The following are a number of corollaries to Hypothesis III, a test of which would be a further test of the hypothesis.

Corollary 4: If a positive response to a suggestion will increase responsiveness to the next suggestion then a negative response should decrease responsiveness This may be tested easily by giving subjects in one group one or more very difficult suggestions (that is, suggestions with a low probability of being evoked initially) before a test suggestion and comparing their response to this test situation with that of a second group that does not receive the difficult suggestions first.

Corollary 5: If a series of suggestions is given to the subject, the probability of inducing a state of hypnosis will be greater if the suggestions are given in a gradually increasing order of difficulty than if they are given in random order This would be predicted since the probability of a positive response to any individual suggestion, according to the theory, is greater the greater the number of positive responses to previous suggestions, and this is maximized if the suggestions are given in gradually increasing order of difficulty. Each positive response increases the probability of success in the subsequent suggestion.

It is interesting to look at some of Barber's (1961, 1965) results in this light. In a number of studies Barber has shown that a good many hypnotic phenomena may occur by means of waking suggestion, without the need of 'hypnotic induction'. (What Barber considers an hypnotic induction is mainly the giving of sleep or relaxation suggestions.) However, if we look at Barber's studies, we find that he usually gives his waking suggestions in a series (without 'hypnotic induction'), usually in gradually increasing order of difficulty. It might very well be that part of the reason for the high percentage of hypnotic-like responses Barber reports is that he has actually put some of his subjects through an hypnotic induction, at least according to its definition in the present paper. In other words, responding positively to the previous suggestion(s) increases the probability of responding positively to the next one.

Corollary 6: An hypnotic state can be facilitated if, along with each of the first few suggestions given in hypnotic induction, the actual sensory stimuli which would ordinarily evoke these suggested responses accompany the suggestions without the subject's knowledge This should be done in such a way that subjects are not aware of the 'artificial' cause of the responses so that they will ascribe them solely to the hypnotist's suggestions. It is felt that this can be done, if the sensory stimulus is kept close to the threshold, almost to the point of being sub-threshold. The response to the sensory stimulus would summate with that to the cognitive stimulus (evoked by the suggestion) to lead to the overall response.

The response could be 'artificially' induced in a number of ways. For instance, the suggestions that they eyes are going to get tired may be helped if a slight strain is placed on them by having subjects look at an object at a difficult angle. Or, the suggestion that subjects were going to feel cold could be reinforced by actually lowering the temperature of the room.

It is interesting to know that an experiment somewhat along these lines has already been run. This is the 'abstract conditioning' experiment of Corn-Becker, Welch and Fischelli (1949), whereby a series of 'artificially reinforced' suggestions led to a definite positive response to a subsequent 'non-reinforced' suggestion. The main difference between the experiment by Corn-Becker et al. (1949) and the type proposed by the corollary is that Corn-Becker et al. (1949) did not attempt to keep the reinforcing stimuli close enough to threshold, and thus their subjects were quite aware of the external cause of the responses and did not think that they were due

solely to experimenter suggestions. It might be said that in the experiments of Corn-Becker et al. (1949) any conditioned inhibitory set was conditioned to the stimulus pattern 'experimenter plus external stimulation', whereas in the experiment proposed by the corollary, the CS would be just 'experimenter' (or hypnotist). The likely reason that Corn-Becker et al. (1949) did obtain a positive response to the 'non-reinforced' suggestion at the end of the series was because of stimulus generalization, that is, having been conditioned to a stimulus pattern ('experimenter plus external stimulation'), subjects still responded to a component of that pattern ('experimenter'). However, it may be predicted that such a generalized response would not be as strong (both in terms of amplitude and ease of extinction) as one where the CS is the same one used during the conditioning. Nevertheless, this approach to facilitating hypnotic induction bears further investigation. It might have the advantage over the 'sub-threshold approach' of not attempting to deceive subjects. If deception were detected by subjects, it could produce irrevocable damage to their attitude towards hypnosis.

Individual difference factors influencing hypnotic induction

In this section some of the individual difference factors that have been purported to influence hypnotic induction are outlined, and an attempt is made to show how their role may be explained in terms of the theory.

Voluntary attention (concentration)

There are individual differences in the ability to voluntarily suppress irrelevant stimuli ('ability to concentrate'). Furthermore, the greater the ability of subjects to concentrate on the hypnotist's suggestions, the greater is the probability of responding positively to them. Thus it may be predicted that the greater subjects' ability to concentrate, the greater the probability of success of hypnotic induction.

Prestige

It is fairly well-accepted that the more 'prestige' an hypnotist has in the eyes of subjects, the better his chances of success. It is felt that this is so because the statements, commands or suggestions of a person with prestige tend to be questioned less, that is, such a person evokes a greater inhibitory set to begin with. In general, people have previously been conditioned to accept at face value the statements of someone who is an authority in his field. That is, an inhibitory set which inhibits contradictory stimuli has been previously conditioned (in much the same way as in the hypnotic induction process). This is so because what the authority says has usually turned out to be true. The more a person is known to be an expert the greater the unquestioning acceptance of his statements (that is, the greater the inhibitory set). Thus, when a person hears of a particular hypnotist's great successes (or witnesses them), this prestige factor or inhibitory set is evoked by the hypnotist and thus aids hypnotic induction. This could be tested by seeing the effect of hypnotizing a shill or previously determined good subject in front of the prospective subject. At least one experiment has supported the contention that prestige can increase the chances of success in hypnotic induction, that of Das (1960). It is believed that if a waking suggestion is effective it is often, to a great extent, dependent on this prestige factor.

Related to the prestige effect is the concept of 'transference' as it is used by psychoanalysts in explaining hypnosis. The latter feel that one of the major factors involved in hypnotic induction is a transference effect, that is, subjects going under

hypnosis are actually reacting to the hypnotist as they would to their parents when children. The 'prestige' influence of the parent is 'transferred' to the hypnotist during the process of hypnotic induction according to this view. It could be that certain characteristics of the hypnotist and his hypnotic induction might, through generalization, evoke the child-parent type of prestige effect which could then interact with hypnotic induction to facilitate it. How big a factor this plays in hypnotic induction will be determined by how similar to their parents subjects perceive the hypnotist to be. It should be pointed out that this transference could also damage an hypnotic induction if subjects had developed a negative reaction pattern to their parents.

Subjects' expectation

The expectation of being hypnotized can have a number of different effects on hypnotic induction. First, there may be a negative effect produced if subjects have a great fear of hypnosis. Or, conversely, with adventurous subjects, who enjoy exploring the 'unknown', it may have a positive effect.

