Although the therapist was unable to make most of the student participants feel better in the relatively brief diagnosis session (30-45 minutes), she was effective with several of the last students for whom she was more assertive in proposing the dynamic reason for their distress—which they accepted as "reasonable." There are several messages here to note. The experience of a significant personal discontinuity may motivate not only the actor to engage in cognitive detective work to come up with an appropriate explanation, but family, friends, co-workers, and professional caregivers may also offer their interpretations. Those views may reflect prevailing societal perspectives, or individual search-frame biases based on personal experience, or they may be a natural consequence of the formal theoretical training of professionals in health-care occupations (see Plous & Zimbardo, 1986). These alternative explanations may add to the Actor's confusion when they are wrong or misleading, yet may be accepted if they have the authority power of a persuasive, credible communicator. For example, it seems that some of the client-patient testimony in "false memory syndrome" cases may be understood as a matter of attributing a variety of personal discontinuities to the alleged recovery of repressed memories of childhood abuse, as suggested by influential therapists, social workers, or the popular media.

We have continued to develop more sophisticated assessment of hypnotic amnesia using EEG event-related potentials (ERP) of memory, as well as other validity tests during hypnosis training. In one of our recent studies, with a reasonably large sample of 44 subjects, (LaBerge & Zimbardo, 1999) of ERP correlates of suggested hypnotic amnesia for recently learned words, high-hypnotizable subjects reporting amnesia show significantly increased P300 in response to words covered by the amnesia suggestion compared to control words. In contrast, subjects not experiencing amnesia, whether high or low hypnotizables, or whether simulating amnesia or not, show no such difference. The increased P300 waveform may well index the surprise of unconscious recognition or unexplained arousal in subjects experiencing amnesia. Although it is possible to breach hypnotic amnesia with expectancy manipulations (Silva & Kirsch, 1987), the expectation of amnesia following deep hypnotic relaxation (as in all of our research) has been shown to produce dramatic reductions in recall for a set of stimulus words.

C. OVERVIEW OF EXPERIMENTAL FINDINGS

The individual experiments that follow will show the following general outcomes:

1. High hypnotizable participants respond differently than those who are low hypnotizable to amnesia versus awareness suggestions of the source of induced arousal.
2. Hypnotic simulators respond less intensely than hypnotic participants to unexplained arousal inductions.
3. There are significant autonomic, psychological, and behavioral conse quences of these induced discontinuities.
4. Concomitant mood states are typically negative in affective quality.
5. Plausible alternative explanations are generated by subjects to account for their experienced discontinuity.
6. Paranoid-like thinking is generated by biased attempts to explain discontinuities based either on unexplained deafness or unexplained arousal with a social search frame bias.
7. Research participants construct explanations for their induced discontinuities that are predictable from their induced search frame categories
8. Predictable types of psychopathological reactions (phobias, hypochondriasis or somatoform disorders, and paranoia) emerge in a significant number of these normal individuals, as assessed by self-reports, peer ratings, objective clinical tests, and expert judgments by clinicians.
9. Subjects typically fail to disclose the strong negative feelings and thoughts they have about their unexplained arousal to another person (peer or confederate) in the arousal context, although when they do, disclosure has beneficial effects.

This interpersonal disclosure setting is one social dimension of Discontinuity Theory that raises the issue of the attribution of one's discontinuity either internally to idiosyncratic dispositions or externally to shared properties of the immediate stimulus situation being experienced by coacting others.

D. MULTIPLE CONSEQUENCES OF UNEXPLAINED AROUSAL

This study (Zimbardo, LaBerge, & Butler, 1993) compared the emotional, cognitive, and autonomic nervous system reactions of subjects experiencing physiological arousal with and without awareness of its source. High hypnotizable subjects (and an equal number of low hypnotizable subjects as controls) were used in a unique within-subject design in which hypnotically induced arousal (heart rate and respiration increases) was experienced by each subject both with awareness and again a second time with amnesia for its source (in randomized sequence). This two-phase

procedure enabled each subject to have arousal experienced as explained and also as unexplained. Unexplained arousal was operationalized in this study as the induction of generalized physical arousal symptoms with source amnesia. We assumed that such unexplained arousal would be experienced only by those subjects who were highly hypnotizable and thus could internalize experimental suggestions for hypnosis and for arousal with amnesia for its true source.

We predicted that the experience of discontinuity, in the form of unexplained arousal, would have the following demonstrable effects: (a) both autonomic and psychological measures of arousal would be comparable in their patterns of change over the time course of experiencing relaxation, arousal, and debriefing; (b) the level of autonomic and psychological arousal would be significantly greater than in other conditions (either for explained arousal among those high in hypnotizability, or in either the amnesia or awareness condition for those low in hypnotizability) because of the added effects of uncertainty-caused anxiety superimposed on the initial general arousal; (c) subjects would report concomitant mood state changes in the negative direction; and (d) subjects amnesic for the source of their condition would be more likely to generate plausible alternate explanations, that is, causal misattributions.

As predicted, for the hypnotizable subjects, unexplained arousal produced significant and dramatic effects when compared with explained arousal (for high or low hypnotizable subjects). We found elevations in self-reported and physiological measures of arousal, negative mood states, and also causal misattributions that characterized those experiencing this discontinuity.

Eighteen subjects completed the experimental procedures, nine in each hypnotizability condition. Among our highly hypnotizable subjects, five were male and four were female; of our low hypnotizable subjects, three were male and six were female. Another eight students were utilized in pretesting phases to train research assistants, test aspects of the procedure, and assess outcome measures. Of the 280 students taking the group hypnotizability test procedure, 55 (20%) scored as highly hypnotizable, 29 (53%) of whom passed the amnesia item, while 32 (11%) scored as low hypnotizable.

Our basic design involved repeated assessment of several physiological and psychological variables at selected times during a 30-minute sequence of events in each of two similar but separate experimental periods. Under the guise of a study of hypnosis and signal detection, all subjects received identical, standardized taped instructions that included responding to a variety of faint audio signals, hypnotic suggestions for relaxation, and then induced arousal with or without amnesia for the posthypnotic suggestion, followed by various dependent measures. Subjects were randomly assigned

to the arousal-amnesia or arousal-aware treatment for the first experimental period. Using a within-subject design, each of the low and high hypnotizable subjects then experienced the reversed aware/amnesia treatment in the second period. This within-subject manipulation was introduced to reduce error variance in the physiological measures and to provide a more effective test of the effects of unexplained arousal uncontaminated by individual differences between subjects.

Three kinds of physiological measures were used: heart rate, respiration rate, and EEG recordings (technical details are available in Zimbardo, LaBerge, & Butler, 1993). Three different psychological measures were utilized to tap perceived arousal, mood, and subjects' attributions for their arousal. A primary dependent measure was the subjective assessment of experienced arousal reported as SUA. These repeated SUA ratings were made five times during the first period of the procedure: (a) initially after the protocol was explained and subjects had completed consent forms; (b) after being fitted with sensors that would record their heart rate, respiration, and EEG reactions, and the recording equipment had been calibrated; (c) following hypnotic relaxation suggestion; (d) following posthypnotic cued arousal; and (e) as the final baseline measure at the end of debriefing in the first phase. During the second phase of the study, SUA ratings were taken three more times corresponding to the repetition of events 3, 4, and 5 in the first period (data presented in Figure 4).

Additional psychological measures were taken during the critical period when subjects were experiencing the effects of arousal following the amnesia or awareness manipulation. These included a selection of items from the Profile of Mood States (POMS) (McNair, Lorr, & Doppleman, 1971), and a sentence-completion task designed to check on memory for the hypnotic suggestion and causal attributions for the arousal. Both were administered verbally via an intercom between the experimenter in the control room and the subject who was isolated in a dimly lit, sound-attenuation chamber within an adjacent laboratory. As the experimenter read each of the 34 mood descriptor terms (e.g., "forgetful," "alert," "annoyed"), the subject replied aloud with a number from a 5-point scale that indicated the extent that mood was currently being experienced (where 0 = not at all; 2 = moderately; and 4 = extremely). Next, the experimenter read aloud each of ten sentence stems (e.g., "Right now I feel . . . ," "The answer to my confusion is . . ." "I feel the way I do right now because . . .") and the subject's spontaneous stem completions were recorded.

Subjects were led to believe the study concerned differences in signal-detection ability between those who differed in hypnotic susceptibility and degree of hypnotic relaxation. This cover story was used so that subjects' attention would be focused on randomly presented, external acoustic signals

in order to create a uniform mental set across subjects. It also would enhance their responsiveness to the acoustic arousal-cue signal. Baseline physiological measures were taken to calibrate our recording systems and to provide a pre-experimental index for subsequent change. Subjects were instructed to try to increase their heart and (HR respiratory rates (11) as much as possible (without moving around in their seat) for one minute. This Arousal-Demand period allowed the subjects to experience intentionally directed arousal in a nonthreatening way in this novel experimental situation, prior to their hypnotically induced arousal experience.

Following their baseline assessment, subjects heard a 2-min tape-recording to induce a state of hypnotic relaxation, followed by the third SUA rating and then taped arousal instructions: "In a short while you will have an unusual experience. When you hear a bell ring, like this (BELL RINGS), you will act as if you are aroused, so that your heart rate will increase and your respiration will increase. You will continue to respond this way while performing various tasks. You will maintain that arousal until you hear, `Now you can relax.' Then you will no longer feel the symptoms of arousal; as the signs of your arousal go down to their usual level, your heart rate and respiration return to their typical normal levels." This posthypnotic arousal suggestion was combined with a second suggestion designed to establish either Awareness (AWR) or Amnesia (AMN) for the source of the cued arousal experience-as I described in the earlier Overview section.

The arousal cue followed a 60-sec baseline period of no activity by the subject, then came the fourth SUA rating, with physiological data collected for 120 sec after the arousal cue. The mood measure and sentence completion measure were then administered, followed by removal of the post-hypnotic suggestions for arousal and amnesia, and a fifth SUA rating. After a brief rest period of about 5 min, this procedure was repeated with the awareness or amnesia suggestion reversed for each subject in the two hypnotizable conditions, with the order counterbalanced within condition. At the end of this two-phase procedure, each subject was given an extended, personalized process debriefing (see later Ethics section for details).

1. Results and Discussion

The major results are described first for the psychophysiological measures, then the SUA ratings, the mood ratings, and finally, the sentence completions (see Zimbardo et al., 1993, for the detailed statistics of these findings).

Mean values of HR and RR were analyzed by a mixed ANOVA (Hypnotic Level *x* Treatment *x* Pre-Post Arousal Cue) and significant main effects were found for both HR *(F*(1, 16) = 15.9, p < .001, and RR (F(l, 16) = 9.1, p < .Ol). A significant Hypnotic Level by Pre-Post interaction indicated that high hypnotizable (HI-HYP) subjects increased their HR more than did the low hypnotizable (LO-HYP) subjects from before to after arousal *(F(1,* 16) = 5.9, p < .03). Arousal change scores associated with the arousal cue were computed and HR was found to be five times greater for the HI-HYP group than for the LO-HYP group under the Amnesia condition (t(16) = 3.1, p < .01). Moreover, the comparison between Amnesia and Aware conditions showed, as predicted, significantly greater respiration rate increases for the HI-HYP group relative to the LO-HYP group (t(16) = 2.6, p < .02). There were no group differences in either measure for the Aware condition (nor any gender or order effects). After the data were Windsorized to deal with outliers, t-tests showed that again, as predicted, the HI-HYP group compared to the LO-HYP group showed more arousal in the Amnesia than Aware conditions for both heart rate (t(12) = -4.2, p < .001) and respiration change scores (t(12) = 2.8, p < .02). Figure 1 shows this effect as box plots for both HR and RR differences. It is apparent that the big action is in the HR arousal effects for the highly hypnotizable subjects experiencing amnesia (our Discontinuity condition).

The immediacy and power of the arousal induction on the HI-HYP subjects compared to the minimal impact on those in the LO-HYP condition is apparent from the HR data plotted across the experimental time line, as shown in Figure 2. The second obvious effect, in support of one of our hypotheses, is the sustained higher arousal of those hypnotizable subjects when they were in the Amnesia condition than when they were Aware of the source of their arousal. By contrast, the lowest arousal is seen for the Amnesia-LO HYP group.

