

JOURNAL OF

Personality AND Social Psychology

Volume 37

February 1979

Number 2

Self-Deception: A Concept in Search of a Phenomenon

Ruben C. Gur
University of Pennsylvania

Harold A. Sackeim
Columbia University

The concept of self-deception has received little empirical investigation despite its broad implications for theories of personality and consciousness. Four criteria, based on a logico-linguistic analysis, are presented as necessary and sufficient for ascribing self-deception: To be self-deceived an individual must hold two contradictory beliefs; these beliefs are held simultaneously; one belief is not subject to awareness; and the nonawareness of this belief is motivated. Two experiments are described that examine whether misidentifications of the voices of oneself and others fulfill these criteria and are, therefore, instances of self-deception. In Experiment 1, it was found that when subjects were incorrect in their self-report identifications of voices, at some level of processing correct identifications had been made, and these subjects held contradictory beliefs. Obtrusive and unobtrusive measures indicated that for the most part, subjects were not aware of committing errors. Correlational data supported the contention that the errors were motivated. In Experiment 2, the hypothesized motivational contexts for the errors were manipulated by giving subjects pretreatments either of success or of failure. As predicted, the failure group committed more misidentifications of self, whereas the success group committed more misidentifications of others. Overall, the findings confirmed that some misidentifications of voices of self and others are instances of self-deception.

The concept of self-deception has received much attention in philosophical and literary writings (e.g., Camus, 1956; Fingarette,

1969; Gide, 1955; Sartre, 1958). Numerous psychologists have also discussed self-deception in accounting for a wide range of behavior. Meehl and Hathaway (1946) and Anastasi (1961) have argued that self-deception on the part of respondents contributes more to the lack of validity of self-report personality inventories than does other-deception, or conscious lying. In the area of motivation and personality, Hilgard (1949) claimed that self-deception constitutes a defining characteristic of all defense mechanisms. In the area of problem-solving behavior, Wason and Johnson-Laird (1972) in-

This research was supported by National Science Foundation Grant BNS-75-23061 to Jerre Levy, Ruben C. Gur, and Raquel E. Gur and by Alcohol, Drug Abuse, and Mental Health Administration National Research Service Award 1F31 MH 05779-01 from the National Institute of Mental Health to Harold A. Sackeim.

We thank Solomon Asch, Jonathan Baron, Donald D. Dorfman, Jonquil M. Drinkwater, Matthew H. Erdelyi, Henry Gleitman, Raquel E. Gur, Lauren J. Harris, Ernest R. Hilgard, Leonard Horowitz,

voked the concept of self-deception as a possible explanation of the persistence of subjects in maintaining hypotheses in the face of disconfirmation. Murphy (1970, 1975) related the concept of self-deception to possible interpretations of the experimental findings on perceptual defense. In fact, Mischel (1974) has viewed all neurotic behavior as instances of self-deceptive acts.

Despite the considerable role assigned to the concept of self-deception in several areas of study, there have been no attempts to demonstrate that any given set of behavior conforms to what is meant by self-deception. Philosophers have frequently remarked that determining what is meant by self-deception and demonstrating that people do deceive themselves have major implications for views concerning the structure of consciousness (cf. Fingarette, 1969; Sartre, 1958). For instance, findings that indicate that people do lie to themselves may also indicate that people can hold beliefs of which they are not aware and that the selective awareness of beliefs can be motivated. Within psychology it has been a long-standing tradition to assume that people are necessarily aware of their cognitions (Wundt, 1912/1973). Recently, however, studies have appeared that shed strong doubt on the validity of this view (Dixon, 1971; Erdelyi, 1974; Nisbett & Bellows, 1977; Nisbett & Wilson, 1977; Sackeim, Packer, & Gur, 1977). The claim that selective nonawareness of cognition can be motivated—the essence of what is en-

tailed by the concept of self-deception—is particularly controversial.

Elsewhere, we have presented a logico-linguistic analysis of what is meant by the concept of self-deception (Sackeim & Gur, 1978). On the basis of this analysis, four criteria have been offered as necessary and sufficient for the ascription of self-deception. Here, we will present two experiments designed to test whether a phenomenon, misidentification of voices of self or others, fits these criteria. Such findings may be viewed as an experimental demonstration of the existence of self-deception.

Criteria Necessary and Sufficient for Ascribing Self-Deception

It has been noted that when it is assumed that people are necessarily aware of their cognition, the concept of self-deception is paradoxical (Canfield & Gustafson, 1962; Demos, 1960; Fingarette, 1969; Gardiner, 1970; Penelhum, 1966; Sartre, 1958; Siegler, 1962). This paradox has been formulated by Sartre (1958) as follows:

The one to whom the lie is told and the one who lies are one and the same person, which means that I must know in my capacity as deceiver the truth which is hidden from me in my capacity as the one deceived. Better yet I must know the truth very exactly in order to conceal it more carefully—and this not at two different moments, which at a pinch would allow us to reestablish a semblance of duality—but in the unitary structure of a single project. How then can the lie subsist if the duality which conditions it is suppressed? (p. 49)

Jerre Levy, Jacob Nachmias, M. Frank Norman, Daniel N. Osherson, Michael Parrish, Richard Passingham, Paul Rozin, Martin E. P. Seligman, Richard L. Solomon, David Williams, Julius Wishner, and Donna M. Zucchi for their comments on an earlier version of the manuscript and Anthony G. Greenwald and several anonymous reviewers for their comments on the present version. We also thank Joseph Liran, who aided in setting up the instrumentation, and Jo Ann Chalal, Harvey Doppelt, Ron Kamnik, Lisa Litvin, Alan Luxenberg, Joseph Piperato, Shelley Steinberg, and Marjory Warner, who served as experimenters.

The order of authors is random.

Requests for reprints should be sent to Ruben C. Gur, Department of Psychology, University of Pennsylvania, 3815 Walnut Street, Philadelphia, Pennsylvania 19104.

In the psychological literature, a similar paradox was raised by critics of research on subliminal perception and perceptual defense (Bruner & Postman, 1949; Eriksen & Browne, 1956; Howie, 1952). The point was made that in order for a perceiver to avoid perceiving a stimulus, the stimulus must first be perceived. When it is assumed that perception implies awareness of the percept, notions like subliminal perception and perceptual defense are paradoxical. Proponents of the existence of these phenomena (Dixon, 1971; Erdelyi, 1974) have argued that it is erroneous to assume that cognition must be subject to awareness. In support of this posi-

tion, Nisbett and Wilson (1977) have summarized a sizable body of literature that indicates that people may lack awareness for both the contents and processes involved in cognition.

Rejection of the assumption that cognition is necessarily subject to awareness is implicit in the common use of the term *self-deception*. Often when people describe an individual as self-deceived, they state that "all along" or "deep inside" the individual holds a belief that contradicts an avowed belief. It is further implied in the common use of the term that the self-deceived individual, who holds such contradictory beliefs, does not do so gratuitously or out of ignorance; rather, one belief is not subject to awareness, in order to provide some psychological gain. Just as people attribute motivational determinants in cases of conscious lying, they view instances of self-deceit as implicating motivation. Accordingly, we have offered the following criteria as necessary and sufficient for ascribing self-deception to any given phenomenon:

1. The individual holds two contradictory beliefs (that *p* and not that *p*).
2. These two contradictory beliefs are held simultaneously.
3. The individual is not aware of holding one of the beliefs.
4. The act that determines which belief is and which belief is not subject to awareness is a motivated act.

Self-Deception: Reactions to Self-Confrontation

In the search for a phenomenon that fits the concept of self-deception, the self-confrontation experience provides a likely candidate. It has been shown that when subjects are confronted with audio- or videotape feedback of the self and others, feedback of the self is associated with considerable psychophysiological reactivity (Holzman, Rousey, & Snyder, 1966; Olivos, 1967; Sackeim & Gur, 1978), changes in affect and constriction in ideation (Duval & Wicklund, 1972; Holzman & Rousey, 1966; Holzman et al., 1966; Rousey & Holzman, 1967), and

changes in self-concept (Alkire & Brunse, 1974; Boyd & Sisney, 1967; Duval & Wicklund, 1972; Gur & Sackeim, in press; Storms, 1973). Self-confrontation manipulations have also been shown to influence dream content (Castaldo & Holzman, 1967, 1969) and other behaviors that do not appear to be mediated by conscious awareness (Huntley, 1940; Wolff, 1943).

Differences in the direction and intensity of reactions to self-confrontation have been associated with experimental manipulations of self-esteem and with individual differences in personality (Davis & Brock, 1975; Duval & Wicklund, 1972; Gibbons & Wicklund, 1976; see Sackeim & Gur, 1978, for a review). These findings have led to the conclusion that individuals who hold negative attitudes about the self and score high on measures of cognitive discrepancy¹ find self-confrontation to be aversive and will tend to avoid it. On the other hand, people low in cognitive discrepancy do not find self-confrontation aversive and in fact will seek it out. Several studies have shown that people often fail to recognize their own voice, and sometimes people identify others as the self (Holzman et al., 1966; Huntley, 1940; Olivos, 1967; Wolff, 1943). The fact that there are individual differences in reactions to self-confrontation, and that some people find self-confrontation aversive while others seek it out, may indicate a motivational basis for the errors in identification.

The question we posed for investigation is whether individuals are engaging in self-deception when they avoid self-confrontation by misidentifying the self as others and when they artificially seek out self-confrontation

¹ Cognitive discrepancy is defined here as the extent to which individuals hold discrepant attitudes and beliefs about themselves. These discrepant cognitions may involve conflicts between what individuals believe themselves to be and what they believe they should be or wish to be. On paper-and-pencil personality inventories, items that a priori would tap this dimension are questions concerning dissatisfaction with the self. For example, on the Neuroticism scale of the Eysenck Personality Inventory (Eysenck & Eysenck, 1963), such an item would be "Do you often worry about things you should not have done or said?"

by misidentifying others as the self. Both of these errors involve distortions of reality. Mistaking self for others reflects an avoidance or a denial of an aversive event. Individuals who misidentify others as self commit a "narcissistic," self-projecting response. Our hypothesis, then, is that at least some misidentifications of self or others are instances of self-deception.

Experiment 1

Operationalizing the Criteria for Self-Deception

In order to demonstrate that misidentifications of self and others are instances of self-deception, it must be shown that when people commit such errors they fulfill the four criteria for ascribing self-deception. The operationalization of the criteria is presently outlined in specific relation to the procedure used in Experiment 1. Subjects were administered a simple identification task in which they were asked to indicate whether audio stimuli were tapes of their own or other people's voices. Galvanic skin responses (GSR) to each voice and reaction time of identifications were recorded. Subjects had completed a battery of personality inventories before the experimental session.