A second effect that expectation can have is that of focusing subjects' attention on the appropriate CS-CR contingency. That is, as a result of the expectancy of being hypnotized, subjects may be more likely to ascribe correctly the occurrence of the 'strange' phenomena to the hypnotist than to some external cause. For example, if the suggestion of coldness is given in a non-hypnotic setting, subjects are more likely to ascribe any subsequent feeling of coldness to the possibility that someone has lowered the temperature of the room. If the positive response (and thus the inhibitory response) is not associated with the hypnotist (the CS) then the desired conditioning does not take place. The idea that focusing attention on the contingency would facilitate conditioning was given considerable support by studies on the effect of awareness on learning (Eriksen, 1962). These studies indicated that the more subjects were aware of the correct contingency the better the conditioning if their attitude was positive.

Parenthetically, it might be mentioned that if it is important that the responses be ascribed to the appropriate CS (the hypnotist or 'experimenter'), we should then expect that subjects will be less likely to be hypnotized if they perform the suggested response voluntarily just to please the hypnotist. If they do this, subjects would not ascribe the responses to the hypnotist but to their own volition, and thus would defeat the purpose of hypnotic induction.

A third way expectation may influence hypnotic induction is if subjects have a certain preconceived notion of what hypnosis is like. One example of how this can have a negative effect on hypnotic induction is where subjects incorrectly expect that hypnosis is some state of unconsciousness or sleep. When they find themselves still aware of things or awake, they think that they have not been hypnotized. This negative thought can have a braking effect on hypnotic induction. Such a negative effect may be eliminated by means of a pre-induction talk where subjects are told that hypnosis is *not* a state of sleep nor unconsciousness, and where they are given some idea of actually what to expect. Another expectation that can damage hypnotic induction occurs when subjects believe that being hypnotized means responding to every suggestion in the hypnotic induction. If subjects fail to respond to one for some reason, even after they have responded successfully to the previous ones, they may decide that they are no longer hypnotized and at that point may stop responding to all subsequent suggestions. To eliminate this, as part of the pre-induction talk, subjects should be told that because of individual differences, there may be some suggestions that

work very well for some people but not for others, and therefore it should not bother them if they do not respond to a suggestion; in such a case they should just wait for the next one.

Subjects' expectations of what hypnosis is like can influence hypnotic induction in other ways. For example, if subjects are told that catalepsy of the dominant hand occurs when they go under hypnosis (Orne, 1959) then as subjects feel themselves responding they are also indirectly being given the suggestion of catalepsy of the dominant hand. This response can, in turn, influence the hypnotic induction, as can any positive responses to previous suggestions.

This last aspect of expectation has played a major role in the 'goal-directed' (White, 1941) and 'role-playing' (Sarbin, 1950) theories of hypnosis. These theories state in essence that hypnotic behaviour is a meaningful, goal-directed striving, its most general goal being to behave like a hypnotized person as this is continuously defined by the hypnotist *and understood by the subject*.

Barber and Calverley (1964a, 1965) demonstrated the overall effect of expectation of hypnosis to have a positive effect. They found that higher scores on the 'Barber Suggestibility Scale' were obtained when the experimental situation was defined as 'hypnosis' rather than as a 'control condition'.

Fears

Fear of the unknown, mistrust of the hypnotist, fear of revealing 'inner secrets', etc., are all examples of fears that can interfere with hypnotic induction. Because of such fears, any positive response to suggestion during hypnotic induction would be fear-producing and, thus, tend to be avoided or suppressed, and in this way interfere with the conditioning of the inhibitory set.* (A pre-induction talk aimed at allaying subjects' fears should facilitate hypnotic induction.) Conversely, an adventurous attitude on the part of subjects would probably lead to facilitation of hypnotic induction. That this seems to be the case is given support by the work of Hilgard (1967), who reported a positive correlation between adventurousness and hypnotic susceptibility.

Motivation

It is fairly obvious that if subjects are not very interested in being subjected to hypnotic induction their chances of responding positively are much less. In one study by Barber and Calverley (1966) it was shown how important the factors of boredom and disinterest were in affecting subjects' responsiveness to hypnotic induction. By repeating the same monotonous hypnotic induction procedure over a period of eight days, these workers produced a significant drop in suggestibility.

Attitude

The fact that certain attitudes can influence hypnotic induction is fairly well accepted (Weitzenhoffer, 1953, p. 283). For example, Dorcus (1963) found that by means of a pre-induction talk aimed at eliminating the interference of certain known negative attitudes (these can be thought of as 'competing cognitive stimuli'), the experimenter was able to hypnotize the six presumably unsusceptible subjects. In another study, Barber and Calverley (1964b) found that by manipulating subjects' attitudes towards

*It is true that indications of fear are considered a good sign by some hypnotists (Gindes, 1951) since this would probably indicate a high degree of expectancy of being hypnotized. However, all things being equal, that is, if people are matched on degree of expectancy of being hypnotized, it would be predicted that the greater the fear, the greater the interference.

the task at hand (a suggestibility test) they were able to significantly affect subjects' suggestibility scores in the right direction. Pre-test instructions aimed at producing a negative attitude led to a considerable drop (almost down to zero) in responsiveness.

Three typical attitudes that might influence hypnotic induction are now discussed, and an attempt is made to explain how in terms of the theory.

One negative attitude which often interferes with hypnotic induction may be called, for want of a better term, 'non-submissiveness' or a strong desire to be in control of oneself all the time. This would lead to a decrease in the probability of a positive response to the suggestions of the hypnotist, and thus interfere with hypnotic induction, since the desire for self-control would be incompatible with giving up control to the hypnotist. This interference can best be eliminated if the hypnotist does not take an authoritarian attitude as his approach. Many people have the misconception that hypnosis invariably means losing control to someone else. This need not be the case. It can be worked so that the only people gaining greater control over subjects are the subjects themselves. This can be done by instructing subjects during their pre-induction talk that the hypnotist should be looked upon as an instructor who is merely showing them a technique whereby they can gain greater control over themselves, greater control over their involuntary side. Subjects are told that they can reinterpret each suggestion given by the instructor by replacing *You* with *I*. For example, if the hypnotist tells subjects, '*You will now feel your arm being pulled up*', subjects can tell themselves, '*I will feel my arm being pulled up*'. They can also be told that they do not have to respond to a particular suggestion if it annoys them, and that they can always feel free to 'awaken' at any point.

Still another way of eliminating this problem might be to let subjects hypnotize themselves. Instead of the hypnotist giving subjects the series of suggestions, subjects could give them to themselves after learning the series. This method might have other advantages as well in that subjects could set their own pace and go on to the next suggestion only after succeeding on the previous one. Often, a hypnotist may not spend enough time on a particular suggestion, or conversely, may spend too much time on it. (In self-hypnosis, as in hetero-hypnosis, a response is usually considered positive only if it occurs involuntarily.)