Although not presented in our earlier publication, there was also a provocative EEG finding, which I think is worth mentioning here for its possible value in speculating about brain mechanisms involved in these amnesia effects. As can be seen in Figure 3, there was relatively greater activation in the right parietal lobe (P4) than the left (P3) for EEG Alpha waves in only one condition: HI-HYP experiencing Amnesia. Although the effect is small and needs replication under conditions where subjects are not carrying out as many tasks as in this study, it could be interpreted to mean that the right cerebral hemisphere was being activated during the time these hypnotizable subjects were experiencing amnesia. Recall it is the right hemisphere that is the "silent partner" to worldly experiences which are interpreted by the left cortex (Gazzaniga, 1998). Thus I would expect this effect to be reversed during the time when those experiencing such discontinuities are trying to generate causal attributions to make sense of them,

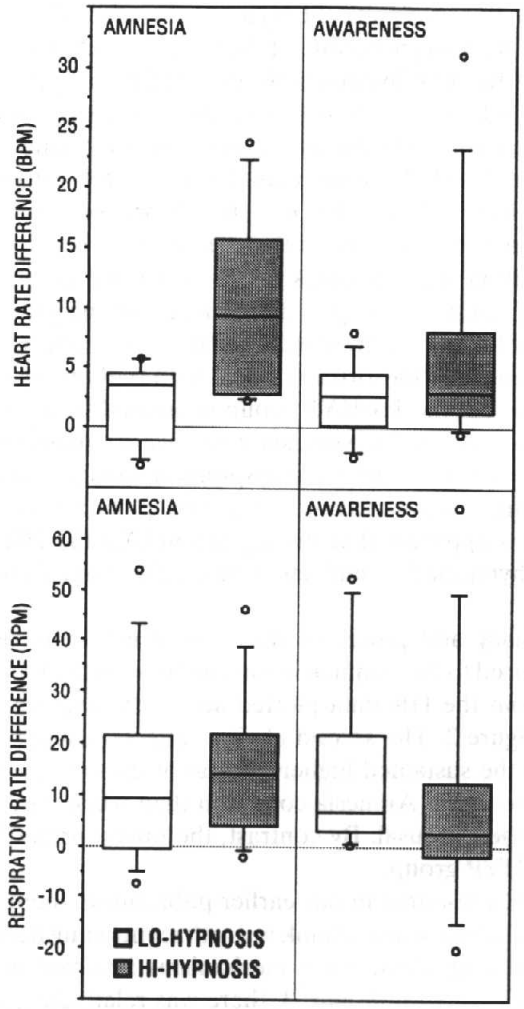

Fig. 1. Box plots for heart rate and respiration rate differences by condition. The box plots (Cleveland, 1985) are read as follows: The line through the middle of the boxes marks the median values; the tops and bottoms of the boxes mark the 75th and 25th percentiles; the lines extending above and below the boxes mark the 90th and 10th percentiles; the circles mark data points above and below the 90th and 10th percentiles. (From Zimbardo et al., 1993. Copyright © 1993 by the American Psychological Association. Reprinted with permission.)

with greater left hemispheric activation. That evidence will have to wait for our next program of research.

The SUA data were analyzed with a 2 × 2 × 2 (Hypnotic Level × Treatment × Pre–Post Arousal Cue) mixed analysis of covariance

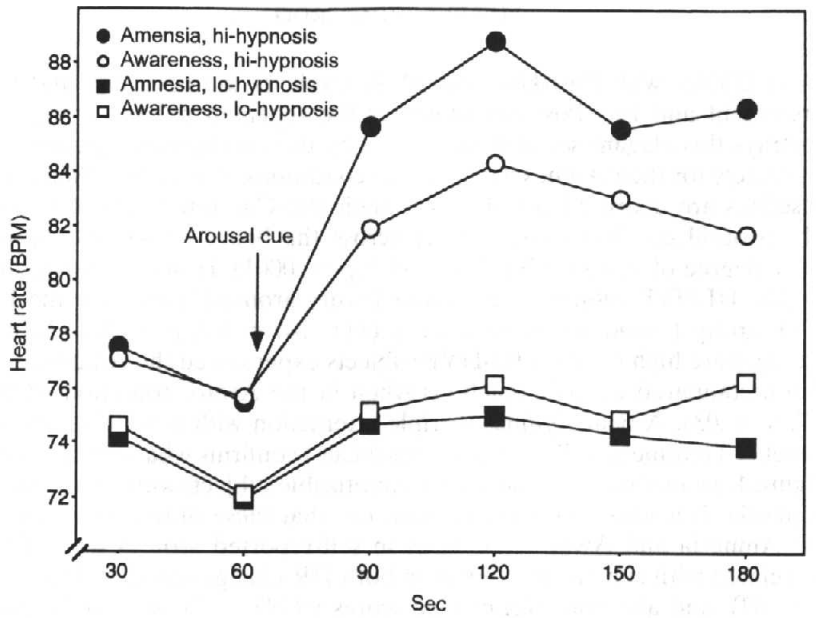

Fig. 2. Mean heart rate under amnesia and aware conditions by hypnosis group. (From Zimbardo et al., 1993. Copyright © 1993 by the American Psychological Association. Reprinted with permission.)

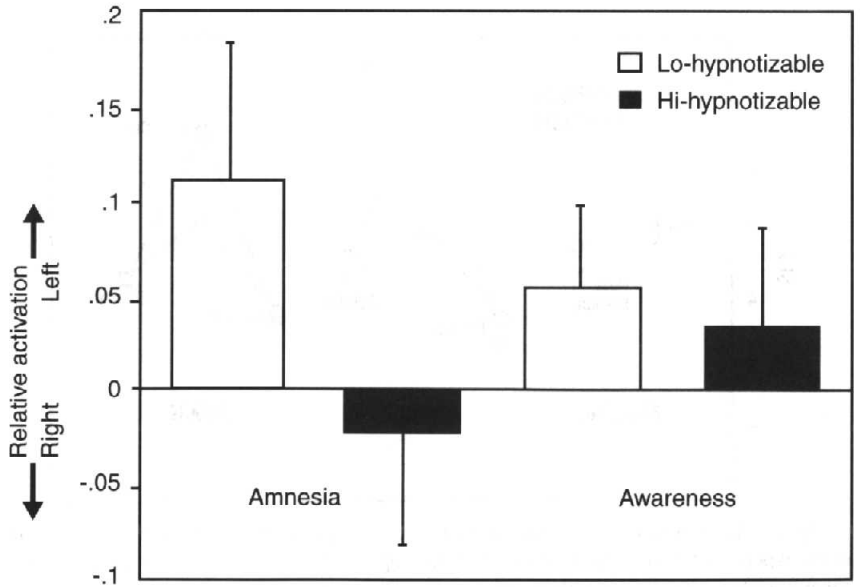

Fig. 3. Mean relative electroencephologram alpha activation in right and left parietal lobes.

(ANCOVA), with Post-Hook-up SUA levels as the covariate and with Treatment and Pre–Post cue scores as the repeated measures. Figure 4 portrays this elegant set of data arrayed by the two hypnosis groups each separately for their Amnesia and Aware conditions. We see that their initial baselines are nearly identical, as are their Pre-Cue low levels of arousal. The arousal cue has a clear effect across the board—everyone showed some degree of arousal ($F(1, 16) = 49.3, p < .0001$). However, the arousal for the HI-HYP subjects was greater ("very aroused") than for the LO-HYP group ("moderately aroused"), ($F(1, 16) = 8.2, p < .01$). Arousal ratings were highest when HI-HYP subjects experienced the Amnesia condition compared to their reactions when in the Aware condition ($t(8) = 2.7, p < .03$). A near significant triple interaction with $p < .07$ (Hypnotic Level × Treatment × Pre–Post Arousal Cue) confirms what can be seen in Figure 4, arousal was greatest when hypnotizable subjects were experiencing Amnesia. It is also important to point out that these differences between the Amnesia and Aware conditions in self-reported arousal were highly correlated with similar differences in both HR change scores ($r(18) = .54, p < .02$), and also with RR change scores ($r(14) = .71, p < .005$). Thus, as expected, both systems were responding comparably to our manipulation.

Two final comments about the SUA ratings deserve passing mention. One index of the effectiveness of our debriefing procedure is shown by the substantial decline in arousal in all conditions back down to, or even below, the initial, normal level of arousal that students brought into this experiment. The power of the hypnotic arousal induction can also be gauged by the HR increases in some subjects by as much as 20 beats per minute in a short interval, with SUA ratings reaching as high as the scale maximum.

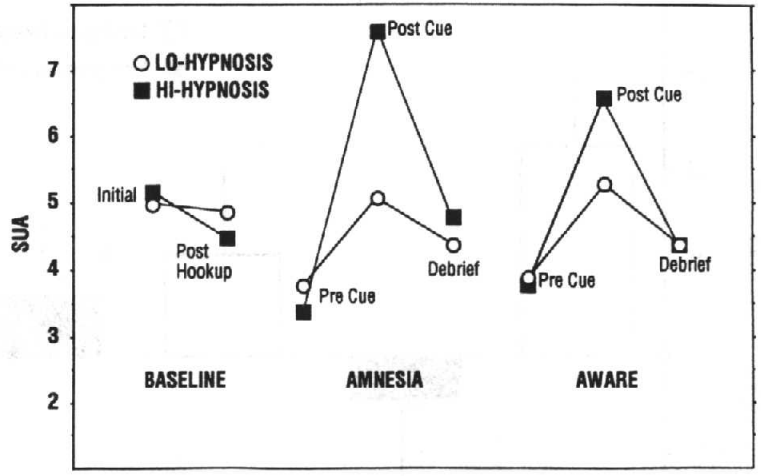

Fig. 4. Mean subjective arousal (SUA) ratings by experimental condition over the course of the experiment. (From Zimbardo et al., 1993. Copyright © 1993 by the American Psychological Association. Reprinted with permission.)

From these arousal measures we do not get a sense of the hedonic quality of the experience; for that report we must turn to our mood measures. They show us that induced unexplained arousal not only has clear psychophysiological effects, but it has a predictable impact on mood states, as shown in Table IV. This effect is not experienced as an hedonically neutral, generalized activation, but rather is manifested as a syndrome of negatively valenced affects. Those subjects in the Discontinuity condition (HI-HYP + Amnesia), showed significant elevations in their degree of Negative Arousal ($t(8) = 2.79, p < .02$); Confusion ($t(8) = 2.90, p < .02$); Anger ($t(8) = 2.45, p < .04$); and a trend in the predicted direction for Depression ($t(8) = 2.00, p < .08$). Paired t-tests revealed no significant differences in the mood states of LO-HYP Subjects in the Amnesia compared to the Aware conditions. Main effects of hypnotizability were obtained for Negative Arousal ($F(1, 16) = 4.4, p < .05$), and for Anger ($F(1, 16) = 4.5, p < .05$). There was also a main effect of condition on several of the scales, with the mood ratings in the Amnesia condition being consistently higher than when the same subjects were in the Aware condition

TABLE IV
MOOD STATE SCORES: MEANS (AND SDs) BY CONDITION AND GROUP[a]

	Awareness condition[b]		Amnesia condition	
	LO-HYP	HI-HYP	LO-HYP	HI-HYP
Negative arousal (tense, restless, nervous, anxious, on edge)	1.51 (.81)	2.20 (1.06)	1.62 (.92)	2.73 (.99)
Vigor (lively, energetic, active, vigorous, alert)	1.82 (.80)	2.20 (.72)	1.96 (.65)	2.60 (.62)
Confusion (forgetful, muddled, bewildered, confused, uncertain)	.89 (.67)	1.07 (1.00)	1.09 (.76)	1.91 (1.18)
Anger (grouchy, annoyed, resentful, rebellious, angry)	.24 (.26)	.89 (1.09)	.44 (.46)	1.53 (1.37)
Depression (unhappy, blue, miserable, sad, discouraged)	.27 (.25)	.69 (.81)	.47 (.49)	1.09 (1.21)
Fatigue (exhausted, fatigued, listless, worn out, sluggish)	1.09 (.71)	1.58 (.81)	1.11 (.74)	1.71 (.87)

[a] From Zimbardo et al., 1993. Copyright © 1993 by the American Psychological Association. Reprinted with permission.
[b] LO-HYP, low hypnotizability; HI-HYP, high-hypnotizability.

(Negative Arousal: $F(1, 16) = 6.7$, $p < .02$; Confusion: $F(1, 16) = 9.4$, $p < .008$; Anger: $F(1,16) = 9.9$, $p < .006$; and Depression: $F(1,16) = 6.1$, $p < .03$).

Attributions for the arousal were obtained indirectly by means of the sentence-completion test and qualitative analysis of the subjects' answers. The apparent differences in the general cognitive-emotional state of HIHYP Ss when they were in the Amnesia versus the Aware condition, and the lack of such differences in the responses of LO-HYP subjects across the two manipulated conditions (which were essentially the same) were tested by having independent judges predict from which experimental condition each response came. They were able to do so to a significant degree (binomial test, $p = .009$) for the HI-HYP subjects, but not for the LOHYP group ($p = .30$). Consider next the different interpretations given by the same highly hypnotizable subjects when they were aware or had amnesia for their arousal as shown in this sample of reactions to the stem, "I feel the way I do right now because . . ."