The First Criterion: Holding Two Contradictory Beliefs

The first criterion for ascribing self-deception requires evidence that when subjects misidentify a voice they hold contradictory beliefs. Subjects' self-report identifications of voices provide one index of beliefs. In affirming that a given voice is, for instance, that of another, a statement has been made concerning a particular belief. Levels of GSR reactivity to voices may provide another index of beliefs. In every relevant study that examined psychophysiological reactivity, it has been found that levels of arousal are substantially higher following self-confrontation as compared to confrontation with others (Holzman et al., 1966; Murray, 1963; Olivos, 1967; Sackeim & Gur, 1978; Verwoerd, Nowlin, & Agnello, 1965; Dickinson & Ray, Note 1; Sackeim, Note 2). If subjects hold contradic-

tory beliefs when they incorrectly identify voices, then their levels of GSR reactivity should be high when they misidentify voices of self as others (false negative responses) and low when they misidentify voices of others as self (false positive responses). This would indicate that when subjects committed such errors, at some level of processing correct identifications had also been made. This use of psychophysiological responding to determine whether subjects hold contradictory beliefs is similar in concept to the use of psychophysiological measurement in the detection of conscious lying (Lykken, 1959, 1974; Orne, Thackray, & Paskewitz, 1972) and to the employment of such measures in subception experiments (Dixon, 1971; Eriksen, 1956, 1958; Lazarus & McCleary, 1951).

The Second Criterion: Simultaneity of Beliefs

The second criterion for the ascription of self-deception requires that the two contradictory beliefs be held simultaneously. In the present experimental context this criterion is fulfilled by examining the psychophysiological index of beliefs at the same time that self-report identifications are delivered.

The Third Criterion: Nonawareness of a Belief

Fulfillment of the third criterion requires evidence that one of the two contradictory beliefs is not subject to awareness and in the present investigation requires demonstration that subjects are not aware of misidentifying voices. Showing that subjects are unaware of stimulus conditions, cognitions, and/or behavior has been particularly difficult in several areas of psychology except through the use of highly obtrusive measures (Martin, Hawryluk, & Guse, 1974; Nisbett & Wilson, 1977). Martin et al. (1974) wrote, "The most pressing methodological problem with the present studies is the one that plagues all studies of learning without awareness. There seems to be no entirely defensible method of assessing subject awareness after the experiment" (p. 604). To overcome this problem in the present study, two measures

of awareness of errors were taken. The first measure relies on postexperimental self-reports of whether subjects are aware of having committed errors. This measure is subject to the criticisms mentioned by Martin et al. (1974). The second measure, however, provides for this context a possible solution to the methodological problem, an unobtrusive index of awareness.

The unobtrusive index of awareness rests on the claim that consciously holding a belief that a voice is that of the self leads to differential consequences in subsequent responding than not being aware of such a belief. When subjects either correctly or incorrectly identify a voice as the self, their subsequent identification of the voice of another will be faster than their responses on other trials of voices of others. In the present study, trials of voices are arranged so that every presentation of the voice of self is followed by presentation of the voice of a stranger. If individuals correctly identify the self, awareness of this fact should make the next identification of the voice of another faster than responses to voices of another not preceded by identifications of self. This is the case because any difference in the physical properties of the voice consciously believed to be the self and those of the subsequent voice will aid in identifying the latter voice as that of another. If subjects are unaware that a given voice is the self, that is, if they commit a false negative error, they should not be faster in identifying the following voice than they are on remaining trials of voices of others. By the same argument, if subjects are not aware of committing false positive errors, that is of misidentifying others as self, they should be faster in identifying voices that immediately follow the false positive errors than in identifying voices that are not preceded by such errors. Comparisons of reaction times on trials following particular response types can thus provide an unobtrusive index of awareness.

The Fourth Criterion: Motivational Determinants

To fulfill the fourth criterion, it must be shown that misidentifications of self and

others are motivated. This criterion is the most difficult to establish, and Experiment 1 is viewed as an initial step in this direction.

Previous studies have found that manipulations of self-esteem influence the aversiveness of self-confrontation (Davis & Brock, 1975; Duval & Wicklund, 1972; Gibbons & Wicklund, 1976). Likewise, it has been shown that measures of personality and psychopathology, particularly assessments of discrepant cognitions about the self, predict levels of psychophysiological reactivity during self-confrontation and changes in affect following the confrontation (Sackeim, Note 2). Given the hypothesis that subjects commit false negative errors in order to avoid aversive consequences of self-confrontation, it might be expected that subjects who commit such errors would score higher on measures of cognitive discrepancy than subjects who do not make these errors. However, this prediction can not be made because of the very fact that it is hypothesized that these subjects are engaging in self-deception. In line with Meehl and Hathaway (1946), we have argued that self-deception be viewed as a generalized response set that depresses measures of psychopathology (Sackeim & Gur, 1978, 1979). On the other hand, individuals who commit false positive responses (i.e., misidentifications of other as self), do so because they find self-confrontation pleasurable. The motivational determinants of these errors are opposite in direction to those of the false negative responses. It is expected that subjects who commit such errors will be low on measures of cognitive discrepancy that predict the aversiveness of self-confrontation.

To examine further the motivational contexts of misidentifications of self and others and to test the face validity of the claim that both these errors may be instances of self-deception, subjects were administered a questionnaire designed to assess individual differences in tendencies to engage in self-deception. It was predicted that subjects who committed either type of error would score higher on this measure than subjects who did not misidentify voices of self or others.

In summary, the following set of conditions should be fulfilled in order to demonstrate that misidentifications of voices of self and others are instances of self-deception: Psychophysiological reactivity to the voice of self is greater than reactivity to the voices of others, *regardless* of the correctness of identifications of voices. Subjects demonstrate that they are unaware of committing errors. Subjects who commit false negative responses or false positive responses, by and large, report that they are not aware of having made such errors. On trials following both true positive and false positive responses, subjects are faster in identifying voices, whereas no savings occur following false negative responses. Subjects who commit false positive responses are lower on measures of cognitive discrepancy than subjects who make no such responses. Subjects who commit either false positive and/or false negative responses are higher on a measure of individual differences in tendencies to engage in self-deception than subjects who commit no errors.

Method

Subjects

The subjects were 60 University of Pennsylvania undergraduate volunteers (30 male, 30 female). Only those students who had always lived in the northeastern United States were accepted as subjects.

Procedure

Subjects were given a set of personality and psychopathology inventories to fill out at home, with assurance that all results would be kept confidential. Appointments were made for returning the forms and participating in the experimental part of the study. Before arriving in the laboratory, subjects were informed only that they would be participating in a study on "voice discrimination and personality."

Upon arrival, subjects were taken to an experimental room, where samples of their voices were recorded. Subjects were seated in a chair so that their mouths were no more than one foot (30.5 cm) from a microphone. They were given a paragraph to read in a "normal speaking voice." Each subject read the same paragraph, taken from Kuhn (1962, pp. 124-125). This paragraph was chosen because pilot studies had indicated that subjects needed to pay careful attention to the text to read the para-

graph correctly. This insured that few subjects would be paying close attention to particular intonations or phrasings.

After the voice sample was recorded, subjects were escorted to another room for electrode placement. GSR electrodes were placed on the volar surface of the middle phalanges of the second and third fingers of the nondominant hand. Subjects were then escorted to the experimental room.

Upon entering the experimental room, subjects were seated in a chair positioned in front of a small table. GSR electrodes were then connected to leads from a polygraph, which was in the room adjacent to the experimental room. When this was accomplished, the following instructions were read to subjects:

We would like you now to participate in a rather straightforward task. I will soon place earphones on your head and we will play a tape for you. On the tape, there are 30 voices. There is a period of silence separating each voice. We want you to listen to every voice carefully. As soon as a voice starts, you should decide whether you think the voice is your own or that of a stranger. As soon as you have made a decision, you should press one of the six buttons, which tells us whether you thought the voice was your own or that of a stranger and how certain you are of this decision. The three buttons on the left (right) correspond to the choice of a stranger. The three buttons on the right (left) correspond to the self.² If you press Button 1 on either side, it means you are not very certain of your decision. If you press Button 2 on either side, it means you are somewhat certain of your decision, whether it be self or other. If you press Button 3 on either side, it means that you are very certain of your decision. Remember, press the button as quickly as you can, indicating your decision as to whether the voice was your own or not and how certain you are.

Many of the voices you may hear will be on for very short periods. Do not be surprised. Your own voice may appear many times, a few times, or even not at all. Press only one button per voice.

In summary, all the task requires is that you listen to each of the 30 voices, make a decision as to whether each voice is that of a stranger or your own, and press one of six buttons telling us what your decision was, and how certain you were. You should do this as quickly as possible. Do you have any questions?

² The positions of "self" and "other" buttons on the left and right sides of the panel were randomized. Both sets of buttons were numbered from left to right.

Remember, please keep as still as possible and, in particular, do not move your left/right arm. There will now be a resting period of a few minutes before the task begins. I will put the earphones on you so that you can get used to them and, after a short while, come back and tell you when we are ready to begin.

After a period of 5 to 7 minutes, the experimenter returned to inform the subject that the tape was about to be run. During the experiment, subjects were monitored through a one-way mirror.

Each tape contained five groups of six voices, differing in temporal duration (2-, 4-, 6-, 12- and 24-sec periods). Ordering of the groups of voices was sequential, starting with the 2-sec voices. A period of silence, ranging from 20 to 40 sec ($M = 30.00$ sec) occurred before and after every voice. The position of voices on the tapes was fixed, with the self appearing once in each group (Voices 4, 10, 15, 24, and 28). Two voices of others were also repeated, each appearing once in each group. Male subjects were played tapes that contained male voices, and female subjects heard only voices of women. The tapes for the two sexes were identical in format. Each subject heard the same other voices, and all stimuli began with the third sentence in the recorded paragraph. The voices of others were provided by 17 male and 17 female undergraduates at the University of Pennsylvania. All had been born and lived continuously in the northeastern United States. They did not differ in age from the subjects in this study.

After subjects responded to the 30 voices, the electrodes were removed, and the subjects were taken to another room. They were then given a postexperimental questionnaire and the Self-Deception Questionnaire (SDQ; Sackeim & Gur, 1979). After these tests were completed, subjects were debriefed.