Another common interfering attitude is what may be called the 'rational' attitude. Too strong a desire to have a rational explanation for everything can lead subjects to ascribe any positive response to 'more rational causes' than the hypnotist's suggestions, for example, '*My arm came down because it would naturally get heavy being in such a position for so long*' or '*My eyes closed because they would naturally do so after staring for so long*', etc. And, as already pointed out, it is important that subjects be focused on the correct CS-CR contingency, that is, they should ascribe a positive response to the hypnotist's suggestions. This negative attitude can best be eliminated if subjects are given a reasonable explanation for hypnosis in their pre-induction talk. For example, it should be stressed that no trickery need be involved in hypnosis, that words can actually evoke such phenomena naturally, that hypnosis is a state whereby words have a much greater effect because of the highly increased concentration, etc.

A third common attitude which can interfere with hypnotic induction is that of skepticism. Skepticism may be thought of as a conditioned set to inhibit response to suggestions and is felt to be a result of a conditioning process whereby suggestions have been reinforced negatively in subjects' past. Such an inhibitory set would naturally interfere with a positive response to the hypnotists' suggestions and thus interfere with the conditioning process taking place during hypnotic induction.

Elimination of a skeptical attitude may be helped by ensuring that the initial suggestions in hypnotic induction have a high probability of success (for example, the ‘chevreul pendulum’ suggestion — see Weitzenhoffer, 1957).

Imagination

We would expect that the greater a subject’s imagination, that is, the greater the sense of evoking vivid imagery to begin with, the greater the probability of responding to suggestions and, therefore, the greater the susceptibility to hypnotic induction. Hilgard (1967), for example, reported positive correlations between childhood fantasy and involvement in reading, and hypnotic susceptibility.

However, there may be limits as to how great a part an initial vivid imagination may play, for subjects may conclude that the positive response to a suggestion is due to their own imagination and not to the hypnotist’s efforts. They might remember that they have been able to evoke similar responses when using their own imagination. And, as has been mentioned, it is important that subjects ascribe the positive responses to the hypnotist.

Age

According to Weitzenhoffer’s (1953) review of the area, suggestibility and hypnotic susceptibility at first increase with age, reaching a peak at the ages of seven to eight, then decrease gradually to the age of 20, when it begins to level off (Weitzenhoffer, 1953, p. 76). The reason that suggestibility varies in this way may be traced to certain factors that vary with age. One of these is language ability. Since hypnosis is dependent to a great extent on the conditioned response evoked by words, we can understand why very young children whose language ability is not yet well-developed would make very poor subjects for hypnosis, and thus why we would expect an initial gradual increase in suggestibility with increasing age.

An explanation for the gradual decline in suggestibility after the age of eight is that with continued increasing age the number of cognitive stimuli competing with a suggestion increases (that is, knowledge increases with age) and a corollary to the ‘reciprocal inhibition’ or ‘stimulus dominance hierarchy’ postulate is that the more stimuli in the hierarchy, the lower the probability of a reaction to any *one* of them. These competing stimuli develop in a number of ways. First, we know that with increasing age the number of possible cognitive stimuli evoked by a word increases. For example, the word *house* has been associated with more and more houses as subjects get older, thus if the suggestion is given, ‘*You will now see a house*’ there will be competition between the many ‘house’ images, with a resultant weakening of any *one* being finally singled out. Also, with increasing age there will be a greater number of possible contradictory stimuli evoked by a suggestion, that is, subjects have more information available with which to verify or contradict the suggestion. Finally, there is the fact that with increasing age there is the development of skepticism. As pointed out above, skepticism may be thought of as a conditioned process where suggestions have been reinforced negatively, that is, people learn in time that not everything anyone says is true.

Aspect 2: Explanation of hypnotic phenomena

An attempt will now be made to show that all hypnotic phenomena can be explained in terms of the following two hypotheses:

- Hypothesis IV: a suggestion leads to the desired response by first evoking a cognitive stimulus which is connected with that response.
- Hypothesis V: the inhibitory set evoked by a suggestion facilitates the suggested response by inhibiting stimuli competing with the cognitive stimulus.

This explanation holds for all suggestion phenomena, whether the suggestion is given in the hypnotic state or in the normal state. The reason that hypnotic suggestion leads to stronger responses than normal suggestions is that the inhibitory set is made more effective after hypnotic induction.

In what follows a number of hypnotic phenomena will be examined in terms of this explanation, with supportive evidence. This will not be an exhaustive list, but should be enough so that readers will be able to apply the explanation to other hypnotic phenomena not covered.

Hypnotic phenomena

Hallucinations

An 'hallucination' is herein defined as a highly vivid image which is incongruous with the present sensory and/or cognitive environment ('reality'). An 'image' is defined as a cognitive stimulus emanating from an engram or recording of a sensation or combination of sensations experienced previously. Since engrams can be of any sense modality, images may also be in any sense modality. It is important to remember this, as the term 'image' is often associated with only visual images.

An hallucination occurs as a result of a suggestion because an image (a cognitive stimulus) is evoked and an inhibitory set is also evoked, one which inhibits competing stimuli in the 'stimulus dominance hierarchy' (one which inhibits 'reality') sufficiently so that the image rises to the dominant position in the hierarchy.

As an example of how the explanation works, let us say the suggestion was given to subjects that there was a water melon on an obviously empty table. First of all, an image of the water melon on the table would be evoked by this suggestion, since words can act as conditioned stimuli triggering engrams. However, ordinarily, this image would tend to be suppressed quickly by the more dominant incompatible stimuli present. The very sight of the empty table, that is, the incompatible sensory stimulus 'empty table', would be most likely enough to suppress the image. In addition, there might also be cognitive stimuli in contradiction, such as the knowledge that water melons were not in season, or the remembrance that no water melons had been carried into the room, etc. If, however, these incompatible, competing stimuli could be suppressed or eliminated, then according to the theory, a highly vivid image of the water melon on the table would occur (an image so vivid that if one were to eat a piece of this imaginary water melon, we would find all the responses associated with the eating of a real water melon — salivation, gastric secretions, enzyme production, etc.). Hypnosis facilitates the production of hallucinations because its strong inhibitory set helps in the suppression of those contradictory stimuli.

Age regression

Age regression induced through hypnotic suggestion is a phenomenon very similar to hallucinations induced through hypnotic suggestion. There are two main differences, however. First, whereas age regression involves evoking a specific image or related

set of images which are recordings of an actual event that has taken place in subjects' past, an hallucination may involve combinations of such images forming a new percept, not experienced previously (such as the image of an animal with a lion's body and the head of a giraffe). Second, an hallucination is often projected onto the present sensory environment (for example, '*You will see a red number seven on the wall*'). The 'seven' is imaginary (but the wall is real), whereas in age regression the present environment tends to be replaced entirely by the set of images evoked.