S1 (AMN): I've been running and I'm trying to relax.
(AWR): I'm following hypnotic suggestion.
S11 (AWR): He told me to do it, I think.
(AMN): I don't know why—I think something is happening.
S14 (AMN): 'Cause I'm nervous.
(AWR): I'm in an experiment.
S15 (AMN): Because she lied (he reported discovering his girlfriend was unfaithful).
(AWR): I'm wired to a machine.
S19 (AWR): The EEG cap on my head is too tight.
(AMN): Exams are coming up; I'm stressed.

This overall pattern of results (despite the relatively small sample size) is in line with the theoretical predictions from Discontinuity Theory. Creating discontinuity experimentally by means of unexplained arousal triggers a range of significant and dramatic effects on emotions, cognitions, and physiological functioning. Furthermore, these results show that the effects of unexplained arousal can be assessed at both autonomic and psychological levels. These effects were not only statistically significant, but were large enough in an absolute sense to represent dramatic increases in arousal intensity that were enduring over the course of the study and even personally disturbing to some of the subjects. The lack of an immediate and situationally appropriate explanation for their sudden arousal clearly heightened the generalized arousal being experienced by our hypnotizable-amnesic subjects.

Our findings also show that unexplained general arousal is a personally experienced discontinuity that is perceived as hedonically negative arousal, and as "aversive" in the moods it invokes. Those feelings are characterized by the research participants' self-reports as being angry, grouchy, annoyed,

resentful, rebellious, unfriendly, anxious, nervous, tense, and restless. I think it is this negative affective state that motivates a search for an appropriate causal explanation, one biased in the direction of selectively noticing or recalling cues that support a negative interpretation of the anomalous experience. Of further interest to the study of emotion was the complex of multiple negative affect states created by our somatic arousal with amnesia. We are reminded here of Polivy's *(1981)* demonstrations of several affects resulting from experimental attempts to induce one particular emotion. Her anger manipulations created not only hostility, but also high levels of correlated anxiety and depression—comparable to the pattern observed in our data reported above.

It should also be apparent that the obtained pattern of results cannot be attributed to experimental "demand characteristics" in which subjects simply give us back what we had instructed them to experience in our suggestions, or were elicited because of implicit communication between subject and experimenter. The pattern of psychophysiological responses shown by the highly hypnotizable subjects who experienced unexplained arousal goes well beyond the specifics of the suggestions they were given (merely HR and RR increases). Moreover, the taped instructions and all treatment of the subjects were identical for the high and low hypnotizable subjects throughout the experiment by the experimental assistant who was blind to their condition. This was equally true of the identical treatment of those in the amnesia and aware conditions, with the sole exception of the taped posthypnotic suggestion to be forgetful or knowledgeable of the source of the arousal. With this encouraging study deposited in the data bank, we move to consider the next, larger experiment, some of whose assets have not been reported previously to the authorities.

E. MULTIPLE PATHWAYS TO PARANOIA

The first of our studies to focus explicitly on inducing psychopathological reactions in normal individuals was conducted with Susan Andersen and Loren Kabat (Zimbardo, Andersen, & Kabat, 1981). Here I summarize the highlights of that study and add a treatment and additional features of the methodology and results that were not reported in the original article (see Zimbardo & Andersen, 1999). They were tangential to the limited focus of that brief report, but are central to the thesis being advanced in this chapter.

Recall Old Joe on the pharmacy line "going ballistic" when he misconstrued his inability to hear the nurse's kind comments to him as her indifference and possibly prejudice toward him? His partial deafness created a

perceptual disorder, which must have made his world confusing at times, and which could be resolved by developing causal attributions about other people acting malevolently toward him. It could be argued that he correctly reasoned (about social agents acting hostile toward him) from an initially false perception (being unaware that his hearing disorder was organic) given the confirmatory evidence he was able to uncover in his social setting. That line of reasoning may generate beliefs that qualify as paranoid delusions when they are held with conviction despite contrary evidence (Cameron, 1943). Such a view about the etiology of delusional thinking has been persuasively argued by Brendan Maher (1974a,b; Maher & Ross, 1984). His analysis is supported by clinical observations that paranoid reactions are often seen among the elderly when their hearing loss is gradual, thus they may be unaware of it as the source of perceptual anomalies (Cooper, 1976; Cooper & Curry, 1976; Cooper, Kay, Garside, & Roth, 1974; Post, 1966, and others).

As I mentioned earlier, of all mental disorders, paranoia should be of most interest to social psychologists. It involves real or imagined transactions between people, as well as fascinating self-attention and social perception-cognition processes (Butler, 1993). Moreover, much of paranoid thinking is characteristic of everyday thought (Artiss & Bullard, 1966; Fenigstein & Vanable, 1992).

Consider this scenario. If you could not hear what people were saying because they seemed to be whispering, and they denied that they were when confronted, it would be reasonable to conclude that they were lying or covering up something. When challenged, they would react with confusion, possibly anger, that could escalate into a hostile interaction. Observers, unaware of the hearing disorder, judge the hard-of-hearing person's actions as bizarre and as evidence that a "dangerous" thought disorder exists. Their interpretation, though false, constitutes a sufficient basis for excluding the person from their company. Perceiving signs of being socially excluded is a new source of ambiguity and confusion for that person, to which he or she responds with hostility and ideation of a now "obvious" conspiratorial threat (Lemert, 1962). Becoming isolated, the person loses opportunities for corrective social feedback, and any delusions of persecution become self-validating in a closed, autistic system. Thus, a once-normal person may spiral down this path to paranoid pathology.

Our research was designed to broaden the analytical focus of these earlier correlational and conceptual studies in several ways. First, we put the concept of perceptual anomaly (deafness without awareness) within the larger generic category of discontinuity. That led us to consider other paths to paranoia, such as that which might be based on a somatic anomaly of unexplained arousal, coupled with a socially focused biased search frame.

Second, we eliminated obvious alternative explanations based on biological aspects of the elderly with hearing deficits, because we studied young, healthy individuals as our subjects. Third, we experimentally created in the laboratory the conditions believed to play a causal role in the etiology of some forms of paranoia.

The purpose of this study was to demonstrate that it is possible to initiate paranoid thoughts and feelings in young, healthy, normal subjects by inducing either of two types of discontinuity, unexplained deafness or unexplained arousal, under certain conditions. One condition was to create a context for socially focused misattributions by having several others present and interacting in ways that could be interpreted as excluding the subject, or even making fun of him. The second condition was to add the social-focus explanatory search frame to the unexplained arousal manipulation.

We predicted that both experimental treatments of discontinuity would give rise to significant elevations in paranoid thinking as measured by standard and specially devised measures, as well as in self-ratings and judges' ratings of the subjects' actions and feelings. The subjects' reactions were compared with two control groups, one of explained deafness, and another for the effects of following posthypnotic suggestions. We did not make differential predictions about the ways the two experimental groups would respond on our various dependent measures.

There were some special features of this study's methodology (in addition to those common elements described in the earlier Overview) that deserve mention.

The 24 highly hypnotizable male students who participated in the training and testing phases of this study were randomly assigned to four treatments: Unexplained Deafness; Explained Deafness Control; Unexplained Arousal (with Social Bias), and a Posthypnotic Suggestion Control group. Amnesia was assessed and validated for all subjects both on the Harvard Group Scale of Hypnotizability and in individual assessment on the Stanford Scale, Form C. During hypnosis training, those assigned to the partial hearing loss conditions demonstrated their ability to experience hearing impairment by failing to repeat five or more of eight standard tape-presented phrases. The last item of subject selection was establishing their normal range of functioning on several scales of the MMPI (Dahlstrom, Welsh, & Dahlstrom, 1975) and on our medical evaluation form.

The paradigm used in this study was one in which individual subjects were led to believe we were studying creativity and problem solving of individuals and teams under varied hypnotic conditions, but they were unaware that the two others in the group were confederates. In phase one, the hypnotic induction of treatments, when the subject arrived at the laboratory, another "subject" was already there and the second confederate

joined them soon after, and all three participants were given hypnotic relaxation suggestions—to establish their comparable status. Next, they were told that they would be listening to special music to deepen their relaxation state, and would each go to separate listening rooms equipped with hi-fi stereo headsets. The real subjects then heard tape-recorded music followed by a tape of one of the four treatments, pre-selected by the research assistant (so all other researchers and confederates were ignorant of their condition).

The discontinuity-induced post hypnotic suggestions for all conditions used the same triggering cue: "When you see the word `Focus' projected on the screen in the next room, and only in that room . . ."

1. Unexplained Arousal (Social Bias): Subjects were given our standard suggestions for that cue to induce increases in heart rate and respiration with amnesia for their source, to which were added, "You might find that what you are experiencing has something to do with other people."

2. Unexplained Deafness: Their instructions continued, "That will be a signal to you that your environment has changed so that sounds are reduced, making room noises and what other people are saying very low. It will thus be very difficult to understand what other people are saying because it will seem as if they are talking so low as to be nearly inaudible. You will be concerned by the fact that others appear to be talking so low you can't hear them well, as if they were whispering." Source amnesia was then suggested.

3. Explained Deafness Control: These subjects were treated identically to the Unexplained Deafness condition, but were explicitly told that they were aware of the suggested source of their experience of partial deafness. Those in both deafness conditions were also told that their hearing would return to its usual level as soon as the experimenter touched their shoulder, and then they would be able to understand perfectly what others are saying.

4. *Posthypnotic Control:* Their instructions continued, "You will begin to experience a change in you. Your left earlobe will begin to feel very itchy, and will continue to itch until you scratch it. You will feel compelled to scratch it. As soon as you do, you will feel fine again. You will not remember having been given this suggestion until the experimenter touches your shoulder. Then you will remember everything. You will not remember this suggestion until then."

This hypnosis control was included to assess whether some dynamic quality of carrying out a posthypnotic suggestion with amnesia might be sufficient to generate the predicted results. Data from the pair of control groups also help to rule out experimental demand characteristics (they were treated identically throughout the experiment and confederates and researchers were blind to conditions), subject selection traits (they were equally hypnotizable and amnesic), and context features that might facilitate irrational reactions (they were the same).

In phase two of the experiment, the subject entered the familiar large laboratory room, (where hypnosis training sessions had been held), taking the empty seat near the two confederates who were sitting closer to each other. The experimenter gave a cover story about creativity, problem solving, and hypnosis, explained that all task instructions and most stimulus materials would be projected on the screen, there would be an initial problem-solving task (10 anagrams) during which they should decide to work alone or to collaborate on the next task of analyzing a picture (TAT card), after which there was a second creativity task to be done alone, followed by final reactions of each of them, also to be done separately in adjacent rooms. Seeming to check out the projector before leaving, the experimenter activated the first slide, "Focus," the posthypnotic cue. As the subject started working on the anagram task, the confederates engaged in a well-rehearsed, standard interaction. Their dialogue was designed to emphasize an alliance or comraderie as they recalled having met at a party, laughed at an incident mentioned, made funny faces, and eventually decided aloud to work together on the next task. Their verbal exchange and mannerisms were also an occasion for misunderstanding by subjects in the experimental conditions. Before turning to the anagram task, one of them casually asked the subject if he wanted to work with them on the next task and recorded any answer unobtrusively, as a measure of desire to affiliate. During the session, the confederates asked the subject three other questions, and they and a pair of observing judges (behind a two-way mirror) recorded the answers, if any. After completing the various timed tasks, subjects were instructed to return to their relaxation music listening rooms for the next part of the study. That gave the confederates the opportunity to immediately and independently give their reactions to the subject on a series of mood adjectives (which were averaged in the data presentation in Table V; their inter-rated reliability across all these measures was $r = .57$).