Apparatus

Master tapes were constructed so that silence periods, before and after the self, consisted of unrecordable leader tape. In this way, it was assured that voices would be present on the tapes for the exact temporal duration intended. No master tape was played on more than 11 occasions. The audio-tape that was used in this study was a 1.5-mil professional mastering tape.

Silver/silver chloride electrodes, 11 mm in diameter, were used, with K-Y jelly serving as the electrolyte. Electrodes were plated prior to the beginning of the experiment. No pair of electrodes with a resistance greater than 250 Ω or with bias potentials greater than .5 mV was used (Edelberg, 1972; Venables & Martin, 1967). GSR was recorded on a Grass Model 7P polygraph, using a low-level direct-current preamplifier. For measurement of GSR, a constant current of 50 μ A was passed.

All voices on the master tapes were recorded on the right channel. Simultaneous with the onset of

the audio stimuli on the right channel was the onset of a 1000-cycle/sec sine wave signal on the left channel. These signals, of 150 msec duration, were recorded from a low-frequency function generator. Tapes were played in stereo, with subjects receiving in both ears only the right channel, through modification of a pair of headphones.

The onset of the sine wave signal triggered a voice-operated relay that simultaneously started a reaction time clock and registered on one channel of the polygraph. When subjects pressed one of the six buttons on the panel before them, the reaction time clock was stopped, and a light was lit in the control room indicating which button had been pressed.

Materials

Subjects were administered the Eysenck Personality Inventory (EPI; Eysenck & Eysenck, 1963) and a revised version of the Preexamination Questionnaire (PEQ; Liebert & Morris, 1967; Morris & Liebert, 1969, 1970).³ The 10 items from the Neuroticism scale of the EPI used by Sackeim (Note 2) to measure cognitive discrepancy were again used in this fashion, along with the Worry scale of the PEQ. These inventories were administered before the experimental session.

The postexperimental questionnaire was concerned with whether subjects had hearing difficulties, how many times they thought they heard tape recordings of their own voices, whether they thought they committed either type of error, how certain they were when they first heard their own voices, what their reaction was to the voice, and how frequently in the past they had been exposed to recorded versions of their voices.

In addition, subjects filled out a questionnaire specifically constructed to measure self-deception, the SDQ. The questionnaire consists of 20 questions, all of which are meant to be psychologically threatening (e.g., Have you ever enjoyed your bowel movements? Have you ever doubted your sexual adequacy?). The questionnaire is answered on a 1 (not at all) to 7 (very much so) Likert-type scale, with scores of 1 or 2 on individual questions keyed as self-deceptions. Total SDQ scores (range = 0-20) are used in the analysis of results.

Results

Effects of Confrontation With Self and Others

In line with previous studies using self-confrontation procedures (e.g., Holzman et

³ The PEQ, which is usually administered prior to examinations, was revised so that subjects indicated how worried and anxious they were about filling out the set of personality and psychopathology inventories.

al., 1966; Olivos, 1967; Sackeim, Note 2), subjects showed greater psychophysiological reactivity to the voice of self than of the voices of others. A three-factor (Self versus Other Voice Conditions \times Sex \times Trials) repeated measures analysis of variance on GSR change-in-conductance scores⁴ revealed a significant effect of self versus other conditions, $F(1, 58) = 42.43$, $p < .001$. Sex was also associated with GSR reactivity, with females more reactive than males, $F(1, 58) = 4.41$, $p < .05$. There was a main effect of order of trials, $F(4, 232) = 4.47$, $p < .005$, as well as an interaction between the factor of self versus other voice conditions and that of order of trials, $F(4, 231) = 11.82$, $p < .001$. This interaction is illustrated in Figure 1.

As seen in Figure 1, the significant interaction indicates that psychophysiological reactivity in the other voice condition habituated with increasing number of trials, whereas reactivity to self did not habituate.

A similar analysis of variance with reaction time as the dependent variable revealed that reaction time was longer on trials of self compared to trials in which the voices of others were presented, $F(1, 58) = 18.84$, $p < .001$. There was no significant effect for

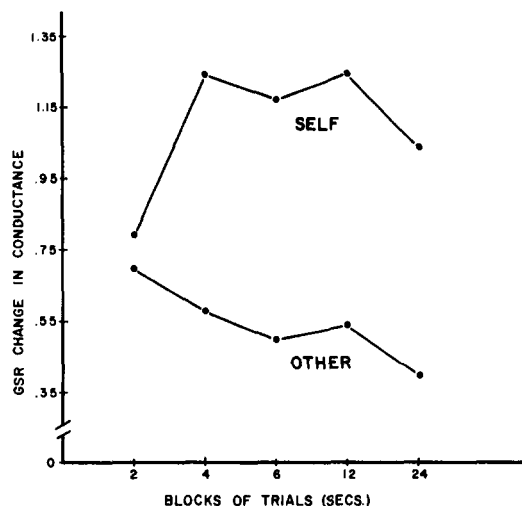


Figure 1. Galvanic skin response (GSR) reactivity (in micromhos) to voices of self and others as a function of block of trials. (Each block of trials increasingly differed in voice duration, as indicated on the abscissa.)

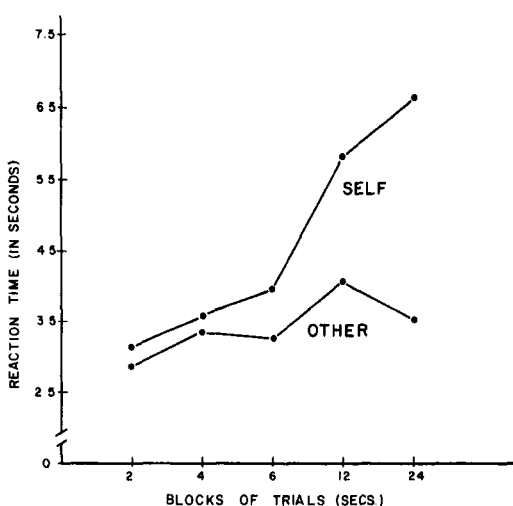


Figure 2. Reaction time to voices of self and others as a function of block of trials. (Each block of trials increasingly differed in voice duration, as indicated on the abscissa.)

sex, $F(1, 58) < 1$. The main effect of order of trials was significant, $F(4, 232) = 20.10$, $p < .001$, as was the interaction between this factor and that of self versus other voice conditions, $F(4, 231) = 14.68$, $p < .001$. This interaction is illustrated in Figure 2.

Figure 2 suggests that the interaction occurred because the longer reaction time in later periods of the experiment was evidenced in identifications of self, but not in identifications of others.

Criteria for Ascribing Self-Deception

The first criterion: Holding two contradictory beliefs. To satisfy the first criterion for ascribing self-deception, it must be shown that GSR reactivity to the voice of self is as high when a subject denies that the voice is the self as when the subject correctly identifies the voice as the self. Likewise, it must be shown that GSR reactivity to the voices

⁴ GSR reactivity scores are measured in units of microhms (Edelberg, 1972). These scores are computed by converting resistance measures to change-in-conductance scores (i.e., $1000/R_2 - 1000/R_1$). R_2 , in k-ohms, is the lowest level of resistance reached by subjects within 5 sec of voice onset. R_1 , in k-ohms, is the level of resistance at voice onset.

of others is as low when a subject misidentifies others as self as when the subject correctly identifies others. As stated above, the motivational factors offered to account for false negative and false positive errors are opposite in direction. Subjects were therefore divided into four groups: subjects who made no errors ($n = 15$), subjects who made false negative errors only ($n = 14$),⁵ subjects who made false positive errors only ($n = 18$), and subjects who made both false negative and false positive errors ($n = 13$). If subjects held contradictory beliefs when they misidentified voices, we would expect that in the group that committed false negative errors only, levels of GSR for true positive and false negative responses would not differ and would be higher than those for true negative responses. In the group that committed false positive errors only, levels of GSR for true negative and false positive responses should not differ and should be lower than levels of GSR for true positive responses. For the group of subjects who made no errors, levels of GSR should be higher on true positive as compared to true negative responses. Finally, the commission of both types of errors by the same subjects cannot be viewed as bona fide instances of self-deception, given the differing motivational factors that presumably produce each type of error. Accordingly, no expectations could be offered for this group.

Because of the significant interaction between self and other voice conditions and order of trials on GSR, subjects' change-in-conductance scores for all identifications had to be adjusted for the effect of this interaction.⁶ To do that, for each subject, trial position was regressed on change-in-conductance scores separately for each voice condition. Adjusted scores, corrected for trial position, were obtained. The mean change-in-conductance scores, adjusted for trials, were computed within subjects for each response category. The results for the four groups of subjects are presented in Figure 3.

As expected, in the group that made no errors, GSR reactivity was greater for the voice of the self (true positive responses) as compared to the voices of others (true nega-

tive responses), $t(14) = 4.63$, $p < .001$, one-tailed. The crucial test of the self-deception hypothesis pertains to the behavior of subjects in the second and third groups. Consistent with this hypothesis, in the group whose only errors were false negative responses, levels of GSR were higher for both true positive and false negative responses compared to true negative responses, $t(12) = 2.91$, $p < .01$, one-tailed, and $t(12) = 2.14$, $p < .05$, one-tailed, respectively. Levels of GSR for true positive and false negative responses did not differ, $t(12) < 1$. The results for the group whose only errors were false positive responses were also consistent with the self-deception hypothesis. Levels of GSR were higher for true positive responses in comparison to both true negative responses, $t(17) = 4.05$, $p < .001$, one-tailed, and false positive responses, $t(17) = 2.20$, $p < .025$, one-tailed. False positive and true negative responses did not differ in levels of GSR, $t(17) < 1$. The results for the group that committed both types of error differ in pattern from the results of the two groups that committed one type of error. Therefore, it can not be claimed that subjects who committed both types of error held contradictory beliefs when the errors were being made. For this last group of subjects, none of the differences among the four response types reached statistical significance by two-tailed tests. The results for this group indicated that they were relatively insensitive in their self-other identifications on both verbal report and psychophysiological response measures.

In summary, those subjects who com-

⁵ One subject, whose only errors were false negative responses, committed five such responses and did not make any true positive responses. Since the analyses of results bearing on the first criterion are within-subjects comparisons of mean change-in-conductance scores for the various response categories, the results for this subject were not included in these analyses.

⁶ To determine whether GSR scores were also associated with the number of times subjects correctly identified voices as self, correlations were computed between number of identifications of self and mean GSR scores for all voices and separately for mean GSR scores for each response category. No associations were found.