Control of physiological responses

Hypnosis may be looked upon as a state where one has greater control over involuntary responses. Most physiological responses are considered in this class. Among the physiological responses reported to have been controlled by hypnosis we find the following:

- Basal metabolism (Platinov, 1959, p. 110).
- Blood sugar level (Platinov, 1959, p. 113; Weitzenhoffer, 1953, p. 135).
- Enzyme secretion, gastric acidity and secretion of bile (Weitzenhoffer, 1953, p. 135).
- Water metabolism and temperature regulation (Platinov, 1959, pp 11, 161, 169).
- Blister formation (Hadfield, 1917; Ulman, 1947; Schneck, 1953, p. 263).
- Hunger contractions (Scantlebury, Feick and Patterson, 1942; Lewis and Sarbin, 1943).
- Heart rate (Schneck, 1952, p. 262).

An example of how such mechanisms can be controlled by means of hypnosis has already been given above. We saw how the suggestion of eating an hallucinatory water melon would be expected to lead to certain gastronomical responses.

Another example would be the control of secretion of pepsin. Here, we could suggest eating a steak since pepsin is the enzyme secreted when proteins are eaten.

In these examples we see that in order to evoke the particular involuntary response(s) in question we must first evoke a cognitive stimulus to which the particular response is attached. The inhibitory set produced by hypnotic induction suppresses competing stimuli, thereby increasing the probability that this cognitive stimulus will rise to a dominant position in the hierarchy and thus increasing the probability that the response will be made.

Emotions

Emotions, another type of involuntary response, may be evoked by means of a suggestion that evokes a cognitive stimulus which leads to the desired emotional response. The inhibitory set raises this cognitive stimulus in the stimulus dominance hierarchy, leading to a strong emotional response. As an example, the emotion of fear could be produced by suggesting that subjects were going to be burned with a hot poker. The emotion of anger could be produced by suggesting something that was known to evoke anger in a subject. In a similar manner, emotions can also be quelled by hypnosis. Fear, for example, can be eliminated by focusing on a cognitive stimulus incompatible with the fear. A dentist using hypnosis to eliminate fear in his patient might suggest a pleasant image of listening to relaxing music. The combined inhibitory effect of this cognitive stimulus plus the overall inhibitory set of the hypnosis will act to inhibit the fear response.

Motor responses

Among the hypnotic phenomena that may be classified as ‘motor phenomena’, we would list things such as deep relaxation, involuntary movement of a limb and increased work capacity (paralysis could also be listed here, but it is discussed in the section on ‘hypophenomena’).

A relaxation response would be produced by evoking a cognitive stimulus connected with the relaxation response. This could be done by simply suggesting that subjects were going to feel more relaxed, since the word *relax* has been associated often enough previously with the response of being relaxed. Or, subjects could be told that they were lying relaxed in a nice warm bath or lying on a beach on a nice warm sunny day.

Involuntary movement of a limb could be produced by evoking the image of a limb moving or being moved. For example, if we wanted the arm to rise, we would suggest that there was a rope lifting the arm.

In all these cases, the inhibitory set would act to increase the strength of the cognitive stimulus by inhibiting interfering stimuli. For example, in the case of increased work capacity, one type of interfering stimulus inhibited would be pain.

Hyperacuity

The phenomenon of ‘hyperacuity’ of the senses produced through hypnotic suggestion may be explained as follows:

- The suggestion of increased acuity evokes a cognitive stimulus which mediates attentive responses, for example, in the case of visual hyperacuity, the head turning in the appropriate direction, the eyes focusing, the increased activity of the reticular activating system, etc.
- The suggestion evokes an inhibitory set which inhibits any stimuli that would tend to compete with this cognitive stimulus; to continue the example, any stimulus that would distract the subject or compete with the visual stimulus. Such competing stimuli would include the ‘negative’ thought likely to occur to subjects that they will only be able to see as well as they have done in the past.

Hypophenomena

Among the ‘hypophenomena’ we would place things such as suggested blindness, anaesthesia, amnesia and paralysis. Suggestion leads to hypophenomena by evoking a cognitive stimulus which is incompatible with the stimulus or response we wish to suppress and by evoking an inhibitory set which tends to inhibit stimuli incompatible with this cognitive stimulus.

Following from this explanation, the suggestion of blindness, for example, must first evoke a particular ‘blindness’ cognitive stimulus (which, of course, is incompatible with responding to visual stimuli). Put in other words, subjects must have some idea of what the word *blindness* means. Although few people will have experienced actual blindness in their past, they can still give some meaning to the term. Subjects could, for instance, interpret *blindness* to mean ‘unable to see as if one were in a dark room’. They have experienced dark rooms and thus a cognitive stimulus or image of a dark room can be evoked. Since reaction to this image is incompatible with seeing, visual stimuli will be inhibited. (From this we would predict that the chances of producing blindness through suggestion would be better if it was actually suggested that

subjects would find themselves in total darkness, rather than directly suggesting blindness. The advantages of this use of this ‘indirect’ suggestion over direct suggestion are discussed more fully later.)

Actually, whenever any visual hallucination is suggested while subjects’ eyes are open they become blind to the visual stimuli incompatible with the hallucination. For example, if subjects were told that when they open their eyes they will be in their first-grade classroom, they will see this and will not see anything but the image, that is, they will be blind to everything but the image. The reason that they do not appear blind at the time, of course, is that they are ‘seeing’ their first-grade classroom.

As another example of how a hypophenomenon occurs under hypnosis, we can take an interesting finding of Hernández-Peón et al. (1960). These workers discovered that they could achieve complete anaesthesia to a cutaneous stimulus by suggesting that subjects were experiencing a different stimulus, a burning sensation. Here, the hallucination of a burning sensation inhibited the cutaneous stimulus.

In explaining hypophenomena we might think it unnecessary to evoke a specific cognitive stimulus, that the inhibitory set by itself should suppress the stimulus to be inhibited. It is true that the inhibitory set may include the particular stimulus in its scope and thus cause inhibition to a certain extent. However, evoking a cognitive stimulus incompatible with this stimulus increases the amount of inhibition, suppressing the stimulus still further.

The mechanism involved in the production of amnesia through suggestion is similar to that involved in causing blindness and anaesthesia. The main difference is that, whereas the suggestion of blindness or anaesthesia involves inhibition of a *sensory* stimulus, the suggestion of amnesia involves inhibition of a *cognitive* stimulus.

There is another type of amnesia associated with hypnosis. It is referred to as ‘spontaneous amnesia’. This often occurs upon awakening from the hypnotic state, without amnesia being suggested directly. One way that this can occur is that subjects might have expected amnesia as a natural consequence of hypnosis. In this case, it may be said that amnesia has been suggested, but indirectly. Another way is as follows: in order to recall a previous event, cues associated with the event are needed.