Subjects' behavior, thoughts, and feelings were assessed on the following dependent measures: number of correct anagram solutions; content analysis of "creative" stories written alone to the TAT picture; their self-assessed creativity on this task; the Multiple Affect Adjective Checklist (MAACL) (Zuckerman & Lubin, 1965), ratings on a series of self-descriptive adjectives; and the short form of the MMPI administered earlier in selection. On that form, subjects rated themselves on 207 items representing scales measuring Paranoia, Suspiciousness, and Grandiosity, as well as on two scales on which we did not expect to find treatment differences, Schizophrenia, and Preliminary Hypochondriasis. Indeed, no differences were found on those two measures. In addition, they also completed the Paranoia

TABLE V

MEANS ON A VARIETY OF MEASURES DISTINGUISHING EXPERIMENTAL FROM CONTROL GROUPS

Dependent measures	Treatment: Experimental — Unexplained arousal, social bias (n = 6)	Experimental — Unexplained deafness (n = 6)	Control — Explained deafness (n = 6)	Control — Posthypnotic suggestion (itching ear) (n = 6)	F	t-value[a]
Paranoia measures[b]						
Paranoia clinical interview form	.33	.30	−.09	−.28	7.48***	4.63****
MMPI-Paranoia	2.33	1.50	.33	−.17	1.72	2.13**
MMPI-Suspicion	2.83	1.00	.00	.67	1.73	1.71*
MMPI-Grandiosity	−.83	1.33	−.83	−1.00	1.63	1.00
MAACL-Hostility	5.33	11.00	2.40	5.17	3.00	3.12****
Thematic Apperception Test						
Affective evaluation	75.00	83.35	16.55	33.50	3.68*	3.23****
Self-assessed creativity	67.50	42.83	68.33	73.33	4.66*	2.47**
Anagrams						
Number correct	2.67	3.00	4.17	4.83	1.19	1.87**
Affiliation (%)						
During experiment	17	17	50	100	8.22[c]***	3.55***
Volunteered for future	17	0	50	67	6.75[c]***	2.36***
Self-rated feelings						
Creative	54.17	34.17	55.83	65.83	1.72	−1.65*
Distracted	74.33	60.83	41.67	19.17	3.81*	3.02****
Confused	55.00	73.33	39.17	35.00	2.17	−1.65*
Relaxed	27.17	43.33	81.67	78.33	7.56***	4.61****
Agitated	74.33	73.33	14.17	15.33	22.72****	8.25****
Irritated	55.83	70.00	25.00	7.00	10.61****	5.34****
Friendly	33.83	26.67	53.33	56.67	2.16	2.48**
Hostile	56.83	38.33	13.33	13.33	3.83*	−3.16****
Happy	74.33	45.83	51.67	65.00	1.25	−1.61*
Judges' ratings						
Confused	33.00	40.83	27.08	17.67	.77	1.31
Relaxed	36.67	34.17	54.59	65.42	3.06	−2.89****
Agitated	38.17	51.25	24.59	13.75	2.62	2.54***
Irritated	28.50	45.84	18.92	11.25	2.75	2.46**
Friendly	35.50	23.34	48.34	65.00	4.87*	−3.39****
Hostile	8.00	18.75	5.00	1.67	2.00	1.92**
Happy	33.34	21.25	40.00	56.25	3.75**	−2.76***

[a] All t-tests are one-tailed and derived using a single planned comparison (Hays, 1965, p. 465).

[b] Reported paranoia means represent difference scores (post minus pre). MMPI, Minnesota Multiphasic Personality Inventory; MAACL, Multiple Affect Adjective Checklist.

[c] Chi square comparisons, experimental versus control groups.

* $p < 10$, ** $p < .05$, *** $p < .01$, **** $p < .005$

Clinical Interview Form, a specially designed instrument for this study that contained 15 declarative self-descriptive statements adapted from a British clinical study of paranoia in hard-of-hearing persons (Kay, Cooper, Garside, & Roth, 1976). All subjects went through an elaborate debriefing expertly administered by Susan Andersen (see Ethics section for details). All those showing strong reactions during the study were contacted the next day for reassurance, and again a month later when we readministered the relevant MMPI paranoia scales and the Paranoia Clinical Interview Form. As we expected, and I am pleased to report, every subject's scores returned to their normal, nonparanoid, pretest values.

1. Results and Discussion

The manipulations appeared to have worked as intended. The Unexplained Arousal subjects were significantly more agitated ($p < .001$) and less relaxed ($p < .005$) than the Controls, but equal to those in the Unexplained Deafness condition (See Table V). All those in the two deafness conditions informally reported difficulties in hearing the other subjects (confederates) during the experiment, felt their hearing was not "keen" on the final postexperimental rating (mean of 21 compared to 78 for the two nondeafness conditions, $p < .001$), and they answered fewer of the four questions posed by the confederates during the experiment than did the other subjects (averages of 1.4 versus 3.8, respectively, $p < .001$). All those in the Itching-ear, posthypnotic control condition scratched their left ears, as noted by both observers, and all of them also reported that they had experienced an itching sensation in their left earlobe. Finally, variations in the amnesia manipulation led all six subjects in the Deafness Explained condition to report (during debriefing) being fully aware of why they were having hearing difficulties, while none of the other 18 subjects reported any memory for that suggestion.

Table V summarizes the primary results for most of our measures. As predicted, experiencing a discontinuity, either perceptual or visceral, with amnesia for its source, produced significant changes in cognitive, emotional, and behavioral functioning. Those in the two discontinuity conditions became more paranoid as shown in a number of ways. Most directly, they showed significant elevations on the Paranoia Scale of the MMPI ($p < .05$) and on the clinically derived paranoia interview form ($p < .001$), and they showed marginally greater scores on the MMPI Suspiciousness scale ($p < .10$), one aspect of paranoid thinking. It is instructive to consider the total lack of face validity in the content of some items on the MMPI Paranoia Scale where discontinuity subjects changed in the paranoid direction from pre- to posttesting, while the controls did not: "If I were a reporter I would

very much like to report news of the theater"; "I have had no difficulty in starting or holding my bowel movements," and "I would like to wear expensive clothes." Something deeper than experimenter expectancy biases or subjects wanting to please the experimenter appears to be operating here.

Another aspect of paranoia is feelings of hostility that experimental subjects displayed at significantly higher levels on the MAACL than did controls ($p < .01$)—notably the enormously high hostility level expressed by the Unexplained Deafness subjects. That finding, when coupled with the absence of differences on other MAACL scales of anxiety and depression, supports the notion that these discontinuity inductions evoked specific affective responses considered most representative of preliminary stages of paranoid thinking (see Beck, 1974).

There were also a number of indicators of the social interplay between the negative feelings and actions of the experimental subjects and the reactions to them of the confederates, which contribute to the process of developing paranoid thinking and the labeling of someone as paranoid. The subjects were highly and significantly agitated, irritated, hostile, and distracted, while feeling neither friendly nor relaxed. The confederates responded to them in kind, perceiving the discontinuity subjects as agitated, irritated, hostile, unfriendly, and not relaxed or happy, all significantly more so than in their judgments of the control subjects. The restricted sense of social involvement accompanying paranoid reactions is seen in the low percentage of experimental subjects who chose to work together with the confederates on the TAT (where collaboration was expected to improve performance, according to the experimenter's depiction). Only 17% chose to affiliate on this task compared to 75% in the control conditions (X^2 (1) = 8.22, $p < .01$). When invited to participate in a future study with the same partners (the confederates), the majority of controls accepted (58%), while the majority of the experimentals declined (92%) (X^2 (1) = 6.75, $p < .01$).

The agitated-distracted state of the experimental subjects took its toll on cognitive processing required in the anagram task, where they solved significantly fewer anagrams than the controls ($p < .05$). They also felt that they were not as creative on the TAT task as did the controls ($p < .05$). However, one aspect of their TAT performance provides a subtle, indirect assessment of paranoid thinking that I especially like. All TAT stories were rated blind and independently by two student judges on a number of a priori dimensions (exact agreement of 83%). One such dimension was the degree to which they were "evaluative," both positively and negatively, regarding the actors in their stories. One hallmark of paranoia is the confident assessment and evaluation of other people, even in ambiguous behavioral situations, and this was exactly what our discontinuity subjects revealed. Their scores on this measure of affective evaluation of the TAT

actors were more than three times greater than those of the controls ($p < .005$).

Despite the overall similarity in the reactions of the two discontinuity conditions that took different paths to the common end-point of paranoia, there are several discrepancies to note in passing. I do so only for their provocative value in stimulating further, more process-oriented research on alternative dynamics in the creation of paranoia. The induction of paranoid reactions by means of unexplained deafness compared to unexplained arousal was marked by somewhat greater grandiosity, but less suspicion, much higher hostility, but lower feelings of creativity. Those experiencing unexplained arousal provided a paradoxical portrait of being least relaxed, most hostile, and yet most happy of any of the student-subjects (a high mean of 74 on a 100-point scale). The confederates did not pick up on their feelings of hostility (rating the unexplained deafness subjects higher, as they also did for agitation and irritation). Perhaps their negative feelings were masked by a show of happiness, which the confederates did judge as being higher among the unexplained arousal subjects than among those in the unexplained deafness condition.

The small sample size in this study constrains enthusiastic generalizations, yet points up the power of our manipulations (and the utility of pre-post, within-subject change scores) to generate so many significant effects that, without exception, support the predictions derived from Discontinuity Theory. It should be apparent that it is the labor-intensive nature of this research that limits sample sizes and not the researchers' lack of industriousness. We turn next to an experiment that expands the pathological consequences of inappropriate resolutions of discontinuities beyond paranoia to phobias, hypochrondriacal mental disorders, and more.

F. BIASED SEARCH FRAMES CREATE PREDICTABLE DIAGNOSTIC PATHOLOGIES

This study (Zimbardo & Piccione, 1999) explored the relationship between particular explanatory search frames and specific types of pathology that might result from relying on them to account for the experience of sudden somatic arousal without awareness of the cause of this discontinuity. We extended our basic paradigm to include the posthypnotic induction of three different biased search frames superimposed on the unexplained arousal manipulation: People, Environment, Body or Health. A host of reactions of these subjects were compared with those in two control conditions; explained and unexplained arousal, without any induced search frames. We assessed emotional, cognitive, perceptual, communicative, and

search behaviors by means of standard scales, projective tests, self-reports, observer ratings, and content analyses. In addition, videotape segments of interviews with the subjects were evaluated by clinical psychologists on a number of dimensions, most importantly, evidence of deficiencies in interpersonal functioning, pathology, and specific *DSM-III* diagnoses. We predicted the following:

1. All groups would show evidence of arousal.
2. The hedonic quality of that arousal would be largely negative.
3. Those given the Environment-search bias would show evidence of visually searching the laboratory environment, create misattributions based on physical features of the current behavioral setting, and be high on the MMPI Phobia scale.
4. Those given the Body/Health-search bias would show evidence of searching their bodies, create misattributions based on aspects of bodily functioning and health status, and be high on the MMPI Hypochondriasis scale.
5. Those given the People-search frame should create people-based misattributions, show emotional-cognitive signs of envy, jealousy, anger, suspicion, and vindictiveness, give more Rorschach human anatomy responses and more rejection responses to the Rorschach (an index of pathology), and also be high on the MMPI Paranoia scale.

We also expected that judgments by clinical raters would reveal evidence of symptomatic behaviors congruent with each of these explanatory biases. Finally, we were simply curious about the extent of "pathology" that these trained observers would find among our "normal" sample of college student-subjects.

The participants were 50 highly hypnotizable-amnesic students (of both sexes) from an Stanford Introductory Psychology class. They were randomly assigned to one of the five conditions described above, after having successfully completed several hypnosis-training sessions. Excluded from this sample were all students who were above the average on the Manifest Anxiety Scale, had reported any current medical or psychological problem, or did not pass several amnesia tests during the training sessions.

One special form of preparation for the current study included having all the subjects-in-training read a letter describing a posthypnotic arousal cue that would make them feel euphoric and happy, but they would not remember the suggestion, and might find that this unusual feeling had something to do with their past. The components of this letter parallel a letter they all would receive later during the study, some suggestions for the unexplained or explained arousal, and search biases. This procedure helped to determine the effectiveness of the manipulation, while also giving

subjects a specific positive association with the laboratory in which they would later be tested.

The guise of "a study of creative problem solving under varied conditions of hypnosis" enabled us to administer a series of projective tests and tasks to the subjects, after they had been deeply hypnotized and given the post-hypnotic suggestions. These standardized taped instructions were delivered through earphones, and at the point where the subject opened her or his eyes, the first experimenter handed over a personal letter to be read silently while simultaneously listening to its contents. The letter specified the terms of each of the five conditions. Since the letters and appropriate tapes were randomly selected by an assistant, the experimenter, as well as the second experimenter who conducted the debriefing, were blind to treatments. The somatic arousal suggestion was again for heart rate and respiration to increase on cue, but this study included a third arousal component of muscles becoming tight.

In the Explained Arousal condition, subjects were told they would remember having read and heard this letter, while the No Bias Arousal subjects were informed that they would not remember these suggestions. But they, like the three biased groups, were told, "that it is important that you try to figure out the reason why you are feeling these reactions." Those in the biased conditions were given the added suggestion that, "they might find that the explanation for what you are feeling has something to do with the physical environment" (Environment-Bias); "your body or health" (Body-Bias); "people" (People-Bias).

The experiment was conducted in the same large room where hypnosis training had taken, subjects were in self-reported good health and mood at the start of the session, and they were alone during the procedure since all instructions and test materials were presented by an automated slide projector. Thus there were no obvious negative aspects of this behavioral context that could serve as a ready attributional focus for any of the three search biases.