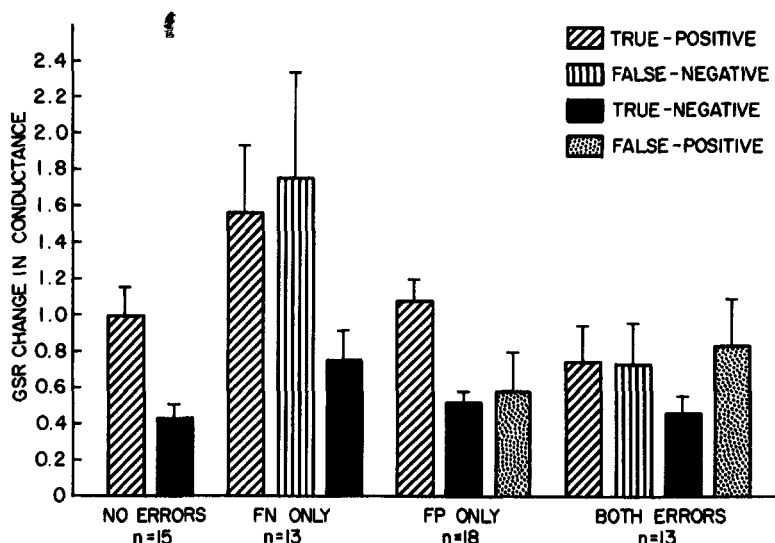


Figure 3. Mean galvanic skin response (GSR) reactivity (in micromhos), adjusted for order of trials, as a function of types of self-report identification for groups that committed no errors (NO ERRORS), false negative errors (FN ONLY), false positive errors (FP ONLY), and false negative and false positive errors (BOTH ERRORS).

mitted one type of error indicated by their GSR reactivity that when they misidentified voices, at some level of processing correct identifications had been made; these subjects, therefore, held contradictory beliefs.

The second criterion: Simultaneity of beliefs. Since the psychophysiological measurements were taken concurrent with subjects' identification of voices, the second criterion was satisfied by the very nature of the experimental procedure.

The third criterion: Nonawareness of misidentifications. Subjects' postexperimental reports as to whether they committed either type of error and their reports as to how many times they believed that the voice of self appeared on the tapes were in high agreement. Only 1 subject out of 27 who committed false negative responses reported having done so. On the other hand, of the 31 subjects who committed false positive responses, 16 claimed to have made such errors. Thus, on the basis of this obtrusive measure, virtually all subjects were not aware of having made false negative errors, whereas about half of the subjects who committed false positive errors lacked awareness of having made these responses.

The results for the unobtrusive measure of awareness were congruent with the findings from subjects' postexperimental reports. Within blocks of trials, reaction time on trials of other voices immediately following correct identifications of self (true positive responses) was first compared to reaction time for the remaining voices of others. This was done in order to establish that conscious belief that a voice was the self resulted in savings in reaction time on the subsequent trial. This was the case both for subjects who committed no false negative responses, $t(32) = 2.68$, $p < .01$, one-tailed, and for subjects who committed false negative errors, $t(25) = 2.12$, $p < .025$, one-tailed. Following false negative responses, however, reaction time was not faster on the subsequent trial of other, $t(25) = -1.91$, ns , indicating that savings occurred only after subjects expressed a conscious belief that a voice was the self.

A similar comparison was made between reaction time on trials that immediately followed misidentifications of voices of others as self (false positive responses) and reaction time on remaining voices of others, within blocks of trials (excluding trials of

other voices preceded by the voice of self). Here, the results were somewhat more complex. When this comparison was made for all subjects who committed false positive responses, faster reaction time on trials following false positive responses was not found, $t(30) < 1$. However, subjects were divided into two groups based on whether they were aware of committing false positive errors, as indicated by postexperimental self-reports. It was found that subjects who claimed not to be aware of making these errors were faster in their identifications following false positive responses, $t(14) = 2.25$, $p < .025$, one-tailed. Subjects who claimed to be aware of false positive errors were not faster on trials immediately following such responses than on remaining trials of voices of others. This pattern of results appears to buttress the validity of the unobtrusive measure of awareness. It also indicates that the lack of faster responding subsequent to false negative errors cannot be accounted for simply by the possible retarding effects of the commission of errors per se.

In summary, the results of both the obtrusive and unobtrusive measures of awareness converge in indicating that virtually all subjects who committed false negative responses were unaware of having made such errors. About half of the subjects who committed false positive errors were not cognizant of the fact.

The fourth criterion: The motivational aspect. In order to test the motivational account of misidentifications of voices, scores on our two measures of cognitive discrepancy were compared for subjects who committed two or more false positive errors and subjects who did not commit such errors. As expected, the groups differed on the Discrepancy scale taken from the EPI, $t(40) = 2.00$, $p < .05$, one-tailed, and on the Worry scale of the PEQ, $t(40) = 2.23$, $p < .025$, one-tailed. The group hypothesized to be actively seeking out self-confrontation (false positive responders) scored low on these predictors of the aversiveness of self-confrontation. Since this finding pertains only to one type of error, and in order to test the validity of the claim that both false negative

and false positive errors can be instances of self-deception, SDQ scores were compared for subjects who had two or more misidentifications of either type and the remaining subjects. The results indicated that the former group had higher scores on this measure of individual differences in tendencies to engage in self-deception, $t(58) = 1.99$, $p < .05$, one-tailed.

These findings provide initial support for the motivational account of misidentifications of voices of self and others.

Consideration of Alternative Explanations

Independence of GSR and self-reports. The evidence presented in support of the first criterion can be interpreted as indicating that self-report identifications and identifications of voices as inferred from the GSR measure were relatively independent. In particular, when subjects misidentified voices by their self-reports, correct identifications could often be made on the basis of the GSR measure. This pattern of results is reminiscent of what early studies on subception were attempting to demonstrate (e.g., Lazarus & McCleary, 1951). In these studies, instances where correct identifications of stimuli could be attributed on the basis of GSR measures, while verbal reports were incorrect, were taken as evidence for subception. Eriksen (1956, 1958) criticized this interpretation of the findings by claiming that GSR and verbal reports were not independent response systems. He argued that GSR and verbal reports were substantially but imperfectly correlated and that the subception findings could be simply accounted for by the uncorrelated error term for GSR and verbal reports.

In order to examine whether the two response systems were independent, we first relied on Eriksen's method of computing the point-biserial correlation on mean GSR scores for trials of self when subjects were correct and incorrect in their self-reports. The same correlation was computed for trials of the other. Both correlations were not significant, $r_{pb}(25) = .03$ for voices of self, and $r_{pb}(30) = .15$ for voices of the other. These results indicate that whether subjects identified

voices as self or other had little influence on levels of GSR, and therefore, in this respect, the two response systems were independent.

Signal detection theory affords an opportunity to separate within response systems the effects of sensitivity and response bias in the identification of stimuli (Green & Swets, 1966). In the present context, such procedures would be particularly useful in establishing whether subjects who differ in the correctness of their self-reports do not differ in the sensitivity of their GSR in discriminating between voices of self and others. However, the small number of trials administered to each subject and the fact that the voice of self was presented to each subject on only five occasions preclude the application of standard signal detection methodology to these data, since separate measures of sensitivity and response bias can not be computed for each subject. Nonetheless, for descriptive purposes it might be useful to examine the sensitivity of GSR in groups of subjects pooled as a function of their self-report behavior.

In order to obtain confidence levels of the degree to which the GSR measure indicated judgments of self, percentages were computed for the GSR on each trial relative to the largest GSR within each block of trials. These percentages were categorized into 10% units. The number of trials of self and other voices falling within each unit was totaled for each subject. As in the analysis of results bearing on the first criterion, subjects were classified into the four groups on the basis of their self-report identifications. The data for subjects were pooled within groups to form essentially four types of perceivers.

Figure 4 presents receiver operating characteristic (ROC) curves for the four groups on the GSR measure. Cumulative probabilities of identifying the voice of another as self, $P(S/o)$, on the basis of GSR, are on the abscissa, and cumulative probabilities of identifying the voice of self as self, $P(S/s)$, are on the ordinate. A nonparametric measure of sensitivity, the area under the ROC curve, or $P(A)$ (McNicol, 1972), was computed for each group.⁷ As can be seen in Figure 4, the sensitivity of the GSR was

well above chance for all four groups of subjects. Subjects who did not commit any errors, $P(A) = .86$; subjects whose only errors were false negative responses, $P(A) = .82$; and subjects whose only errors were false positive responses, $P(A) = .85$, did not differ in sensitivity, whereas subjects who made both types of errors, $P(A) = .71$, showed lowered sensitivity in their GSR identifications of self and others. At least for the groups that identified voices in a manner congruent with the motivational account of misidentifications, these findings indicate that the self-report and GSR response systems were independent.

Effects of certainty of identifications. Another alternative account of the findings related to the first criterion might be stated as follows: Subjects have more difficulty and, therefore, are less certain when they identify their own voices as compared to voices of others. This greater uncertainty produces greater psychophysiological reactivity to voices of self. Furthermore, the differences in levels of GSR found for the four response categories may reflect differences in levels of certainty. In particular, the high level of GSR found when subjects commit false negative errors may indicate that subjects are particularly uncertain when such misidentifications are made. Of course, this account would have to posit that subjects are not uncertain when false positive errors are made.

⁷ The most common measure of sensitivity derived from ROC curves is d' . However, to use d' it must be assumed that the distributions of signal (i.e., self) and of signal plus noise (i.e., other) are equal in variance and that both are normal—assumptions we are not entitled to make with the present data. The nonparametric measure of sensitivity, $P(A)$, does not require fulfillment of these assumptions. Furthermore, signal detection methodology usually enables one to separate the effects of sensitivity from the effects of response criteria or response bias on performance (Green & Swets, 1966). However, while the area under the ROC curve, or $P(A)$, is an acceptable nonparametric equivalent of d' , there are no satisfactory nonparametric alternative measures of response criteria (McNicol, 1972). Therefore, response criteria effects were not examined in this analysis.