Spontaneous amnesia occurs because when subjects awaken from a deep hypnotic state the cues around them are no longer the ones they were focusing on during hypnosis. During hypnosis they have been completely oblivious to their surroundings as they focused on the imaginary world evoked by the hypnotist. Thus, the cues in the surroundings were not connected with this ‘imaginary world’. This same type of explanation may be used to explain why it is so difficult to recall dreams on awakening from sleep.

Paralysis produced by suggestion occurs when the cognitive stimulus evoked is one incompatible with the motor response being inhibited. For instance, the suggestion that subjects will be unable to move from their chairs might evoke the dominant thought that they are too comfortable to move, or the suggestion that subjects will not be able to lift their arms might evoke the image of a very heavy weight on the arm.

Evidence in support of the explanation of hypnotic phenomena

Here, evidence in support of Hypothesis IV and Hypothesis V is considered, as well further tests of them being suggested. In so doing, not only will evidence be presented in support of the theory but methods will be suggested whereby suggestions may be

made more effective, increasing the probability of positive responses to suggestions being obtained.*

Hypothesis IV: A suggestion produces the desired response by first evoking a cognitive stimulus which is associated with that response

This, among other things, means that the suggestion must have meaning for subjects or no response will result. For example, if the experimenter suggests to subjects that they will secrete the enzyme pepsin (the protein enzyme), no response is likely to occur since most people would not know what pepsin is.

From the hypothesis we can deduce a number of corollaries.

Corollary 7: The higher the cognitive stimulus is in the stimulus dominance hierarchy to begin with (that is, the height before the cognitive stimulus is aided by the inhibitory set), the greater the response to the suggestion This corollary predicts that hypnosis would facilitate the recall of meaningful material more greatly than nonsense material, this because recall of meaningful material involves evoking stronger cognitive stimuli than nonsense material. There are a number of studies in support of this contention. For example, White, Fox and Harris (1940) tested recall for nonsense material, meaningful verbal material and meaningful non-verbal material (scenes from films). They reported no gain in hypnosis for nonsense material, but found a definite gain of approximately 50% for meaningful verbal material and a gain of approximately 80% for meaningful non-verbal material.

This corollary implies, for example, that if an aim was to increase the chances of inducing age regression, it would be wise first to suggest some incidents that were likely to have made a deep impression at the particular age (that is, left a strong engram), such as a birthday party or graduation.

This corollary also predicts that indirect suggestion would be more effective than direct suggestion when attempting to control involuntary responses. To illustrate what is meant here we will look at a number of examples.

In the pepsin example above, it was implied that the word *pepsin* was never associated with the eating of protein. But, for some subjects, there might be some association between the two. Would the suggestion of pepsin secretion lead to pepsin secretion in such subjects? Probably to a certain extent, but from this second corollary we predict that this direct suggestion of pepsin secretion would be much less effective than the indirect suggestion of eating a steak. This is because the cognitive stimulus of a protein food evoked by the word *steak* would be higher in the stimulus dominance hierarchy than the cognitive stimulus evoked by the word *pepsin*. The word *pepsin* is not likely to have been present very often during the eating of a protein meal (subjects are much more likely to think of the word *steak* than the word *pepsin* whilst eating a steak), nor is it likely to have been associated much with protein-type words which could act as mediators.

Similarly, if the hypnotist wanted subjects to salivate it would be wiser to use the indirect suggestions of tasting salt, sucking a lemon or eating a delicious meal than to make the direct suggestion to salivate. How often do we actually think of salivating

*Since the amount of responsiveness to individual suggestion will be a definite factor affecting hypnotic induction, these methods might also be felt to be of value in making hypnotic induction more effective as well.

when salivating? Also, if an increase in heart rate was required, something fearful could be suggested or to decrease heart rate, something relaxing could be suggested.

The evidence supports the contention that indirect suggestion is more effective than direct suggestion in controlling involuntary responses. The conclusion reached by Weitzenhoffer (1953) in summarizing his extensive review of this area was that the involuntary functions:

... appear to be most susceptible to indirect influences arising from the direct evocation of emotional states and hallucinations. Direct evocation of the changes themselves is least effective. In fact, it is rare that involuntary responses are directly altered by suggestion. It is of considerable significance for a theory of hypnosis that the available information appears to show that in nearly every reported instance for which alterations of reflex and reflex-like responses were produced by suggestions, the reflex arc was most certainly one that involved higher centers in the cortical and subcortical regions. (Weitzenhoffer, 1953, p. 138)

Corollary 8: The more (compatible) cognitive stimuli associated with the response evoked by the suggestion, the stronger the response to the suggestion Thus, if we wanted to induce a vivid regression, it would be wisest to suggest as many things known to be associated with the particular age as possible, as opposed to merely suggesting that subjects will regress to a particular age. For instance, the experimenter could obtain considerable information about a particular day in a subject's past from the parents and use this in age regression suggestions. Also, to increase the probability of producing an involuntary response, it would probably help to add considerable garnish to the suggestion. For example, instead of merely suggesting that subjects were eating a steak, we might suggest that they were eating a thick, juicy steak, smothered in onions.

Hypothesis V: The inhibitory set facilitates the suggested response by inhibiting stimuli competing with the cognitive stimulus

This hypothesis is, of course, founded to a great extent on Corollary 5 of the postulates, which states that if a set to inhibit incompatible stimuli is conditioned to a given CS, the presence of the CS will facilitate the occurrence of any response that would be interfered with by such incompatible stimuli. Three corollaries will now be considered.

Corollary 9: Suggestibility should be increased if sensory stimulation is curtailed This corollary predicts, for example, that if the eyes are shut, the lights are dim, proprioceptive stimulation is kept down (by lying still), noises are eliminated, etc., suggestibility should be increased. (Anyone familiar with the area of hypnosis will recognize these sensory-curtailling procedures as part of the usual procedure followed by most hypnotists.) Curtailment of sensory stimulation decreases the number of stimuli in the stimulus dominance hierarchy (and this includes cognitive stimuli since sensory stimuli can evoke cognitive stimuli) and thus increases the responsiveness to any cognitive stimuli focused upon.

In partial support of this prediction are the sensory deprivation studies already mentioned above, which report an apparent increase in suggestibility under sensory deprivation conditions.

Similar to the sensory deprivation evidence are the clinical reports on patients with damaged sensory organs. This includes the visual sense (Coleman, 1894;

Weinberger and Grant, 1940; Wagener, 1948; Bartlet, 1950), the auditory sense (Coleman, 1894) and the proprioceptive sense (Bartlet, 1950; Sternberg, 1964). A high incidence of hallucinations has been reported in such studies, which would lead to the suspicion that suggestibility is also increased. At least one report (Sternberg, 1964) indicates this to be so. In this report the hallucinations were shown to be induced through self-suggestion.