After writing a story to a TAT card for 3 min, a buzzer sounded the posthypnotic signal. After a 1-min interval (for the arousal to start and be noticed), subjects completed the MAACL, a set of 10 Group Rorschach cards (Harrower & Steiner, 1951), and three scales from the MMPI: Phobia (PHO, Wiggins, 1966), Hypochondriasis (Hs', Welsh, 1948, and Simple Paranoia (Pa-S, Wiener & Harmon, 1946). After writing one more TAT story, they completed a personal reactions inventory that asked about their current feelings, and reasons for what they were experiencing. The second experimenter then conducted a semistructured interview (for 10 to 15 min), asking subjects to elaborate and clarify those thoughts and feelings. Whenever subjects generated an explanation that fit one of the three biases, the interviewer challenged it by inviting them to consider other possibilities from the other two categories. A lengthy debriefing followed, and no subject left the experiment until the clinical psychologist (Piccione) felt assured that there was no evidence of symptomatic behavior. Subjects who had reacted strongly during the experiment were contacted the next day to treat any negative carry-overs (there were none), and all subjects were contacted again in a 1-year follow-up (the results of which are described in the Ethics section). The entire procedure was videotaped and parts of it were analyzed by raters who were ignorant of the hypotheses. Pairs of observers also rated subjects' search behaviors as they were directly observed from behind a special one-way window.

The last feature of this study, and perhaps its most important one, involved having ten clinical psychology interns from local Veterans Administration Hospitals review the videotapes of the final interviews between subjects and experimenters (prior to debriefing). Each pair of them viewed 10 of the 50 edited tapes (roughly equivalent lengths with the sequence of conditions randomly arranged). Each clinical intern separately provided a series of ratings and evaluations on a Clinical Observation Form that invited them to identify any students who should not be allowed to continue to participate in a second study on stress and its management. While carrying out this primary task (and ignorant of the experimental context of the interviews), they were also asked to note or rate the information category the subject predominately provided to the interviewer (our three biases plus several others); the subject's personal and interpersonal reaction styles (11-point scales on eight dimensions, such as sadistic-friendly, phobic-curious); individuals who seemed most "normal" and most "pathological," and finally, if justified, to give a *DSM-III* diagnosis of any student whose symptoms merited such a clinical judgment. (The interns participated at the encouragement of their supervisors, were given a fee for their services, and a lecture later about Discontinuity Theory, this experiment, and their collective results.)

1. Results and Discussion

Obviously this study generated a huge amount of data, only some of which can be reported briefly within the already overtaxed constraints of this chapter. I'll start with the good news that all of our predictions were supported, with two exceptions to be described.

The majority of subjects (70%) rated their experience as negative, 24% as a mix of negative and positive, and only 6% evaluated their arousal positively. Thus for 94% of the subjects this hypnotically induced arousal was interpreted as either totally negative or mixed. It was most clearly

negative for those in the People-Bias condition (90%, 10% mixed)—a powerfully negative reaction among these subjects that will resurface across many of the measures. The observational data offer another index of subjects' general distress and tension. Of the average number of 31 identifiable coded reactions per group (range: 27–36), fully 74% were of tension and emotional and behavioral signs of distress, whereas only .05% were of positive reactions, with the remainder being searching the environment, one's body, or other reactions.

A factor analysis of subjective mood appraisal on the MAACL generated five factors (principal components), on which only People-Bias subjects showed significant trends toward being least Positive, least Relaxed, and most Negative-Situationally, with no effects for Challenging or Negative-Personal. On specific adjectives, the People-Bias subjects were highest on Envy ($p = .05$), Guilty ($p = .09$), Angry ($p = .09$), and lowest on Friendly ($p = .08$), with no other clear trends. On composite scales, the People-Bias subjects were again highest on Disgust (Disgusted, Scornful, Contempt, Resentful, Envious) of any group ($p < .10$), lowest on Happiness (Amused, Elated, Excited, Thrilled, Happy, Contented) ($p < .05$), and Calm ($p < .10$). The only other effects of note were for the Body-Bias to be most Nervous ($p < .10$), and the No Bias group to be most Interested (Interested, Challenged, Expectant) ($p < .05$).

The rest of the data will be presented in terms of the predicted effects for each of the three biased conditions rather than by individual measures. Starting with subjects given the **Environment-Bias,** we found as expected, that they searched the experimental environment significantly more than any other group ($p < .005$) by looking around, touching things, checking out the equipment. Their mean of 4.2 was nearly twice as high as that of any other condition, which were comparably low. The reasons they gave (on the postexperimental questionnaire) for their unusual feelings were coded into 12 subcategories related to the environment, with 80% of these subjects resorting primarily to environment-based explanations. Ratings by the clinical judges of the nature of the information communicated during the interview phase of the study, again show that the majority (55%) of what these subjects said was related to the environment, as seen in Table VI. But it is the quality of their misattributions that is more important than that they simply followed the posthypnotic suggestion appropriately. Consider some of their causal explanations: "I really think that the fumes of the projector kind of made me sick . . . the ink fumes . . . not the ink fumes . . . maybe it was just the warm air"; "Well, I was feeling kind of claustrophobic . . . I was [seated] in a corner and stuff"; "Maybe from being alone, in a room alone"; "It was the heat of the projector blowing on me . . . that really bugged me. . . Well, I think it might have been that

TABLE VI
CATEGORICAL INFORMATION BIAS: CLINICAL JUDGES' RATINGS OF BIAS IN SUBJECTS' COMMUNICATED INFORMATION

	Experimental conditions				
Category[a]	Body	People	Environment	No bias	Explained
Body	77*	24	35	45	40
People	08	62*	05	25	30
Environment	04	03	55*	20	15
Other	11	11	05	10	15

[a] Percentage of "category of information predominantly presented."
* Predicted highest percentage.

camera actually." Others said their aroused state might be due to the uncomfortable chair, the stuffiness of the room, the rainy weather, the stimulus materials, or even the shape of the pencil they were given to write their reactions. Two other bits of evidence that mesh nicely are the clinical raters' judgments of phobic symptomatic behavior (see Table VII) and the MMPI data (see Table VIII). Those in the Environment condition were highest on displaying phobic behavior; their mean score is significantly higher than any other condition ($p = .01$). Moreover, their elevated mean

TABLE VII
INTERPERSONAL STYLE WITH INTERVIEWER: CLINICAL JUDGES' RATINGS ON ANCHORED DIMENSIONS[a]

	Experimental conditions				
Dimensions	Body	People	Environment	No Bias	Explained
Hostile versus friendly	.15	.47*	.00	.05	.05
Dominant versus submissive	.23	.10	.05	.15	.25
Mistrusting versus trusting	.08	.60*	.20	.15	.20
Illness versus health bias	.58*	.23	.35	.15	.15
Avoiding versus exploring environment	.15	.40	.45*	.25	.30

[a] Eleven-point scale: For example, −5 = "hostile", 0 = neutral, +5 = "friendly." Ratings are mean number of ratings in negative direction, divided by total ratings.
* Predicted highest value.

TABLE VIII
MEAN SCORES ON MINNESOTA MULTIPHASIC PERSONALITY INVENTORY SUBSCALES BY EXPERIMENTAL CONDITIONS (WITH COMPARATIVE POPULATION MEANS FOR EACH SCALE)

Scale: Hs'	Hypochondria	
	Population Mean:	1.7
Conditions	**Body/health**	2.7
	Environment	1.3
	Explained arousal	1.1
	People	0.9
	No bias	0.8
Scale: PHO	Phobia	
	Population mean	7.3
Conditions	**Environment**	7.4
	Explained arousal	5.7
	No bias	4.9
	People	3.8
	Body/health	3.8
Scale: PA-S	Paranoia-simple	
	Population Mean	5.8
Conditions	**People**	7.5
	No bias	8.1
	Body/health	7.8
	Environment	7.3
	Explained arousal	6.4

score, which resembles the clinical outpatient population mean, is interpreted as "admitting to a number of fears, many of them of the classically phobic variety such as heights, dark, closed spaces, etc." (Wiggins, 1966, p. 13).

The **Body-Bias** subjects did not search their bodies, as we had predicted, any more than did the others. In retrospect this was a naive prediction since the induced action was happening inside their bodies and not externally. However, most (70%) of the reasons they gave for their feelings were in one of nine subcategories related to health or their bodily functioning, among them: not enough sleep, hungry, on a diet, exercised too much, drank coffee, ate something bad, or biological cycle. For example, "My muscles are a bit tense and I have a headache . . . I think it is because of today's early swimming practice . . . or maybe from horseback riding." Or consider these multiple attributions from another subject, "I'm uptight because my summer plans had not been all laid out, and also I'm coming down with a cold . . . I got a really bad headache on the right side. . . . I haven't been getting much sleep because I went to the Formal (dance)." While subjects in all conditions communicated a lot of information during the interview about their bodies since their discontinuity was based on a visceral change of state, Table VI shows that the Body-Bias group spoke about little else, with 77% of their talk in the body category. As expected, their excessive concern about their health led the clinical raters to judge their symptomatic behavior as primarily hypochondriacal (see Table VII). Finally, their MMPI scores reveal them to be not only significantly more hypochondriacal than any other group ($p = .0003$), but even greater than the population comparison mean for the MMPI Hs' scale of hypochondriasis.

The **People-Bias** group is clearly the most fascinating for social psychologists because the manipulation was a powerful catalyst for attributions about the real and imagined social world. Although there were no actual people with them in the laboratory when they became aroused, and they had only positive prior contacts with the experimenters, these subjects "saw" people everywhere, and in very upsetting scenarios—in line with their negative mood state noted before. Nine of the subcategories in their interviews dealt with relationships with other people, which were the dominant explanatory category for 80% of them. Specifically, they felt guilty because they had "killed" the actors in their TAT stories; were sad because of how the TAT actors had died; were depressed by how the TAT actors looked; were upset by the "horrible, violent ending" of the TAT story; were angry at recalling recent confrontations with a boyfriend, roommate, and parents; and were angry at some mean people. One remarkable attribution of extreme jealousy may or may not have actually happened, but is surely unusual in this context: "I feel that I am under heavy stress right now. . . . It's like I remember something about two people I care about, and I am like a third person. . . . I turn around and I see my girlfriend and my brother is swinging my girlfriend around. . . . There should be a reason to be jealous. . . . We broke up 'cos my mom and dad asked me to because they didn't want me to get serious. . . . I still like her a lot . . . and to see her with my brother playing around triggered something." The subjects were also significantly more likely to report seeing human anatomy in the ambiguous Rorschach cards than any other group ($p < .05$), as well as reporting seeing "nothing at all," or rejecting a card, which clinicians regard as an index of pathological responding (7 of 10 subjects gave 24 rejection responses compared to only 3 of 10 in the other bias conditions who gave only 4 rejection responses). Table VI shows that their communication with the experimenter was judged to be primarily about people, whereas Table VII shows that the clinical judges rated their videotaped interaction with the experimenter as reflecting the highest levels of para-

noid, vindictive symptomatic behavior, but also very high degrees of hostile, sadistic symptoms. Curiously, these subjects were also relatively high on hypochondriacal symptoms. Note that among the two controls there was no predominant symptom category as perceived by these judges. The one fly in the otherwise soothing predictive ointment is the failure of our MMPI measure to reveal this paranoid orientation. Examination of Table VIII does show that the mean of the People-Bias subjects of 7.5 is well above the population mean for this PA-S measure, but so are all the others, with the No Bias control highest of all! Resolution of this anomaly comes from our later discovery that we had used the wrong scale, since the Subtle Paranoia Scale has been found to have poor validity with non-psychiatric populations (Wiener, 1947). But we shall see on the final measures provided by our clinicians that somehow imposing a people explanatory search frame on the motivation to understand unexplained arousal transformed the ordinarily normal cognitive and emotional functioning of these college students subjects into pathological realms.

Although the clinical judges saw only a relatively brief behavioral sample of all of our subjects, they decided in 78 of their 100 total judgments (50 subjects $\times$ 2 judges) that a particular student-subject should be allowed to continue onto a second experiment involving stress, and in 22 cases should not be allowed exposure to stress. Next, when asked to select those who would be judged most "normal" and the most "pathological," if any, from their set of 10 subjects, 30% were assigned to the pathology category and 70% to the normal. Finally, and most amazing, was their willingness to offer clinical diagnoses with certainty in a third of the cases, that is *DSM-III* diagnoses of Axis-1 (clinical syndromes) and Axis-2 (Personality Disorders). Diagnostic uncertainty was shown in two-thirds of the cases, where they either gave no diagnosis or deferred/provisional ones. Figure 5 graphs the clinicians' diagnostic evaluations of pathology of our "normal" subject population by the percentage of such ratings in each experimental condition. On this index, scores above 70 (when summed across both raters) reflect greater diagnostic certainty of psychopathology. Set against the low levels in the two control conditions is the increasing level of pathology from Environment-Bias (30%), to Body-Bias (50%), up to the highest level among People-Bias (80%). These differences are highly significant conceptually as well as statistically. The p value for the ANOVA is $<.002$, whereas the contrast of the three experimental groups with the two controls is greater than .0001, and the People-Bias condition is significantly higher than the other experimental conditions ($p < .0001$) or all the other groups ($p < .0001$).