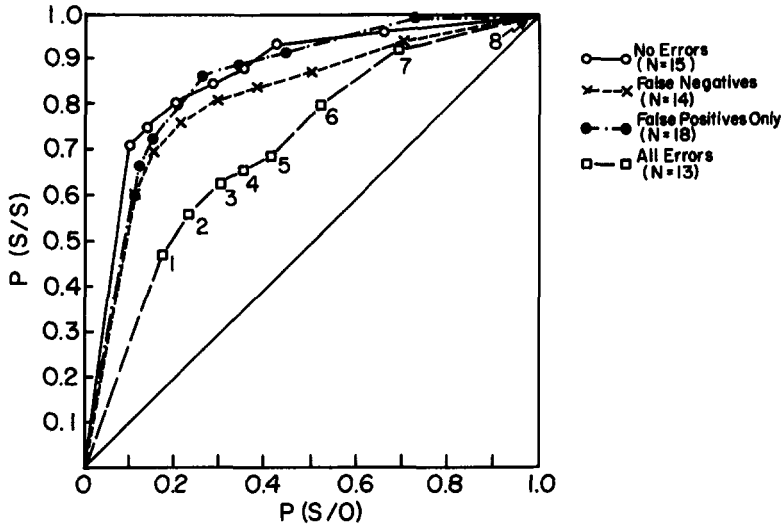


Figure 4. Receiver operating characteristic (ROC) curves of identifications of voices of self and others based on galvanic skin response (GSR) reactivity for groups committing no self-report errors, false negative errors, false positive errors, and false negative and false positive errors (all errors). [Points marked 1 correspond to the cumulative probabilities of hits, $P(S/s)$, and false alarms, $P(S/o)$, for GSR scores that were between 91% and 100% of the largest GSR within their respective block of trials. Points marked 2 correspond to the 81% to 90% interval; points marked 3 correspond to the 71% to 80% interval; points marked 5 correspond to the 41% to 50% interval. Because of low frequencies of occurrence, the data for the intervals 21% to 30% and 31% to 40% were combined and correspond to points marked 7. Likewise, points marked 8 correspond to the 0% to 20% interval.]

A three-factor (Self versus Other Voices \times Sex \times Trials) repeated measures analysis of variance on certainty judgments showed main effects for self versus other voices, $F(1, 58) = 14.49$, $p < .001$, and trials, $F(4, 232) = 7.92$, $p < .001$. Subjects were less certain of their identifications of the voice of self than of the voices of others, and certainty increased with trials (see Figure 5). Sex had no significant effect, $F(1, 58) < 1$, nor were there any significant interactions. These findings provide some support for the certainty account. There are a number of reasons, however, for rejecting this alternative explanation.

When certainty of identifications was included as a covariate in both analyses of GSR and reaction time, as a function of self versus other voices, sex, and trials, the patterns of results reported earlier were unaltered. In the analysis of the first criterion, the general finding was that levels of GSR did not differ for true positive and false negative responses on the one hand and for true negative and false positive responses on the other. For subjects who committed false negative

errors, mean levels of certainty of identifications were compared for false negative and true positive responses. Subjects were neither more nor less certain when they made correct or incorrect identifications of their own voices, $t(25) < 1$. Therefore, the equivalence of levels of GSR despite differences in the correctness of self-reports for these responses cannot be attributed to differences in the certainty of identifications.

A similar comparison was made for levels of certainty on true negative and false positive responses for subjects who committed false positive errors. Here, it was found that when subjects correctly identified others, they were more certain than when they misidentified others, $t(30) = 8.12$, $p < .001$, two-tailed. Assuming that less certainty should result in greater psychophysiological arousal, this difference in certainty for the two response groups cannot account for their equivalence in low levels of GSR.

Finally, mean GSR for the four types of response might be compared at each level of certainty. Given that few subjects committed



Figure 5. Certainty of identifications of voices of self and others as a function of blocks of trials. (Each block of trials increasingly differed in voice duration, as indicated on the abscissa.)

all four types of response and that it was impossible for any subject to make all four responses at each level of certainty, data had to be pooled across subjects. In Table 1, mean GSR is presented for the four types of self-report response at the three levels of certainty. The pooling of data across subjects, whereby subjects do not equally contribute to each cell of the table, precludes the use of standard statistical tests of significance of differences. However, inspection of Table 1 indicates greater GSR reactivity for true positive responses with the higher levels of certainty. There is no clear-cut relationship between GSR and certainty for false negative responses. For true negative responses, there is a trend for lower levels of certainty to be associated with greater levels of GSR. As in the case for true positive responses, higher levels of GSR for false positive responses were associated with higher levels of certainty. In sum, the trend of the results in Table 1, along with the previous analysis, disconfirms the alternative explanation that differences in the certainty of identifications

account for the evidence originally presented in support of the first criterion.

Effects of repeating voices. No distinction has yet been made in the obtained results between repeated and nonrepeated voices of others. Perhaps repetition per se of the voice of self on five trials led to the significant differences in reactions to self and others. However, this argument may be discounted. Recall that two of the voices of others were also repeated, each for five trials, to allow examination of any repetition effects. The difference in mean reaction time on repeated and nonrepeated voices of others was not significant, $t(59) < 1$. The difference in mean levels of GSR was significant, $t(59) = 3.80$, $p < .001$, two-tailed, indicating greater habituation of GSR on repeated trials of other voices. Since this observed effect is opposite in direction to that which would account for the greater reactivity on trials of self, the combining of repeated and nonrepeated voices of others was justified.

Effects of previous exposure to playbacks of self. There may be a more parsimonious explanation of individual differences in rates of misidentifications of the self and others (rather than the motivational account offered here). People differ in their experience with tape playbacks of their own voices. The

Table 1
Mean GSR Reactivity Across Subjects for True Positive, False Negative, True Negative, and False Positive Responses for each of Three Levels of Certainty of Response

| Response type | Certainty level | <i>n</i> | <i>M</i> | <i>SD</i> |
|----------------|-----------------|----------|----------|-----------|
| True positive | High | 48 | 1.18 | .86 |
| | Medium | 25 | .80 | .70 |
| | Low | 13 | .85 | .54 |
| False negative | High | 14 | .77 | .80 |
| | Medium | 12 | 1.61 | 1.77 |
| | Low | 7 | 1.47 | 1.93 |
| True negative | High | 60 | .53 | .37 |
| | Medium | 48 | .59 | .37 |
| | Low | 26 | .69 | .61 |
| False positive | High | 11 | .73 | .67 |
| | Medium | 14 | .86 | .74 |
| | Low | 18 | .47 | .37 |

only previous study to examine the relationship between frequency of previous exposure to tape playbacks of the self and the rates of false negative responding found the relationship to be negative (Rousey & Holzman, 1967). However, that study, as well as other studies that have provided data concerning nonrecognition of the self (e.g., Holzman & Rousey, 1966; Holzman et al., 1966; Huntley, 1940; Olivos, 1967; Rousey & Holzman, 1967; Wolff, 1943), used procedures that tended to maximize rates of nonrecognition. This approach was deemed inadvisable for the present experiment, which attempted to minimize rates of nonrecognition attributable to factors other than self-deception. In this regard, the repetition of the trials of the self, the quality of the audio stimuli, the longer durations of voices, and the explicit instructions that the task was one of identification all served to minimize the difficulty of making self-other discriminations. The lowest rate of nonrecognition previously reported was in the Olivos (1967) experiment, where false negative responses constituted 45% of the responses to voices of self. In the present investigation, 18.7% of the trials of self involved false negative responses. The difference is maintained even when the percentage of false negatives on the first trial of self (31.7%) is compared with those of previous studies. Rates of false positive responding had not been reported in the literature. The rate of false positive responding in the present investigation was 3.8%. It can be concluded that the method employed in the present experiment succeeded in minimizing instances of nonrecognition.

To examine the association between exposure to playback of the self and rates of misidentifications, a one-way analysis of variance was performed for groups stratified for number of false negative responses (none, one, and two or more). This analysis indicated no association, $F(2, 56) < 1$. A similar analysis for groups stratified for number of false positive responses indicated that the groups did not differ significantly, $F(2, 57) = 2.74$, $.05 < p < .1$. However, when subjects who committed two or more false positive errors were compared to the rest of the

sample, it was found that the former group had less experience with tape playbacks, $F(1, 57) = 5.47$, $p < .025$. These results suggest that overall frequency of previous exposure to playbacks of the self does not account for misidentifications of the self and others. As in the case of the analysis of results bearing on the third criterion, where it was found that some subjects who made false positive responses were aware of their errors, it appears that at least some false positive errors may reflect lack of previous exposure to recorded voices of self and are unlikely instances of self-deception.

Discussion

The results of Experiment 1 support the contention that there is a phenomenon that fits the concept of self-deception, since confirming evidence was found for fulfilling the four criteria for its ascription. When subjects misidentified the voices of self and others, they showed that at some level of processing correct identifications were made; their levels of GSR did not differ from those when they correctly identified voices, and therefore, they simultaneously held contradictory beliefs. Furthermore, subjects were not aware of misidentifying the voice of self and sometimes were not aware of incorrectly identifying voices of others. Finally, there is initial evidence that misidentifications of the voices of self and others are motivated. It was claimed that subjects who misidentify others as self are narcissistic in their self-regard and do not find self-confrontation aversive. In fact, they seek it out. These subjects scored low on measures that predict the aversiveness of self-confrontation. Subjects who misidentified either voices of self or others scored high on a measure of individual differences in tendencies to engage in self-deception.

Of the four criteria for ascribing self-deception, the results of the present study are least compelling in regard to satisfying the fourth criterion of motivation. The view that misidentifications of self and others are motivated requires further substantiation. The evidence presented so far is correlational in nature and does not fully address the question of whether

these misidentifications are purposeful, an issue implicit in attributions of motivation (Irwin, 1971). Furthermore, the results bearing on the fourth criterion pertain primarily to subjects who committed false positive errors. The claim that subjects who commit false negative errors do so because they find self-confrontation particularly aversive could not be examined. Additional evidence must be sought relating levels of cognitive discrepancy or self-esteem to misidentifications of both self and others in order to support the claim that these errors are motivated.

Experiment 2

Recent studies have shown that experimental manipulations of cognitive discrepancy influence selective exposure to the self. Duval, Wicklund, and Fine (cited in Duval & Wicklund, 1972, pp. 16-21) found that subjects who received prior negative false feedback about themselves departed from a room in which they were confronted with a mirror sooner than subjects who received prior positive false feedback or subjects who were not confronted with a mirror. Gibbons and Wicklund (1976) found that subjects whose self-esteem was enhanced by positive interaction with a female confederate subsequently spent more time listening to tapes of their own voices compared to subjects who experienced decreased self-esteem. Davis and Brock (1975) found that self-confronted subjects who received positive false feedback concerning a bogus test of creativity emitted more first person pronouns, when asked to guess English translations of foreign words, than subjects who received negative false feedback or subjects who were not self-confronted.