Corollary 10: Drugs that act as stimulus inhibitors should lead to a state of heightened suggestibility In support of this prediction are the numerous studies indicating that drugs such as LSD and Sernyl, that have been shown to act as stimulus inhibitors, do indeed produce states of hypersuggestibility (Barrios, 1965; Sjoberg, 1965; Solursh and Rae, 1966).

Similarly, anaesthetic-type drugs, such as sodium pentothal, which induce a sleep-like state, have been reported to increase suggestibility when light doses are used, that is, when doses are not heavy enough to induce complete unconsciousness (Weitzenhoffer, 1953, pp 52–4).

Corollary 11: Suggestibility should be greater when the number of potentially conflicting cognitive stimuli are kept to a minimum It has already been pointed out how the elimination of negative attitudes towards accepting suggestions would be expected to increase suggestibility. Also, from this corollary, we would expect that responsiveness to a suggestion would be greater the more unfamiliar subjects were with the area of the suggestion, or as put by Lindzey (1954, p. 27), people will accept suggestions more readily 'if they are relatively unfamiliar with a topic, unaccustomed or unable to check up on the suggestion offered to them'.

Aspect 3: Post-hypnotic suggestion

All responses produced in the hypnotic state can be carried over into the normal 'waking' state. That is, they can be made to recur on cue after the hypnosis is terminated. This includes the control over all the involuntary functions mentioned, including habits, attitudes, fears, etc. This 'carry-over' is facilitated by means of what is referred to as 'post-hypnotic suggestion'. The purpose of this section is to explain how post-hypnotic suggestion produces such results.

The first step in this explanation is to show that the phenomena may be explained as a form of higher-order conditioning, a form that Mowrer (1954) called 'sentence' or 'sign-sign' conditioning and which is referred to in the present paper as 'cognitive-cognitive' (C-C) conditioning. The second step is to present evidence that hypnosis can facilitate this type of conditioning.

In what follows, C-C conditioning and post-hypnotic suggestion will be defined. Next, the explanation of post-hypnotic phenomena will be condensed into two major hypotheses, with supporting evidence.

C-C conditioning

'C-C conditioning' is defined as a form of higher-order conditioning resulting from the pairing of two cognitive stimuli. It differs from Pavlovian or first-order conditioning in that the CS and UCS are cognitive rather than sensory.

As an illustration, the example is taken of conditioning salivation to the ringing of a bell by means of C–C conditioning. Rather than pair a real bell with real food, as in Pavlov's classic example of conditioning, it should be possible to establish an association between 'bell' and 'food' by pairing the words, *bell* and *food*. (Because of previous conditioning, the word *bell* has come to evoke the cognitive stimulus 'bell' and the word *food* the cognitive stimulus 'food'.)

Hebb (1949) proposed a similar model to explain learning in the mature organism. According to Hebb (1949):

The characteristic adult learning (outside of psychological laboratories) is learning that takes place in a few trials, or in one only. It seems always to involve a recombination of familiar perceptions and familiar patterns of movement ... Adult learning is thus a changed relationship between the central effects [cognitive stimuli] of separate stimulations, and does not concern the precipitating stimulus or, primarily, the motor response whose control is embedded in the central activity ... That is, the central effects of sensation are what enter into an association, rather than the comparatively simple sensory event itself. This seems especially true of the most efficient learning — the kind that is established most easily and persists longest. (Hebb, 1949, pp 126–32)

The type of C–C conditioning resulting from suggestion differs from Pavlovian (or sensory–sensory (S–S)) conditioning in still another way. A suggestion which pairs the words *bell* and *food* involves more than just merely saying *bell* and *food*, *bell–food*, *bell–food* over and over. The form of suggestion usually used is more like, '*Whenever you hear a bell you find the taste of food in your mouth*'. This suggestion does two things, it evokes the cognitive stimuli 'bell' and 'food', but *in addition*, it evokes an inhibitory set (as do all suggestions) which tends to suppress any stimuli which would interfere with the association of these stimuli.

Post-hypnotic suggestion

'Post-hypnotic suggestion' may be defined as suggestion given during hypnosis producing C–C conditioning that affects later, post-hypnotic behaviour. Not all suggestions producing C–C conditioning during the hypnotic state will affect later post-hypnotic behaviour. Whether the post-hypnotic behaviour is affected depends on the wording of the suggestions and on how the post-hypnotic state is terminated. For example, the suggestion '*When I ring a bell you will taste food*' given during the hypnotic state will probably not affect later, post-hypnotic behaviour. This is because when bringing subjects out of the hypnotic state the hypnotist either directly or indirectly suggests that subjects will come back to normal, that is, that all suggestions given during the hypnotic state will no longer hold. That this suggestion of return to normality can so quickly extinguish the conditioning that has taken place is given some support by the work done on the effect of cognitive factors on conditioning. For instance, Spence (1963) found that when subjects in a conditioning experiment were led to believe that the experiment was over, presentation of the CS was suddenly found to longer evoke the CR.

Such effects of trance termination on C–C conditioning can be avoided by means of appropriate wording of the suggestion. For example, the suggestion would be worded, '*Whenever I ring a bell you will taste food*', or better yet, '*After you have awakened, whenever I ring a bell you will taste food*'.

Explanation of post-hypnotic suggestion in terms of two hypotheses

Hypothesis VI: Suggestion leads to behaviour change by a form of higher-order conditioning called C–C conditioning

In strong support of this hypothesis are Mowrer's (1954) theoretical formulations on language and behaviour, presented in his presidential address to the American Psychological Association and later expanded in his book, *Learning Theory and the Symbolic Process* (Mowrer, 1960). In his discussion of the role of language in conditioning, Mowrer (1960) postulates that the sentence (a form of suggestion) can act as a means of conditioning. As he puts it:

The notion under examination in this chapter is ... that the sentence is, pre-eminently, a *conditioning device*, and that its chief effect is to produce new associations, new learning, just as any other paired presentation of stimuli may do ... The essence of the argument advanced up to this point is that the subject–predicate complex which we call a sentence is, in effect, simply an arrangement for conditioning the meaning reaction produced by the predicate to the interoceptive stimulation aroused by the meaning reaction elicited by the sentence subject. (Mowrer, 1960, pp 141–2, 147)

Although in this quote Mowrer (1960) refers to 'meaning reaction' rather than cognitive stimuli, it will readily be apparent to anyone reading Mowrer that he would consider the two terms practically synonymous (*see* Mowrer, 1960, pp 163–207).

Mowrer (1960) goes on to 'put this hypothesis about language function into a broader, more systematic perspective' by subsuming sentence conditioning under what he calls 'sign–sign' conditioning (what we refer to as C–C conditioning). He points out that signs need not be words only (as in sentence conditioning), but other stimuli and cues with acquired meaning as well.