When these results and the entire study were presented to the clinical interns and their supervisors, concern focused on the "symptomatic" evi-

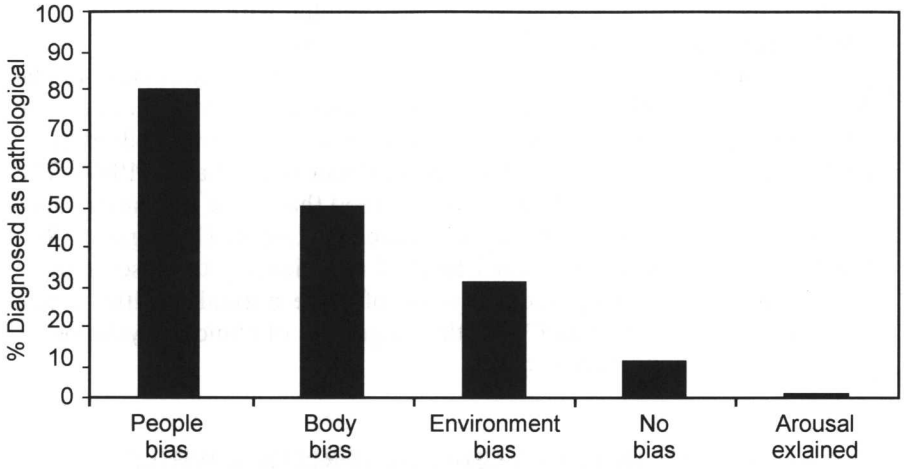

Fig. 5. Percentage of "normal" subjects judged with diagnostic certainty above *DSM-III* pathology criterion.

dence that may have been used to draw these diagnoses of pathology among these ordinarily sane students. Four causal candidates were rigidity, agitation, multiple attributions by the subjects, and the clinicians' expectations. Confidence in making pathology judgments seems to have been greater when interviewees rigidly stuck to a particular reason for being distressed and were unwilling to even consider the alternatives posed by the interviewer; were physically agitated (notably one woman in the People-Bias condition who began banging on the desk while recalling several confrontations); or gave several different attributions in close succession. In addition, because they had expected these college students to be rather normal except for the usual stress of academic pressures, the clinicians may have overreacted to the degree of emotional distress and cognitive confusion they witnessed in many cases. In a sense, our situation was the reverse of the one made famous by my colleague, David Rosenhan (1973), in his classic study of being sane in insane asylums. There the expectation was that anyone in a mental hospital who was not staff, must be crazy. Here the expectation was that anyone in a prestigious university must be smart and well functioning. So when the clinical judges observed someone who was relatively incoherent and dysfunctional, a contrast effect exaggerated the extent to which the evidence supported a pathology judgment. When psychiatrist David Spiegel reviewed some of these same tapes earlier as an ad hoc reviewer for the Stanford Human Subjects Research Committee, he saw many signs of distress in them, but not the level of pathology

reported by these judges. However, he was familiar with the context of the experiment and the reason for the subjects' arousal.

One final bit of data to support the claim of relative normality of the population from which our subjects were drawn comes from data on the general symptom inventory (GSI) given recently to several hundred Stanford Introductory Psychology students (Holman & Zimbardo, 1999). The student mean of .61 is less than—less disturbed than—the nonpatient adolescent norm of .76 on the highly correlated SCL-90-R (Derogatis, 1982, 1983). Nevertheless, in less than 1 hour of experiencing the discontinuity created in this research paradigm, some of these normal, healthy young men and women went "mad"—in the judgments of clinical psychologists and by their own assessments.

G. RULING OUT DEMAND CHARACTERISTICS, WHILE BROADENING THE RANGE OF DIAGNOSTIC EFFECTS

The next study had two aims, the first of which was to establish in a definitive fashion that results found with our hypnosis paradigm could not be explained away by resorting to notions of experimental demand characteristics in which subjects were consciously behaving as we had told them to, or as they imagined they should in order to please us. Instead, I want to argue that the manipulations initiate the predicted central motivational and cognitive processes that in turn generate the obtained outcomes found in the studies reported here. The second aim, and partially related to the first, was to broaden the range of measurable effects of coping with discontinuities by including a new psychophysiological measure—muscle tension—and several new measures diagnostic of emotional distress, cognitive worry, and interpersonal style.

One way to handle the issue of demand characteristics is to incorporate an hypnosis simulator control condition. Low hypnotizable subjects (from the same general student population) are given experimental instructions identical to those for the unexplained arousal subjects, and told to act as if they were hypnotized in carrying out any tasks and answering any scales or questionnaires. They need to be low in hypnotizability because highly hypnotizable subjects might spontaneously enter hypnosis while simulating the state. We expect these simulators to respond comparably to the experimental group they are mimicking when response measures have high face validity and it is obvious how one might react while following posthypnotic suggestions. However, on more subtle, nonobvious response indicators, they should not be able to match the experimental behavior of the unexplained arousal subjects. If so, then our confidence

increases in believing that something more is driving the behavior of the experimental subjects than mere demand characteristics or experimenter expectancies.

After describing the details of the simulator condition, I will outline the procedural features of this study that were rather complex, since its design required repeated assessments across many measures to detect specific changes at discrete phases of the experiment, as well as using a new arrangement in the onset-offset of the arousal manipulation. The low hypnotizable subjects scored only 1 or 2 on the Harvard Group Hypnotizability Scale (Shor & Orne, 1962) compared to 9-11 for the high hypnotizables. Like the highs who met in small groups for hypnosis-enhancement training, the lows met for the same amount of time to view a film on hypnosis that stressed the importance of simulator controls in the scientific investigation of hypnosis, and to listen to me lecture on and lead a discussion on myths, methods, and evidence for hypnotic phenomena. They were also made aware of their low hypnotizability scores. When they arrived at the laboratory, these students were given sealed instructions that read: "You will be instructed to simulate or pretend to be hypnotized during the study; to try to convince an observer that you are indeed hypnotized and following the hypnotic suggestions as are high hypnotizable subjects. They will be given suggestions to enter an hypnotic state and while in that state to experience certain reactions and to complete a series of ratings, scales, and experimental tasks."

The informed consent statement given to all subjects further reinforced this direct comparison between hypnotized and simulating subjects: "You will listen to taped instructions designed to induce a state of hypnosis. You may be given posthypnotic suggestions to act, feel, or think in certain ways. You may be in a condition in which you might react to the hypnotic suggestions by being deeply relaxed, confused, aroused, or distressed for a brief period of time. You might be in a control condition in which you are instructed to simulate, or role-play hypnosis—to act as if you were hypnotized even though you are not."

Throughout the rest of the study, simulators and hypnotizable subjects were treated identically, and research assistants were unaware of the status of any subject. Simulators were later given the same induction letter and heard the same tape (for relaxation, arousal, amnesia, and People-search bias) as did the Unexplained Arousal subjects. The instructions for the Explained Arousal group were the same as described in our previous research.

The reactions of the nine low hypnotizable Simulators (Sim) were compared to twenty high hypnotizable experimentals randomly assigned to conditions of Unexplained Arousal (UA) (n = 11) and Explained Arousal

(EA) (n = 9). We previously assessed the psychological adjustment of these and other potential subjects on the Weinberger Adjustment Inventory (Weinberger & Schwartz, 1990), using only those whose scores were within one SD of the normative mean. Those in the Sim and UA groups were given the suggestion that what they were feeling "might have something to do with people." To demonstrate the arbitrariness of the arousal cue and to examine differential reactions to its presentation sequence by the Sim and UA subjects, it was designed to be activated for the EA subjects when they started an experimental timer, and stopped when they turned it off. But for the other two conditions, stopping the timer was the onset cue that was to be sustained until the end of the experiment.

The subject was placed in a special chamber equipped for psychophysiological recording, and communicated throughout the study by intercom with the experimenter. Sensors were applied to the face to record facial muscle stress at various phases of the study. SUA ratings were recorded at seven different critical points in the procedure, to more closely monitor changes in arousal related to various experiences subjects were having. Two other measures that were each completed three times during the experiment were Plutchik's Emotion Circle (see Plutchik, 1980; Plutchik & Conte, 1997) and the Interpersonal Circle (Wiggins, 1979; Wiggins & Broughton, 1984), each to be described when their data are reported. Emotional reactions were assessed once on the MACL, and also on Endler's (1983) Personal Affect Reactions Questionnaire (PARQ). The PARQ also includes assessment of cognitive worry. Postexperimental feelings and attributions were collected prior to full debriefing. Finally, an ambiguous stimulus was shown that could be perceived as a human or animal, and also the paranoia subscale (Pb) of the MMPI—to assess possible effects of the People bias manipulation.

1. Results and Discussion

a. Arousal. All subjects reported being aroused at the onset of the arousal cue. While the EA subjects' arousal was immediately reduced at the offset cue, the UA and Sim subjects' reported arousal gradually diminished over the course of the experiment. There were no differences between conditions at the pre- or postmeasurement epochs, and both were at similar low levels (once again showing the effectiveness of our debriefing to return subjects to their pre-experimental levels). However, significant differences were found within the five other experimental epochs: (a) hypnotized; (b) arousal on for EA; (c) arousal off for EA, on for UA and Sim; (d) working on tasks; (e) debriefing. A repeated-measures, split-plot ANOVA on SUA ratings of the seven epochs, by condition and sex (about

equally divided in conditions) revealed a significant condition effect ($p < .05$), a robustly significant condition by epoch interaction ($p < .0001$), and no effect of sex (dropped from subsequent analyses). A priori orthogonal contrasts were carried out for the two hypnotizable groups for the five experimental epochs, with high values for the arousal-onset epoch. Both analyses were highly significant ($p < .002$). The most important comparison to be made here, and in other data sets, is the highest level of arousal reached by the UA and EA groups, in order to assess predicted incremental effects of amnesia for the arousal. From a comparable, low SUA level of 1.6 for EA and 1.9 for UA, the groups both rose to high levels immediately following the onset of their arousal cue—up to 4.8 for EA, but to a significantly higher SUA of 6.6 for UA ($p < .01$), as can be seen in Figure 6. Unexplained arousal adds something beyond the impact of the same arousal whose source is known.

The data for the Sim group both mimic the UA, yet differ from it in important ways. Neither pattern of orthogonal contrasts for the experimental groups was significantly different when applied to the SUA means for Sim. In general, they looked much like the UA group, with two notable exceptions. When the experimental subjects were at low of 1.7 during hypnosis, the Sim subjects "relaxed" mean was 3.3, an increase of 1.5 units from baseline. Next, when the on cue was given for the EA group the Sim subjects reacted most strongly, their mean of 5.1 being even higher than the 4.8 for the EA group, but recall that turning on the timer was *not* the arousal cue for Sim. Turning off the timer was the arousal cue for the UA

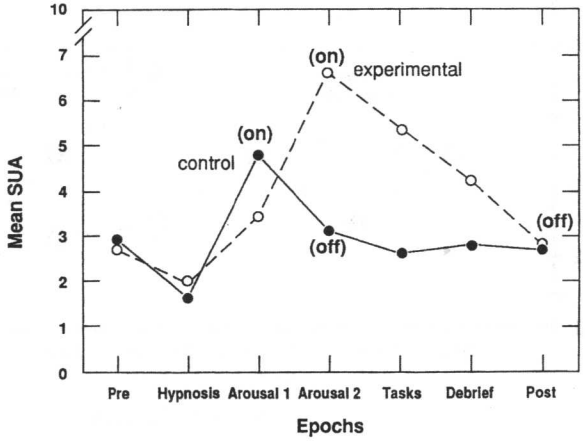

Fig. 6. Mean subjective arousal ratings for experimental conditions across epochs.

group, and they increased their SUA from 3.4 up to 6.6 ($p < .02$), whereas the Sim subjects increased only 0.9 units (ns) in response to their arousal cue from their "anticipatory arousal" prior level.