The results of these studies indicate that after experiences of negative feedback, self-esteem is lowered, and confrontation with the self becomes more aversive. On the other hand, positive feedback enhances self-esteem and makes self-confrontation less aversive. If the misidentifications subjects make when self-confronted are indeed motivated, one would expect subjects who have experienced failure or who have lowered self-esteem to demonstrate greater difficulty in making iden-

tifications of self. They should be slower in their reaction time on trials of self, they should be less certain in making such identifications, and, in particular, they should commit more false negative errors. Subjects who have experienced success should show less difficulty in identifying the self. Most importantly, they should commit a greater number of false positive errors.

Method

Subjects

The subjects were 60 University of Pennsylvania undergraduates (30 male, 30 female) who volunteered to participate in a study on intelligence and voice discrimination. All subjects had been born and lived continuously in the northeastern United States.

Materials and Procedure

When subjects reported for the study, they were informed that they would participate in two experiments, one of which required the recording of a speech sample. They were then asked to read the same paragraph that was used in Experiment 1, and their voices were recorded. Subjects were then greeted by another experimenter, who told them that they were to undergo an assessment of their intellectual capacities. They were informed that the purpose of that part of the study was to validate a short test designed to measure intelligence among college students. They were told that they would be presented with 15 multiple-choice synonym problems and that they must provide an answer to each problem within 30 sec of presentation. They were also informed that they would receive feedback concerning their performance on each question and on the test as a whole.

The experimenter then presented subjects with 15 synonym problems taken from the *Guilford-Zimmerman Aptitude Survey, Verbal Comprehension* (1953). Each problem was presented individually on an index card. The experimenter used a stopwatch to time subjects' responses. If a subject did not produce a response within 30 sec of presentation, the experimenter informed the subject that time had expired and requested an answer. Subjects were given feedback as to the correctness of each response, and when errors were made, subjects were told the correct answers. When the test was completed, subjects were told how many of the 15 problems they had answered correctly.

Subjects in the success condition were presented with the 15 easiest problems on the test, and subjects in the failure condition were presented with the 15 most difficult problems. Subjects were randomly assigned to the two conditions. However, final ac-

ceptance into the failure condition was contingent on subjects not succeeding on more than 10 of the 15 items. Similarly, final acceptance into the success group was contingent on correctly solving more than 10 of the problems. Five subjects who were initially assigned to the failure condition succeeded in solving more than 10 of the problems. The results of these subjects were dropped from the analyses reported below. None of the subjects initially assigned to the success group failed to reach the criterion for final inclusion in that group. In order to avoid any bias in assignment of subjects to groups, the results of four subjects, who were initially assigned to the success group and who had succeeded in solving all problems, were also dropped from the analyses. These four subjects were randomly chosen from all subjects in the success condition who had correctly solved the 15 problems. This procedure resulted in a final sample of 30 subjects in the failure group and 21 subjects in the success group.⁸

After completing the verbal problems, subjects were escorted to the experimental room, in which the voice identification task took place. Subjects were administered the Multiple Affect Adjective Checklist (Zuckerman & Lubin, 1965) and were then read the same instructions for the voice identification task as were used in Experiment 1, with the exception that subjects were not informed as to the number of voices that would appear on the tape. The tapes played to subjects contained 28 voices, each voice 4 sec in duration. The voice of the self appeared four times on each tape in Positions 6, 11, 19, and 24. A period of silence, ranging from 15 to 25 sec ($M = 20$ sec) occurred before and after each voice. Male subjects were played tapes that contained male voices, and female subjects heard only voices of females. Each subject heard the same voices of others, and all voices began with the third sentence in the recorded paragraph. The voices of others were provided by 24 male and 24 female undergraduates at the University of Pennsylvania. All had been born and lived continuously in the northeastern United States. They did not differ in age from the subjects in this study.

After the tape was played, subjects completed a postexperimental questionnaire. Questions were designed to check the effect of the pretreatment manipulations. Respondents were also asked whether they had hearing difficulties, whether they had been aware of committing errors, what their reactions were to their own voices, and how frequently in the past they had been exposed to tape recordings of themselves.

The apparatus was identical to that used in Experiment 1, with the exception that GSR recordings were not taken.

Results

Manipulation Checks

The Multiple Affect Adjective Checklist (Zuckerman & Lubin, 1965) is scored on

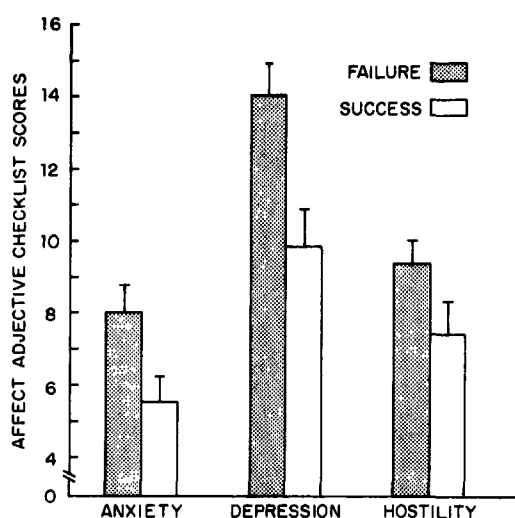


Figure 6. Effects of failure and success manipulations on Multiple Affect Adjective Checklist scores.

three dimensions: anxiety, depression, and hostility. As is seen in Figure 6, subjects in the failure condition were more anxious, $t(49) = 2.23$, $p < .025$, one-tailed; more depressed, $t(49) = 3.03$, $p < .005$, one-tailed; and more hostile, $t(49) = 2.03$, $p < .025$, one-tailed, than subjects in the success condition.

Subjects' evaluations of their performance on the verbal problems were assessed on the postexperimental questionnaire. As is shown in Table 2, subjects in the success condition were more pleased with their performance, $t(49) = 4.18$, $p < .001$, one-tailed, and rated their performance as comparing more favorably to that of other undergraduates, $t(49) = 3.92$, $p < .001$, one-tailed, than subjects in the failure condition. Ratings of degree of intelligence regardless of performance did not differ significantly between the two groups, $t(49) = 1.02$, *ns*.

⁸ It could be argued that the five subjects initially assigned to the failure condition, by solving most of the difficult questions, had an experience of success and should have been reassigned to the success group. Were this to be done, there would be 30 subjects in each condition. With this assignment of subjects to conditions, the results are somewhat stronger than those to be reported below.

Table 2
Self-Ratings of Subjects in Failure and Success Conditions About Performance on Verbal Problems and Overall Intelligence

| Measure and condition | <i>M</i> | <i>SD</i> |
|---|----------|-----------|
| How pleased or displeased were you with your performance on the verbal problems? (scale = 1-7) | | |
| Failure ^a | 3.63 | 1.64 |
| Success ^b | 5.57 | 1.53 |
| In percentile terms, how would you compare your performance on the verbal problems with that of other undergraduates at the University of Pennsylvania? (scale = 0-100) | | |
| Failure ^a | 58.33 | 20.83 |
| Success ^b | 81.62 | 19.89 |
| How would you rate your overall intelligence compared to other undergraduates, regardless of your performance today? (scale = 0-100) | | |
| Failure ^a | 71.00 | 16.80 |
| Success ^b | 76.67 | 22.11 |

^a *n* = 30.

^b *n* = 21.

Effects of Success and Failure on Reaction Time and Certainty of Identifications

In line with the findings of Experiment 1, overall, subjects were slower in making identifications on trials of self than on trials of others. A three-factor (Success versus Failure \times Self versus Other Voice Conditions \times Trials) repeated measures analysis of variance on reaction time revealed a significant main effect for self versus other voice conditions, $F(1, 49) = 11.46$, $p = .002$. The main effect of order of trials was also significant, $F(3, 147) = 21.23$, $p < .001$. In Experiment 1, the order of trials was confounded with the duration of voices. The results of the present experiment indicated that when duration was held constant, subjects became faster in making identifications with increasing numbers of trials. The interaction between success versus failure and self versus other voice conditions was significant, $F(1, 49) =$

4.24, $p < .05$. As is seen in Figure 7, subjects in the failure condition, when compared to subjects in the success condition, were slower in making identifications on trials of self ($p < .05$). Subjects in the two groups did not differ in reaction time on trials of others. This finding indicates that the effects of failure did not generalize in slower reactions to all voices but resulted in retarded performance only on trials of self.

A similar analysis was performed on certainty of identifications. The main effects of self versus other voices, $F(1, 49) = 7.76$, $p < .01$, and order of trials, $F(3, 147) = 5.13$, $p < .005$, were significant. The interaction between success versus failure and self versus other voices did not reach significance, $F(1, 49) = 2.29$, $p > .05$. The results are illustrated in Figure 8. Figure 8 indicates that there was a trend for less certainty in identification on trials of self in the failure group and not in the success group.

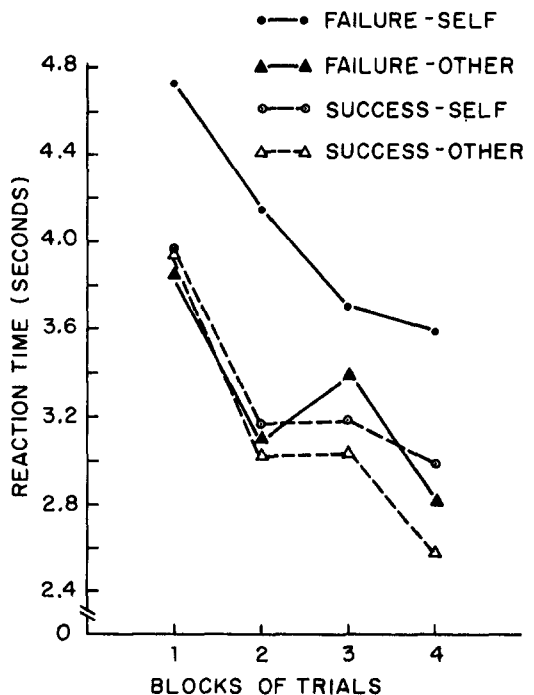


Figure 7. Reaction time of failure and success groups in identifying voices of self and others, as a function of block of trials.