What Mowrer (1960) is saying, essentially then, is that contiguous cognitive stimuli, whether elicited (suggested) by words or by other stimuli, can bond together forming a new cognition, a new conditioned association, leading to new behaviour. Mowrer's (1960) arguments in favour of such a contention are quite persuasive and experimental evidence in support of it has already been reported by Staats, Staats and Heard (1959).

Hypothesis VII: Hypnosis facilitates the C–C conditioning produced by suggestion
It must, of course, be obvious to anyone that under ordinary circumstances suggestions are not always readily accepted, thus C–C conditioning does not always take place after the appropriate suggestion. Why is this so? We will find that the answer to this question will begin to throw some light on the part played by hypnosis in facilitating C–C conditioning.

Osgood (1963) perhaps best answered this question in his presidential address to the American Psychological Association when discussing Mowrer's (1960) concept of the sentence as a conditioning device. According to Osgood (1963), if the assertion made by the sentence (the suggestion) is incongruent with subjects' previously held beliefs and attitudes (the cognitive environment) or their present perceptions (the sensory environment), it will tend to be suppressed.

The interference of incongruent stimuli with C–C conditioning is understandable in terms of the conditioning paradigm. Postulate II (the conditioning postulate) is recalled. It will be remembered that a corollary to this postulate stated that anything interfering with the contiguous occurrence in the focus of attention of the stimuli being associated would interfere with the conditioning. Since incongruent or incom-

patible beliefs, attitudes, perceptions, etc., tend to suppress the cognitive stimuli to be paired, they thus interfere with the conditioning. Therefore, we hypothesize that anything which would eliminate such interfering stimuli should facilitate C–C conditioning. (This hypothesis may be tested by first producing a situation where competing stimuli were eliminated or suppressed and then seeing if this facilitates the C–C conditioning.)

This leads to the part played by hypnosis in the facilitation of conditioning. Hypnosis, it is felt, provides an especially effective means (the inhibitory set) whereby interfering stimuli can be readily inhibited. That the writer is not alone in this approach to explaining the part played by hypnosis in conditioning is seen from the following quote:

I attributed the quickness and the ease of conditioning during hypnosis to the relatively complete concentration achieved on the conditioned and unconditioned stimuli, and the consequent absence of conflicting and inhibitory responses at the time of conditioning. I envisioned hypnosis as providing ideal circumstances for conditioning to occur. It provided the experimenter with the means for excluding distracting psychological variables — interfering thoughts and experiences. (Leuba, 1955, p. 10)

In discussing the possible mechanisms whereby hypnosis facilitates C–C conditioning, it is necessary not only to explain why hypnosis facilitates the making of the associations but also why the CR produced can be such an enduring, ‘functionally autonomous’ response. Hull (1933) seems to be aware of this characteristic in his section on post-hypnotic phenomena where he discusses the results of Patten’s (1930) study of the effect of repetition on the strength of the post-hypnotic response:

The composite graph of these results shows that the vigor of the [post-hypnotic] response, while slightly variable, displays no tendency whatever to fall, but, if anything, a slight tendency to rise. Patten believes that with a daily practice post-hypnotic suggestion might persist indefinitely without renewal of the suggestion. However this may be, it is evident that the repeated performance of the post-hypnotically suggested act characteristic of clinical practice would seem to be favorable for maintaining its strength. (Hull, 1933, pp 164–5)

It is felt that the functionally autonomous nature of the post-hypnotic conditioned response can best be explained if an interference theory explanation of extinction is assumed. This theory states that in order for a response to become extinguished, another incompatible response must become conditioned to the CS. An implication from this interference theory would be that if the CR is stronger than a potentially interfering response, the latter will be the one inhibited. Thus, as long as there is strong enough CR to begin with, it can keep itself from being extinguished. And, what is more, if there is such a strong conditioned response, not only will it inhibit the competing responses but it will become conditioned itself to the potentially interfering stimuli. (For example, we know that if we attempted to extinguish a strong conditioned fear response by feeding an animal in the direct presence of the feared object, we could very well find that the animal soon becomes afraid of eating.) Not only would the CR become associated with the competing stimuli but, of course, neutral stimuli as well. All this would serve to strengthen the CR in that it would now be associated with many more stimuli than just the original CS.

It should be mentioned that in therapy there is probably still another reason for a post-hypnotic response becoming functionally autonomous — it can become self-reinforcing from the relief or new pleasure experienced whenever the new response occurs.

Having shown how a strong CR may become functionally autonomous, the question now is why is the CR established through post-hypnotic suggestion so strong in the first place? In order to explain this it is proposed, first of all, that in the process of conditioning in general there are *two* components of the UCS which become associated with the CS, an excitatory *and* an inhibitory one. This inhibitory component, or set, is the same one suppressing the competing stimuli at the time of the association.

This is close to the position held by Harlow (1959), who considered learning to involve the transfer of the learnt inhibition of the error-producing factors (the competing stimuli) operating during the learning, to the particular situation (the CS).

In the case of conditioning taking place when post-hypnotic suggestion is given, the inhibitory set conditioned to the CS is the same one developed by hypnotic induction. It is because this set is so strong that the CR is so strong.

Understandably, a learning theorist might hesitate before accepting the possibility that it is a process of conditioning which underlies the dramatic changes produced in hypnotherapy. One-trial conditioning and functional autonomy are not commonly encountered in the laboratory. However, such phenomena *are* more prevalent outside the laboratory.

The inhibitory set approach which has been stressed in the present paper offers a more comprehensive theory of learning. Is there evidence to show that hypnosis does, indeed, facilitate C–C conditioning?

Evidence that hypnosis facilitates C–C conditioning

There are at least four sources of evidence that we might use to support the hypothesis that hypnosis facilitates C–C conditioning. One comes from the use of post-hypnotic suggestion to facilitate psychotherapy. Another comes from the experiments which have shown hypnosis to facilitate first-order conditioning. A third comes from its use in medicine and, finally, there is the experimental work that has been done on post-hypnotic suggestion.

Facilitation of therapy via post-hypnotic suggestion

As pointed out by Barrios (1969, 1970), post-hypnotic suggestion has been shown to be a highly effective means for producing therapeutic behaviour changes. Three large-scale studies were cited in support of this contention (Richardson, 1964; Chong Tong Mun, 1964, 1966; Hussain, 1964).

Richardson (1964) reported an improvement rate of 94.7% of 76 cases of frigidity. The average number of sessions was 1.53. The percentage of orgasms (the criterion for judging improvement) rose from a pre-treatment average of 24% to a post-treatment average of 84%.

Chong Tong Mun's (1964) study covered 108 cases. These included patients suffering from asthma, insomnia, alcoholism, dysmenorrhoea, dermatitis, anxiety state and impotence. Ninety per cent of patients were reported improved (removal or improvement of symptoms). The average number of sessions was five. The average follow-up period was nine months.