Another measure of arousal comes from the facial muscle EMG data reported in Figure 7 for the two experimental conditions. The pattern of tension as recorded from forehead and cheek muscles varies systematically in predicted directions across the experimental epochs. Similar to the SUA data, the EMG means decrease during hypnotic relaxation, increase with arousal onset, and decrease over the remainder of the study to return to levels at, or lower than, initial levels. The UA group shows a heightened anticipatory arousal effect, of tensing up when the clock is activated, although it is the onset cue for only the EA group. However, again the most important contrast here is the significantly higher level of facial muscle tension at the peak of arousal for those experiencing unexplained than explained arousal.

b. Emotions. Two measures of emotion/mood/affect come from the MACL, and the Emotion Circle. The strongest felt moods (on MACL) by

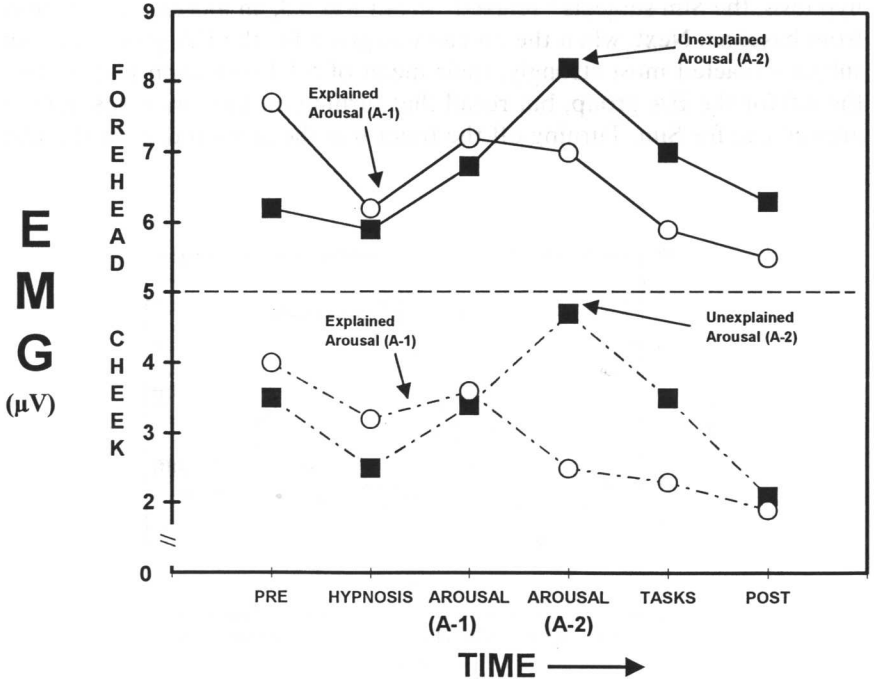

Fig. 7. Mean facial muscle tension for experimental conditions across epochs.

the EA group were rather mild and positive compared to those reported by the UA and Sim groups. They were in order of intensity, Friendly, Content, Happy, Anxious, and Excited, but at relatively low levels from 4.9 to 3.6 on this 9-point scale. By contrast, the UA subjects were most feeling Tense, Anxious, Frustrated, Nervous, and Excited, with a high averaged value across these mood states of 7 on the 9-point scale. The more negative experience of emotion by the UA than the EA was highly significant ($p < .003$, by contrast analysis following a significant ANOVA). The Sim group again mimicked the UA group closely, with no significant differences between them on this measure. However, their strongest felt negative moods were less intense than those reported by UA, 6.4 vs. 7.0. The biggest differences between these two groups were the greater levels of Frustration (7.1 vs. 5.1), Tension (7.5 vs. 6.8), and Resentment (5.0 vs. 4.3), in the UA than the Sim group, respectively.

The Emotion Circle consists of 16 emotions arrayed around an outer circle and 6 inner concentric circles of intensity of emotions being experienced, from neutral to extremely. Subjects placed one mark anywhere on the circle to indicate both their feeling and its intensity, at three times: baseline, arousal epoch 1 for EA; and arousal epoch 2 for UA and Sim. Here is the first measure on which the simulators fail to match the reactions of the unexplained arousal subjects. During the baseline epoch, the experimental groups were similar in choosing as their average emotion as Optimism/Anticipation, with mean ratings around 1.7 (between "slight" and "somewhat"). At that time, the Sim group selected Anticipation weakly, 0.5 intensity. During the first arousal period, these ratings shifted as follows: the EA shifted away from Optimism to more a more negative Anticipation (2.1 rating); the UA group was virtually unchanged; the Sim group became more positive in selecting as their representative emotion Optimism/Joy (1.8 rating). Differences emerged clearly in the next epoch, Arousal-2, as follows: EA, no longer aroused, moved four sectors positively from near Anticipation across Joy and Love to near Acceptance (1.4 rating); the UA group, now aroused, moved negatively from Optimism/Anticipation to Anticipation/Aggressiveness (1.3 rating); and the Sim moved into the dead center of the circle at Neutral. Because these mean ratings might distort individual changes in opposite directions, chi-square analyses were conducted on changes in individual subjects in emotions at the various rating periods. There were no differences on either the baseline or Arousal-1 epochs, but strong effects surfaced for Arousal-2 epoch. First, more EA subjects (89%) selected positive emotions than did the other groups who did not differ ($p < .01$). Second, more UA subjects (82%) selected negative emotional reactions from among the sectors of Anger/Aggressiveness; Aggressiveness/Anticipation; Disappointment/Sadness; and Fear/Submis-

sion than the EA subjects (11%) or Sim. subjects (22%) This difference was significant between all three conditions ($p < .02$), and also between UA and Sim ($p < .05$). Also comparing the use of these four categories versus all others from the Emotion Circle, the UA group was again statistically different from each of the other conditions. What most characterized the emotional reactions of the UA subjects on this measure was their high intensity scores on the Aggressivity dimension, where more of them gave ratings of 3 or higher (moderate, high, extremely) than did those in the other two conditions ($p < .05$). So on this measure, the Simulators did not duplicate the more intense, negative emotional reactions of the UA group.

The emotional and cognitive components of subjects' experience immediately after the second arousal cue was assessed by the PARQ, 20 self-report items answered on a 5-point scale of how much the affect or cognitive process is being felt "at this particular moment." After the ANOVA revealed highly significant between-group differences for emotional arousal and overall reaction ($p < .005$), with near significance for the cognitive component of worry ($p = .059$), individual group multiple comparisons were made. They show once again that the UA group differed significantly from its EA counterpart on all three indices ($p < .02$ or greater). The emotional arousal level for UA of 37 was higher than Endler's clinical norm of 23, equal to it for worry, and much above it for overall negative reactivity (67 vs. 53, respectively). However, on this measure where the face validity is high, the Sim group did not differ from the UA group on any of the PARQ components, although UA was higher on each of them.

c. Interpersonal Style. The Interpersonal Circle measure invites subjects to "imagine talking to someone right now," and to decide how they would relate to him or her by putting an X anywhere on the circle to indicate their interpersonal style. The opposite poles are Controlling/Dominant and Submissive/Docile (top to bottom), and Hostile /Antagonistic and Friendly/ Cooperative (right to left sides). Clockwise we find Advising between Controlling and Friendly, Accepting between Friendly and Submissive, Sulking between Submissive and Hostile, ending with Criticizing between Hostile and Controlling. Like the Emotion Circle intensity is indicated by five inner concentric circles ending at the neutral center. This measure was taken at baseline and immediately after each arousal epoch. Subjects' single-point responses in this circular space have x, y coordinates, thus could be computed for each dimension by coding them separately on the x-axis (Friendly-Hostile) and on the y-axis (Controlling-Submissive) for quantitative analyses. Baseline scores were covaried in the analysis of Arousal-1 epoch, and baseline plus Arousal-1 scores were covaried in analysis of Arousal-2 epoch. The ANOVA on axis-y scores is significant for the three groups ($p = .Ol$), caused entirely by EA group becoming much more

(+10.4), whereas the other groups that were not yet aroused, had similar low scores on this dimension. On the warm-cold dimension of FriendlyHostile, the significant overall effect ($p = .01$) was due to the EA group becoming slightly colder, while the other two, as yet unaroused, groups became much warmer. But the most powerful effect (that was delightful to behold) was the significant Arousal-2 effect ($p = .03$) as the EA group became very warm and friendly (+14.6), while the Sim group moved toward Neutral (-0.2), but the UA group became more negative and cold (-6.2). Their scores qualified them as being Hostile/Antagonistic-reactions comparable to those in several of our previously reported studies. This complex index of interpersonal style was thus able to differentiate between those experiencing unexplained arousal with a people-focused search frame from simulators given the same exact instructions.

d. People-Related Measures. On the next two measures, simulators also responded quite differently than UA, and surprisingly so. Although there were no group differences on the overall paranoia scale, there was a trend worth noting on a submeasure of the scale that identifies critical paranoid items, with the Sim group being much higher (2.9) than the UA group (1.0) or the EA group (0.7), with $p = .08$. Here the simulators over reacted in believing the UA group would respond with paranoid symptoms. However, this particular experimental setting mediated against that possibility since the UA subjects had little time alone to ruminate about the meaning of their discontinuity; they were in regular contact with the experimenter in the next room, calling out answers and being aware that their physiological reactions were being continuously monitored. Another unexpected difference was on the measure of seeing people or animals in the ambiguous "Rat/Man" picture. The significant condition effect ($p < .05$) was due to all of the EA seeing people, most of the Sim group (78%) also seeing people, while our UA group was evenly divided in seeing people and animals. Thus the effect of the People-bias, imposed on the experience of a discontinuity, does not lead to a mindless perception of people everywhere, certainly not in a cartoon-like ambiguous figure, but perhaps only of "people" who in some way might play a meaningful attributional role in understanding the cause of the unexplained arousal.

e. Attributions. Presentation of these results ends with but one more vital set of evidence in support of Discontinuity Theory, the explanations advanced for what the subjects were experiencing. Those whose arousal was explained all attributed their feelings of arousal to the letter they had read. The simulators again overshot their mark, by giving exaggerated, pathological explanations that differed from the UA group's explanations. Typical Sim attributions were "People are after me; out to get me, trying to beat me up"; "People are watching me." Or, they reiterated the instructions,

"People have something to do with it." There was a sharp contrast with the more thoughtful, varied attributions of those using the People-bias to help make sense of their unexplained arousal: "My girlfriend makes me feel jealous of her; it gets me mad because I feel so inadequate"; "It's hard to know what people expect of me, so I find it hard trying to deal with people"; "I am having trouble with people at work"; "I'm starting to panic because there should be people around here and there aren't any, so I am alone." Following debriefing, all subjects understood the reason for their arousal and their emotional reactions returned to the normal level they were initially.

This pattern of evidence helps rule out experimental demand characteristics as an alternative explanation for our previous results and the current ones. Simulators were able to match the reactions of the discontinuity group on measures where it was apparent how one should behave. But on some of these measures they overreacted in being much more extreme than the UA group, and on other more subtle or complex measures where it was not so clear how the UA might respond, the simulators were undone in their desire to mimic them. The second aim of this research was to extend the realm of observed differences between those experiencing discontinuities and those with similar arousal but aware of its origin. I think we have done so with the consistently significant differences found in this study on measures like: SUA, facial muscle tension; Mood Adjective Checklist (MACI); PARQ; Emotion Circle, and Interpersonal Circle. We did not see in this study the more pathological effects found in the previous studies for those with the phenomenological perspective of feeling aroused, without knowing why but thinking people might hold the answer. It is most likely due to the severe constraints imposed on the subjects by the restrictive facial physiological sensors, the many tasks, and the frequent interactions with the experimenter in the control room. All of which may have combined to limit time for reflection, memory search for available instances of relevant people, rumination, and some solitary incubation period that may be necessary to sow the seeds of pathological thinking and feeling.

H. FAILURES OF INTERPERSONAL DISCLOSURE OF DISCONTINUITIES

This research was stimulated by the case study example noted in an earlier section about the workers in the Bud Plastics Company suffering from neurotoxic-induced deficits in a range of behavior, thinking, and emotions. While unaware of the subtle environmental cause (chronic exposure to toxic substances on the job) of their severe dysfunctional state, they

chose to conceal their anomalous reactions from co-workers. They probably did so out of embarrassment, concerns about appearing strange, and fears of getting laid off. But had they disclosed their reactions and confusions immediately, it would have been possible to identify common situational elements in the workplace that were the causal agents for their shared symptoms. Their treatment then would not have been the unnecessary psychiatric care for mental disorders, but the required medical care, and it would have prompted earlier corporate prevention actions. However, the failure to disclose maintained the idiosyncratic interpretations of each affected man that "something is wrong (only) with me." When this view was aggregated, it created a state of general pluralistic ignorance that was a public health menace.