Effects of Success and Failure on Errors of Identification

The rationale for Experiment 2 was based on the argument that errors made in identification of self and others are instances of self-deceptive acts and are therefore motivated. Accordingly, it was expected that subjects who had experienced failure would make more false negative errors, whereas subjects who had experienced success would commit more false positive errors. Eleven out of 30 subjects in the failure group had at least one failure to identify self (false negative error), while only 2 out of 21 subjects in the success group committed at least one false negative response. This effect was significant, $\chi^2(1) = 4.79$, $p < .05$. On the other hand, 13 subjects in the failure group made at least one erroneous judgment of self (false positive error), and 16 subjects in the success group

made at least one false positive response. This effect was also significant, $\chi^2(1) = 5.44$, $p < .025$. In short, when people are made to feel good about themselves, they tend to "project" and see themselves in places where they are not. When people are made to feel bad about themselves they tend to "deny" seeing themselves in places where they are. To examine whether overall rates of error differed for the two groups, a degree-of-self-projection measure was computed by scoring each false negative response as -1 , each correct identification as 0, and each false positive response as 1. Subjects' scores were summed for the 28 identifications, and it was found that the success group ($M = 1.19$, $SD = 1.68$) and the failure group ($M = -.07$, $SD = 1.81$) differed in types of errors committed, $t(49) = 2.47$, $p < .01$, one-tailed. Thus, the experimental pretreatment differentially influenced rates of types of misidentifications, thereby supporting the motivational account of these errors.⁹

Reactions to Hearing the Voice of the Self

In the postexperimental questionnaire, subjects were asked to rate how much they enjoyed hearing their own voices and how unpleasant or pleasant they found their voices to be. Supporting the hypothesis that manipulations of cognitive discrepancy influence the aversiveness of self-confrontation, subjects in the failure condition ($M = 3.73$, $SD = 1.41$) tended to enjoy hearing the voice of self less than subjects in the success condition ($M = 4.33$, $SD = 1.04$), $t(49) = 1.63$, $p < .06$, one-tailed. The failure group ($M = 4.00$, $SD = 1.07$) also rated their voices as less pleasant than the success group ($M = 4.81$, $SD = 1.05$), $t(49) = 2.63$, $p < .01$, one-tailed.

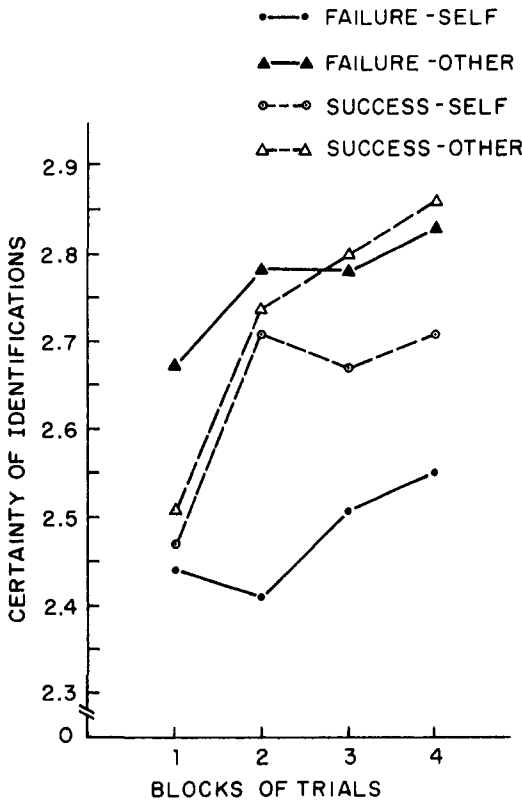


Figure 8. Certainty of failure and success groups in identifying voices of self and others, as a function of block of trials.

⁹ The obtrusive and unobtrusive measures of awareness of errors taken in Experiment 1 were also computed for Experiment 2. Replicating the results of Experiment 1, subjects were not aware of committing false negative errors, whereas some subjects were aware of having made false positive errors.

Discussion

We have argued that when people misidentify voices of self and others, they are engaging in self-deceptive behavior (Sackeim & Gur, 1978). In our view, part of the attribution of self-deception necessitates demonstrating that these errors are motivated. We claimed that individuals who are dissatisfied with themselves find confrontation with the self aversive. Identification of the self is more difficult for them, and they will avoid the aversive consequences of self-confrontation by failing to identify correctly the voice of self. On the other hand, we argued that individuals who hold themselves in high esteem do not find confrontation with the self aversive. Indeed, such individuals narcissistically seek out self-confrontation. Identification of the self is not difficult for them, and they demonstrate their preference for self-confrontation by identifying voices of others as self.

Previous studies have indicated that experimental manipulations of cognitive discrepancy or self-esteem influence selective exposure to the self (Duval & Wicklund, 1972; Gibbons & Wicklund, 1976). The principal measure used in these studies was the amount of time individuals engaged in exposure to the self. If our claim is valid that errors made in identification of the self and others are motivated, then we would expect manipulations of self-esteem to influence the difficulty of making identifications of the self and the rates of types of errors committed in identifying the self and others.

The results of Experiment 2 supported these predictions. Subjects who experienced failure were slower in making identifications of voice of self than subjects given pretreatments of success. The effects of the failure pretreatment did not generalize to identification of all voices, since the failure and success groups did not differ in the speed of their identifications of others. Furthermore, the two groups differed in the types of errors they committed. The failure group engaged in more false negative responding (misidentifications of self); the success group made more false positive errors (misidentifications

of others). It could be argued that a number of seemingly "defensive" behaviors, such as self-serving biases in perception and memory, need not be determined by motivational factors (e.g., Greenwald, Note 3). However, the pattern of results presented here indicates that misidentifications of the self and others involve motivated distortions of reality.

General Discussion

This investigation was an attempt to demonstrate that a specific phenomenon, misidentification of the voices of self and others, is an instance of self-deception. In Experiment 1, we showed that when subjects made errors in identifying the voices of self and others, they provided evidence of simultaneously holding correct and incorrect beliefs as to the nature of the voices. We also found that subjects, for the most part, were not aware of holding the correct beliefs, and correlational data suggested that these errors in identification were motivated. Experiment 2 focused specifically on the role of motives by experimentally manipulating motivation to seek out or to avoid self-confrontation. We found that subjects who underwent a pretreatment designed to lower self-esteem and, therefore, to increase the aversiveness of self-confrontation had more failures to recognize their own voices. In contrast, subjects who received a pretreatment designed to increase self-esteem and, therefore, were hypothesized to be more likely to seek out self-confrontation made more errors of identifying voices of others as their own.

Our finding that some misidentifications of self and others are instances of self-deception collaterally demonstrates that the properties of motivated, selective nontransparency should be attributed to consciousness. This conclusion goes beyond recent assertions that people can be unaware of cognitions (e.g., Hilgard, 1976, 1977; Nisbett & Wilson, 1977). We claim that at times, such selective non-awareness can be determined by motivational demands.

A question that presents itself concerns the relationship of the concept of self-deception to the psychoanalytic notion of repression.

Certainly, the concept of repression also attributes a motivated, selective, nontransparent nature to consciousness. Since Freud (1914/1957) wrote that repression is "the cornerstone on which the whole structure of psychoanalysis rests" (p. 16), hundreds of psychological investigations have been interpreted as either propping up or tearing down this cornerstone. In a review of many of these investigations, Holmes (1974) concluded that there is no consistent experimental evidence supporting the existence of repression. However, it should be pointed out that the criteria for the ascription of self-deception may be necessary, but are certainly not sufficient, for the ascription of repression. The ascription of repression requires not only the claim that there is a motivated selective nonawareness of beliefs, it also requires the additional assertion that beliefs not subject to awareness are stored in an unconscious. The unconscious is a functionally independent control system, capable of purposeful influence on behavior. In this respect, the concept of repression entails that consciousness is not only nontransparent but also nonunitary. It is for these reasons that we believe that the demonstration of the existence of self-deception is logically necessary prior to a demonstration of the existence of repression and, further, that such a demonstration in the case of repression is likely to be a more arduous endeavor.

Given this initial evidence that self-deception is an experimentally real phenomenon, a number of additional questions come to the fore. They concern the nature of self-deception, the possibility of individual differences in frequency of self-deceptive behavior, and the processes and structures underlying self-deception. The results of the present investigation do not provide solutions to any of these questions, but in relation to some they do suggest directions for further study.

An important issue in the elucidation of the nature of self-deception is whether acts of self-deception are typical responses of individuals to, for instance, threatening stimuli, or whether they are specific and situation- or stimulus-bound. Our use in Experiment 1 of a paper-and-pencil questionnaire to assess in-

dividual differences in tendencies toward self-deception was predicated on the view that self-deception is not a stimulus-bound phenomenon but a generalized response set, or characteristic defense (Hilgard, 1949), the frequency of its use varying among people. In support of this view, we found that subjects who committed either false negative or false positive errors showed greater tendencies to deny psychologically threatening statements on the SDQ. Elsewhere (Sackeim & Gur, 1978, 1979), we have found that there are substantial negative correlations between SDQ scores and degree of self-reported psychopathology. The magnitude of the associations between SDQ and psychopathology measures is greater than that between standard lie scales and self-reported psychopathology. These findings support the contention of Meehl and Hathaway (1946) that "what is much more important, they (lie scales) are mainly directed at the sort of *conscious* falsehood which most writers have stressed, while ignoring the more subtle tendencies to self-deception which are probably of even greater importance in affecting scores" (p. 528). As a generalized response set, self-deception may influence behavior in contexts other than personality testing. For instance, Mischel (1974) argued that the "neurotic paradox" reflects a motivated attempt by individuals to keep specific ideas out of awareness and that all neurotic behavior is self-deceptive (cf. Abramson & Sackeim, 1977). The phenomena found in experiments on cognitive dissonance, self-serving biases in attribution, and studies of subjects' accounts of their behavior in obedience and conformity situations may be likewise interpreted in terms of self-deceptive acts. Since it may be possible to measure relative tendencies to employ self-deception, there is now an opportunity not only to examine individual differences in self-deception but also the influence of self-deception on broad ranges of behavior. As Jacques Rivière (cited in Fingarette, 1969) has suggested, "The discovery of a deceiving principle, a lying activity within us, can furnish an absolutely new view of all conscious life" (p. 1).

Reference Notes

1. Dickinson, W. H., & Ray, T. S. *Immediate effects of body image confrontation with chronic schizophrenic women*. Paper read at the meeting of the Oklahoma State Psychological Association, Oklahoma City, October 1965.
2. Sackeim, H. A. *Personality and the self-confrontation experience*. Unpublished manuscript, Oxford University, 1974.
3. Greenwald, A. G. *The totalitarian ego: Fabrication and revision of personal history*. Manuscript submitted for publication, 1978.