Hussain's (1964) study reports on 105 patients of varying diagnostic categories. These included patients suffering from alcoholism, sexual promiscuity, impotence and

frigidity, sociopathic personality disturbance, hysterical reactions, behaviour disorders of school children, speech disorders, and a number of different psychosomatic illnesses. The percentage of patients reported improved was 95.2. The number of sessions ranged from four to 16. The criterion for judging improvement was complete or almost complete removal of symptoms. Follow-up ranged from six months to two years.

Facilitation of first-order conditioning

Two studies seem to indicate that hypnosis facilitates first-order conditioning. Scott (1930) found that he could establish a conditioned finger withdrawal response much more rapidly and effectively in his hypnotic subjects. Whereas only five of nine control subjects were conditioned, in an average of 26.6 trials, all of the hypnotized subjects were conditioned and in an average of only 14.2 trials. The remaining four control subjects had not been conditioned after an average of 30.3 trials.

Leuba (1940) found that he could establish conditioned sensations in his hypnotic subjects in an average of six trials, often in only one trial. During deep hypnosis, two stimuli, such as ringing a bell and a pin-prick on the hand, were applied simultaneously for about six pairings. Before awakening, subjects were given post-hypnotic amnesia for what had occurred. A few minutes after awakening, one of the two stimuli was presented whereupon the subjects automatically reacted as if the other stimulus had also been presented. The conditioned sensations were frequently so intense and vivid as to be mistaken for actual sensations. Unfortunately, Leuba (1940) does not report using a control group of non-hypnotic subjects.

Use of post-hypnotic suggestion in medicine

Post-hypnotic suggestion has been used very successfully with hospitalized patients who were ill because of traumatic injury and/or chronic disease (Kroger and DeLee, 1943; Raginsky, 1951; Schneck, 1953; Crasilneck et al., 1955; Fogelman and Crasilneck, 1956; Cangello, 1961). In these studies post-hypnotic suggestion served a number of uses. For example, it was of great use in the reduction of pain and the need for narcotics. This included post-operative pain, the pain resulting from severe burns and the pain of terminal cancer. It has also been used, for example, to induce a greater appetite in patients whose previous refusal to eat was endangering their lives (Crasilneck et al., 1955).

A criticism that might be levelled at the use of the above clinical reports as evidence in support of the contention that hypnosis facilitates C-C conditioning is that in most cases no appropriate comparison control group was run. That is, matched patients were not treated with waking suggestion rather than hypnotic suggestion, leaving open the question as to whether such results could have been achieved on the basis of waking suggestion alone.

Experiments on post-hypnotic suggestion

Despite a wealth of anecdotal material and case reports, there have been few experimental investigations of the performance of post-hypnotic behavior. (Fisher, 1954)

Although Fisher made the above statement in 1954, for the most part it continued to hold true in the time that followed.

Lundholm (1928) was able to produce deafness and blindness by means of post-hypnotic suggestion. Hammer (1954) found that post-hypnotic suggestions of

increased ease, concentration, motivation and ability led to significant increases in various learning tasks. Gladfelter and Crasilneck (1960) found that they could increase subjects' vocabulary skill by means of post-hypnotic suggestions aimed at inducing certain emotions, fear having the greatest effect. Rosenberg (1960) used post-hypnotic suggestion to change subjects' attitudes.

A number of studies have examined the duration of post-hypnotic suggestion (Kellogg, 1929; Patten, 1930; Weitzenhoffer, 1950; Edwards, 1954; Orne, 1963), indicating that, in general, although there was an overall gradual decay of the response, in many cases it continued to be effective for long periods of time, even years, and in some cases there was no decay. There were also a number of studies on other characteristics of post-hypnotic suggestion. Erickson and Erickson (1941) investigated the 'spontaneous self-limited post-hypnotic' trance produced in performing post-hypnotic suggestion. Marcuse, Hill and Keegan (1945) studied the effect on post-hypnotic suggestion of conscious awareness of the post-hypnotic signals and responses. Weitzenhoffer (1950) discussed the effect of task difficulty on post-hypnotic suggestion. Levitsky (1960) summarized various techniques for giving the post-hypnotic suggestion.

A study by Barrios (1969, 1973) was more specifically aimed at testing the hypothesis that hypnosis facilitates C-C conditioning. The experimental design was such as to eliminate certain methodological shortcomings associated with most of the previous hypnosis experiments. Among other things, this included the use of an appropriate control group as well as using subjects as their own controls, a tape-recorder was used to eliminate any possibility of experimenter bias due to changes in tone of voice, a more appropriate measure of hypnotic depth was used and an involuntary response (salivation) was used to measure the conditioning rather than the usual voluntary type of response used in most previous post-hypnotic suggestion experiments. The results from the experiment supported the three predictions made from the hypothesis. That is, it was found that:

- The hypnosis group showed significantly greater conditioning than the control group.
- The strength of the conditioned response for the hypnosis group was positively correlated with hypnotic depth.
- The conditioned response once formed was a strong one, as evidenced by no significant extinction.

Conclusion

In conclusion, an attempt has been made to explain hypnotic induction as the conditioning of an inhibitory set — the set to inhibit stimuli (sensory or cognitive) incompatible with a suggestion given by the hypnotist. The hypnotic induction procedure, defined as the giving of two or more suggestions so that a positive response to one will increase the probability of responding to the next one, was placed in the conditioning paradigm, with the CS, UCS, CR, UCR, trials and reinforcement clearly delineated.

The explanation of hypnotic induction has been put in the form of three major hypotheses:

- Hypnosis is a conditioning phenomenon.
- The response conditioned during hypnosis is an inhibitory one.

- A positive response to one suggestion increases the probability of responding to the next one.

Evidence was presented in support of these hypotheses and further experimentation proposed.

Numerous suggestions, deducible from the theory, for improving the success of hypnotic induction were interspersed throughout. Finally, some of the major individual factors that can influence hypnotic induction were discussed and their role explained in terms of the theory. The factors discussed included concentration, prestige, expectation, fears, attitudes, imagination and age.

It has been proposed that response to suggestion (whether it be normal or hypnotic suggestion) occurs because of two properties of a suggestion. The words of a suggestion can act as conditioned stimuli which trigger the suggested response (via the appropriate cognitive stimuli) and evoke an inhibitory set which increases the strength of the suggested response by suppressing any stimuli (both sensory and cognitive) which would be incompatible with the suggested response. The reason that *hypnotic* suggestion is more effective than *normal* suggestion is that the inhibitory set is greater in the state of hypnosis.

Furthermore, the phenomenon of post-hypnotic suggestion, whereby responses produced in the hypnotic state can be carried over into the normal state, has been explained as occurring through a process of higher-order conditioning. It was also pointed out that it is the inhibitory set produced by the hypnotic induction that facilitates this conditioning. This overall explanation was condensed into two hypotheses and evidence was presented in support of them.

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