References

- Abramson, L. Y., & Sackeim, H. A. A paradox in depression: Uncontrollability and self-blame. *Psychological Bulletin*, 1977, *84*, 838-851.
- Alkire, A. A., & Brunse, A. J. Impact and possible causality from videotape feedback in marital therapy. *Journal of Consulting and Clinical Psychology*, 1974, *42*, 203-210.
- Anastasi, A. *Psychological testing*. New York: Macmillan, 1961.
- Boyd, H. S., & Sisney, V. V. Immediate self-image confrontation and changes in self-concept. *Journal of Consulting Psychology*, 1967, *31*, 291-294.
- Bruner, J. S., & Postman, L. Perception, cognition, and behavior. *Journal of Personality*, 1949, *18*, 14-31.
- Camus, A. *The fall*. New York: Vintage Books, 1956.
- Canfield, J. W., & Gustafson, D. F. Self-deception. *Analysis*, 1962, *23*, 32-36.
- Castaldo, V., & Holzman, P. S. The effects of hearing one's own voice on sleep mentations. *Journal of Nervous and Mental Disease*, 1967, *144*, 2-13.
- Castaldo, V., & Holzman, P. S. The effect of hearing one's own voice on dream content: A replication. *Journal of Nervous and Mental Disease*, 1969, *148*, 74-82.
- Davis, D., & Brock, T. C. Use of first person pronouns as a function of increased objective self-awareness and performance feedback. *Journal of Experimental Social Psychology*, 1975, *11*, 381-388.
- Demos, R. Lying to oneself. *Journal of Philosophy*, 1960, *57*, 588-595.
- Dixon, N. F. *Subliminal perception: The nature of a controversy*. London: McGraw-Hill, 1971.
- Duval, S., & Wicklund, R. A. *A theory of objective self-awareness*. New York: Academic Press, 1972.
- Edelberg, R. E. Electrical activity of the skin. In N. S. Greenfield & R. A. Sternback (Eds.), *Handbook of psychophysiology*. New York: Holt, Rinehart & Winston, 1972.
- Erdelyi, M. H. A new look at the new look: Perceptual defense and vigilance. *Psychological Review*, 1974, *81*, 1-25.
- Eriksen, C. W. Subception: Fact or artifact? *Psychological Review*, 1956, *63*, 74-80.
- Eriksen, C. W. Unconscious processes. In J. R. Marshall (Ed.), *Nebraska Symposium on Motivation* (Vol. 6). Lincoln: University of Nebraska Press, 1958.
- Eriksen, C. W., & Browne, C. T. An experimental and theoretical analysis of perceptual defense. *Journal of Abnormal and Social Psychology*, 1956, *52*, 224-230.
- Eysenck, H. J., & Eysenck, S. B. G. *Eysenck Personality Inventory*. London: University of London Press, 1963.
- Fingarette, H. *Self-deception*. London: Routledge & Kegan Paul, 1969.
- Freud, S. [On the history of the psychoanalytic movement] In J. Strachey (Ed. and trans.), *The complete psychological works of Sigmund Freud* (Vol. 14). London: Hogarth, 1957. (Originally published, 1914.)
- Gardiner, P. L. Error, faith and self-deception. *Proceedings of the Aristotelian Society*, 1970, *50*, 221-243.
- Gibbons, F. X., & Wicklund, R. A. Selective exposure to self. *Journal of Research in Personality*, 1976, *10*, 98-106.
- Gide, A. *The counterfeiters*. New York: Modern Library, 1955.
- Green, D. M., & Swets, J. A. *Signal detection theory and psychophysics*. New York: Wiley, 1966.
- Guilford-Zimmerman Aptitude Survey. Beverly Hills, Calif.: Sheridan Supply Co., 1953.
- Gur, R. C., & Sackeim, H. A. Self-confrontation and psychotherapy: A reply to Sanborn, Pyke and Sanborn. *Psychotherapy: Theory, Research and Practice*, in press.
- Hilgard, E. R. Human motives and the concept of the self. *American Psychologist*, 1949, *4*, 374-382.
- Hilgard, E. R. Neodissociation theory of multiple cognitive control systems. In G. E. Schwartz & D. Shapiro (Eds.), *Consciousness and self-regulation, advances in research* (Vol. 1). New York: Plenum Press, 1976.
- Hilgard, E. R. *Divided consciousness: Multiple controls in human thought and action*. New York: Wiley, 1977.
- Holmes, D. S. Investigations of repression: Differential recall of material experimentally or naturally associated with ego threat. *Psychological Bulletin*, 1974, *81*, 632-653.
- Holzman, P. S., & Rousey, C. The voice as a percept. *Journal of Personality and Social Psychology*, 1966, *4*, 79-86.
- Holzman, P. S., Rousey, C., & Snyder, C. On listening to one's own voice: Effects on psychophysiological responses and free associations. *Journal of Personality and Social Psychology*, 1966, *4*, 432-441.
- Howie, D. Perceptual defense. *Psychological Review*, 1952, *59*, 308-315.
- Huntley, C. W. Judgments of self based upon records of expressive behavior. *Journal of Abnormal and Social Psychology*, 1940, *35*, 398-427.

- Irwin, F. W. *Intentional behavior and motivation: A cognitive theory*. Philadelphia, Pa.: Lippincott, 1971.
- Kuhn, T. S. *The structure of scientific revolutions*. Chicago: University of Chicago Press, 1962.
- Lazarus, R. S., & McCleary, R. A. Autonomic discrimination without awareness: A study of subception. *Psychological Review*, 1951, 58, 113-122.
- Liebert, R. M., & Morris, L. W. Cognitive and emotional components of test anxiety: A distinction and some initial data. *Psychological Reports*, 1967, 20, 975-978.
- Lykken, D. T. The GSR in the detection of guilt. *Journal of Applied Psychology*, 1959, 43, 385-388.
- Lykken, D. T. Psychology and the lie detector industry. *American Psychologist*, 1974, 29, 725-738.
- Martin, D. G., Hawryluk, G. A., & Guse, L. L. Experimental study of unconscious influences: Ultrasound as a stimulus. *Journal of Abnormal Psychology*, 1974, 83, 589-608.
- McNicol, D. *A primer of signal detection theory*. London: Allen & Unwin, 1972.
- Meehl, P. E., & Hathaway, S. R. The K factor as a suppressor variable in the Minnesota Multiphasic Personality Inventory. *Journal of Applied Psychology*, 1946, 30, 525-564.
- Mischel, T. Understanding neurotic behavior: From "mechanism" to "intentionality." In T. Mischel (Ed.), *Understanding other persons*. Totowa, N.J.: Rowman & Littlefield, 1974.
- Morris, L. W., & Liebert, R. M. Effects of anxiety on timed and untimed intelligence tests. *Journal of Consulting and Clinical Psychology*, 1969, 33, 240-244.
- Morris, L. W., & Liebert, R. M. Relationship of cognitive and emotional components of test anxiety to physiological arousal and academic performance. *Journal of Consulting and Clinical Psychology*, 1970, 35, 332-337.
- Murphy, G. Experiments in overcoming self-deception. *Psychophysiology*, 1970, 6, 790-799.
- Murphy, G. *Outgrowing self-deception*. New York: Basic Books, 1975.
- Murray, H. A. Studies of stressful interpersonal disputations. *American Psychologist*, 1963, 18, 28-36.
- Nisbett, R. E., & Bellows, N. Verbal reports about causal influences on social judgments: Private access versus public theories. *Journal of Personality and Social Psychology*, 1977, 35, 613-624.
- Nisbett, R. E., & Wilson, T. C. Telling more than we can know: Verbal reports on mental processes. *Psychological Review*, 1977, 84, 231-259.
- Olivos, G. Response delay, psychophysiological activation and recognition of one's own voice. *Psychosomatic Medicine*, 1967, 29, 433-440.
- Orne, M. T., Thackray, R. I., & Paskewitz, D. A. On the detection of deception: A model for the study of the physiological effects of psychological stimuli. In N. S. Greenfield & R. A. Sternbach (Eds.), *Handbook of psychophysiology*. New York: Holt, Rinehart & Winston, 1972.
- Penelhum, T. Pleasure and falsity. In S. Hampshire (Ed.), *Philosophy of mind*. New York: Harper & Row, 1966.
- Rousey, C., & Holzman, P. S. Recognition of one's own voice. *Journal of Personality and Social Psychology*, 1967, 6, 464-466.
- Sackeim, H. A., & Gur, R. C. Self-deception, self-confrontation, and consciousness. In G. E. Schwartz & D. Shapiro (Eds.), *Consciousness and self-regulation, advances in research* (Vol. 2). New York: Plenum Press, 1978.
- Sackeim, H. A., & Gur, R. C. Self-deception, other-deception, and self-reported psychopathology. *Journal of Consulting and Clinical Psychology*, 1979, 47, 213-215.
- Sackeim, H. A., Packer, I. K., & Gur, R. C. Hemisphericity, cognitive set, and susceptibility to subliminal perception. *Journal of Abnormal Psychology*, 1977, 86, 624-630.
- Sartre, J. P. [*Being and nothingness: An essay on phenomenological ontology*] (H. Barnes, Trans.). London: Methuen, 1958.
- Siegler, F. A. Demos on lying to oneself. *Journal of Philosophy*, 1962, 59, 469-475.
- Storms, M. D. Videotape and the attribution process: Reversing actors' and observers' points of view. *Journal of Personality and Social Psychology*, 1973, 27, 165-175.
- Venables, P. H., & Martin, I. Skin resistance and skin potential. In P. H. Venables & I. Martin (Eds.), *A manual of psychophysiological methods*. Amsterdam: North-Holland, 1967.
- Verwoerd, A., Nowlin, J. B., & Agnello, S. A. A technique for studying effects of self-confrontation in cardiac patients. *Health Sciences TV Bulletin*, 1965, 2, 1-6.
- Wason, P. C., & Johnson-Laird, P. N. *Psychology of reasoning: Structure and content*. Cambridge, Mass.: Harvard University Press, 1972.
- Wolff, W. *The expression of personality*. New York: Harper, 1943.
- Wundt, W. *An introduction to psychology*. New York: Arno Press, 1973. (Originally published, 1912.)
- Zuckerman, M., & Lubin, B. *Manual for the Multiple Affect Adjective Checklist*. San Diego, Calif.: Educational and Industrial Testing Service, 1965.

Received March 10, 1978 ■