Disclosure to others of strong emotions, anxiety, distress, and uncertainty may have the potential gains of discovering an external, situational cause for one's symptoms, one that might be modifiable, as well as sympathy and understanding. On the other side of the scale are the anticipated costs of revealing a significant discontinuity to others in terms of vulnerability to negative social appraisals if these others do not share the same reactions, or may not show "attributional charity." Getting such unsupportive information pushes one toward concluding the problem is personal, dispositional, and deviant.

The issue of disclosing anomalous experiences raises a social dimension embedded in Discontinuity Theory. Many reactions to discontinuities are social to the extent that they involve other people who may notice and become concerned about the actor's atypical reactions, or are personally affected by their consequences. I have assumed that a basic motivation of the actor in a discontinuity scenario is a striving to sustain a positive self-image for one's self, and to project it to others. Given the etiological ambiguity of some discontinuities, especially the ones created in our research, the decision to disclose or not pits concerns for self-image maintenance against concerns for cognitive clarity and developing problem-solving coping strategies (Lazarus & Folkman, 1984).

Research on disclosure makes it clear that people do not make intimate self-disclosures to strangers (Snell, Miller, & Belk, 1988) because it would be judged inappropriate (Chaikin & Derlega, 1974). And disclosure is less likely as the dissimilarities in dyadic partners increase (Stephen, Wenzel, & Cornelius, 1991). However, since disclosure is often symptomatic of underlying anxiety (Stiles, Shuster, & Harrigan, 1992), it could be expected to decrease feelings of arousal and anxiety (Sholle,1992) in some interpersonal settings. I wondered if it would do so in our experimental setting.

Two related studies were conducted in our laboratory (Zimbardo & Williams, 1998) to determine the extent of disclosure by subjects experienc-

ing unexplained arousal, and to study the consequences of such disclosure. We also wanted to explore the specific tactics and strategies of interpersonal disclosure used by various subjects. For instance, would they first question the other person about their feelings before giving up any personal information, or begin by putting out some minimal self-revelation to prime the other to reciprocate?

The first study examined pairs of subjects who were both experiencing our unexplained arousal manipulation, at the same time, in the same setting. The second study used different types of confederates to try to stimulate disclosure in subjects experiencing unexplained arousal. Both studies will be outlined only briefly because of their disappointing findings of *failures to disclose discontinuities.* However, their methodologies are sufficiently interesting, as are a few results, to warrant some consideration, especially in planning new research on this unstudied realm of disclosure.

The first study sought to examine disclosure among student-subjects in twelve dyads where each person was experiencing unexplained arousal. Four of the dyads were male, four female, and four mixed gender. Under the cover story of solo versus team problem solving and creativity when hypnotized or in ordinary consciousness, individual students were given the standard hypnotic induction tape with posthypnotic suggestions for later cued unexplained arousal in part 2. Then pairs of students were brought together to work on a series of problems and tasks, some alone, in the presence of the experimenter, and some as a team, without the experimenter present during the disclosure phase. On the solo tasks (writing creative TAT stories, solving word puzzles), a barrier separated the subjects. It was taken down as they started a shared anagram task on which they were encouraged to discuss solutions (to prime later verbal disclosure). The start of the next shared task included the posthypnotic arousal cue. The experimenter started an experimental clock for the 5-min task, left the pair alone, and discreetly videotaped their interaction.

In general, there was almost no disclosure of the high levels of arousal and uncertainty that both members of each dyad were experiencing (as determined from their posttest ratings). In only 2 of the 12 dyads was there any evidence of disclosure of emotions, or of the agitation and confusion created by the manipulation. In one of these dyads, the disclosure of the first person was seconded by the other, but quickly attributed to their mutual concern for final exams, which ended the search for causes in the experimental context. The second disclosing dyad came close to discovering the true situational cause of their common, unusual feelings as somehow related to hypnosis. But after some discussion about the hypnosis training and its usually relaxing effects, they dismissed it as the cause of their current

tension. Although the latter pair were females and the former was a mixed gender pair, the results are too lean to make any gender inferences.

Analysis of the tape-recordings revealed that distraction was the most common tactic employed during the period when the subjects might be privately disclosing to each other. They quizzed each other about school-related topics and avoided mention of the research underway. Such distracting talk may be a tactic to lower one's arousal, but it reduces the probability that the other person will then move from this banal communication mode to a more intense, personal mode involved in interpersonal disclosure of strong, confusing emotions. Also it allows the misinterpretation that the other person is not similarly aroused if they are casually talking about courses, sports teams, dorm food, and the like. The next experiment attempted to correct this problem by having an aroused subject interact with a confederate whose overt reactions clearly established an emotional similarity.

In this study, 33 high hypnotizable students were randomly assigned to either a condition where a confederate acted tense (CT), or a confederate acted calm (CC) while the subject was experiencing unexplained arousal. The gender of the confederate matched that of the aroused student, 7 males and 10 females in CT, 7 males and 9 females in CC.

We again used the cover story from the first experiment, but added repeated SUA measurements, and appropriate reasons for the confederate and subject to be separated at times and to be close together at other times. The first of five SUA ratings was made before starting an initial solo task. This was repeated after hypnotic relaxation, arousal induction, immediately after the disclosure period, and finally after debriefing. The taped hypnotic induction process was followed by the next SUA rating and the first of several mood ratings, Profile of Mood States (POMS) (McNair et al., 1971), and then oral answers were called out to word association and Stroop color naming tasks. Confederates were blind to the experimental hypotheses, and even to the knowledge that subjects were hypnotized, since they could not hear the taped hypnosis induction and were unaware of the contents of a letter subjects read privately informing them that they would experience somatic arousal (when activating a timer) and would have amnesia for the suggestion.

Following the solo task, the confederate was seated next to the subject to begin their shared creativity task. For 4 min, they were to write a story about a TAT picture by each writing one sentence and passing back and forth their response sheet. Next they did a similar task to a different TAT card but solo for 3 min, with each starting their own timers (arousal cue). In the CT condition the confederate began to make sounds and gestures intended to convey that she or he was feeling tense, which continued

throughout the rest of the writing and disclosure periods. In contrast, in the CC condition, the (same) confederate acted calm, smiled, and was at ease during this task and subsequently. After completing another SUA and POMS, the experimenter pretended to have made a mistake in not having the next form available in the folders of the two students, and excused himself for a few minutes while he went upstairs to get copies of them. This was the occasion for the subject and confederate to be alone, and ideally to disclose their thoughts and feelings.

During the 4-min Disclosure Period, videotaped by a concealed camera, the confederate enacted a scripted role by saying nothing for the first minute (if the subject did not speak) then asked, "Which of the two stories did you like writing best?" Any input by the subject was responded to in kind, but the confederate did not initiate conversation about hypnosis, emotion, or the experiment. If asked how the confederate felt, he or she replied either, "I feel fine" (CC), or "I don't know, I guess I feel a little tense" (CT).

When the experimenter returned with the missing forms to be completed separately, the postdisclosure SUA form and POMS were completed and the subject was then interviewed by me about her or his current feelings and awareness of the reason for them. Subjects' arousal and amnesia were lifted, they were fully debriefed, and they completed the final SUA.

1. Results and Discussion

The basic conditions for testing our hypotheses were clearly met: subjects experienced unexplained arousal, and the differences in the confederates' behavior were perceived veridically. Arousal level, as measured by SUA ratings, went down during hypnotic relaxation (change from initial baseline = -3.2), went far up following the arousal manipulation (change from relaxation = +3.8), down after the Disclosure Period (change from arousal = -1.0), and further down after debriefing to a final level that was much lower than the baseline (change from disclosure = -1.4). (This is further evidence of the efficacy of our debriefing procedure, as described in the later Ethics section). Each change was highly significant ($p < .001$). All but three experimental subjects gave evidence of complete amnesia for the arousal suggestions (and they were deleted from all analyses). Those in the CC condition rated their partners as quite relaxed (high mean of 67 on 100-point scale), and significantly more so ($p < .001$) than those in the CT condition (low mean of 29). The tense confederates were seen as significantly higher in anxiousness than were the confederates who had acted calm (57 vs. 20, $p < .005$), in agitation (50 vs. 12, $p < .001$), and in irritation (35 vs. 9, $p < .005$). Clearly, the confederates' scripted behavior

elicited divergent perceptions from the subjects in the two confederate conditions—of reacting like me (CT) or dissimilar to me (CC).

Another dimension of the unexplained arousal manipulation was manifest in the content and affect of subjects' solo TAT stories. A story's content was rated "violent" if its central or secondary theme explicitly involved violence, murder, or rape. Affect of the stories was rated on a 10-point scale, from 1 = very negative to 10 = very positive. Comparisons of these ratings with those from a Control Group (of 18 high hypnotizables not given any treatment, 8 males, 10 females) indicated greater negativity in the stories of those with unexplained arousal (4.6 vs. 3.1, $p < .001$). There was also more violent content in the stories of the males experiencing discontinuity than in those of either all the Controls or the female Experimental subjects. Those comparison groups' data were violence-free, while 42% of the stories of the aroused males were aggressive ($p < .05$). Those who wrote such hostile stories during their arousal phase were also higher on the POMS Tension/Anxiety subscale ($p < .05$), and this POMS measure correlated significantly ($r = .49$) with the degree of negative affect in those stories.

Thus strong conditions were created that should have encouraged disclosure to another student who was in the same discontinuity situation and was also clearly demonstrating his or her similar arousal/anxiety. However, once again, very little disclosure occurred in any condition. Only 7 (23%) of the 30 aroused students disclosed at all, with no differences in gender or confederate condition. These few met the most minimal definition of disclosure, that is, the subject made a statement about what he/she was feeling-as reported by either confederates or the two videotape recording raters. And then subjects rarely followed through when the confederate acknowledged feeling similarly. This low rate of disclosure mimics our earlier results.

Three additional results are worth mentioning for their value in future research. Those who disclosed were more highly aroused (7.0 vs. 6.2, $p < .05$) prior to the disclosure period than those not disclosing, and they rated themselves as more creative on the POMS than did non-disclosers (71.7 vs. 51.7, $p < .05$). The only really positive result from my perspective is the final measure of the consequences of disclosure for those few who did so. There was a significantly greater decline in their arousal level after having disclosed than among the non-disclosers (-2.0 vs. -0.8, $p < .05$). (The general slight decline in arousal over the course of the experiment is a function of adaptation to the arousal, which we have found in all of our research.)

Why the failure to disclose in these studies? Several alternatives present themselves. First, it may be that the self-image costs of disclosing confusing

feelings of strong arousal/anxiety to a stranger are simply greater than the perceived gains in terms of enhanced understanding of a one's discontinuity. We know that people rely on different self-presentation strategies when relating to strangers than friends (Tice, Butler, Muraven & Stillwell, 1995). But this tendency for greater reliance on self-enhancing strategies in interactions with strangers is put in competition with the potential risks of disclosing one's unexplained arousal states, without even the assumed sympathetic ear of friends. We need to know more about this situation because of the practical consequences of learning how to create optimal conditions for effective self disclosures of strong, negative affective states that may be precursors to psychopathological reactions (Derlega, Margulis, & Winstead, 1987).

Future research should focus on eliciting high degrees of disclosure of discontinuities by using novel experimental strategies, such as, (a) having friends be confederates trained to induce disclosures from their buddies, to make them feel better; (b) informing subjects that their partner has successfully navigated the same situation, is nonjudgmental, good at psychological problem solving, and has other traits that might lower the threshold for disclosure; and (c) make the experimental subject's task to elicit or force disclosure from their partner-confederate under the guise that the partner is the target of research interest.

A second reason for the failure to find disclosure in these studies may simply be traced to the power of the hypnotic manipulation. The suggestion of not being able to remember why they were feeling aroused may have created a mental barrier in the subjects against sharing any information with others that might breach the amnesia, and thus "spill the beans." This potential constraint might be relaxed by new hypnotic suggestions that imply subjects might understand why they are feeling aroused while they exploring possible reasons with certain other people. Alternatively, other research needs to be done that does not use the hypnotic paradigm to generate the discontinuity to be disclosed. But these last suggestions all raise additional concerns about the ethics of such deceptive research and the elicitation of emotional arousal and cognitive misdirections. I address those ethical issues next.

V. Raising, Reconciling Some Critical Ethical Issues

Since the research presented in this chapter was explicitly designed to make normal, healthy college students "mad," if even for a short while, it raises serious ethical issues. It was necessary to address and resolve them

by working closely and creatively with Stanford's IRB in order to develop special procedures that enabled this research to be conducted while protecting the rights, dignity, and well-being of our student-research participants. This section describes how that trade-off was handled.

A psychological colleague, critical of some of the present research, as well as my earlier Stanford Prison Experiment (SPE) (Zimbardo, 1972; Zimbardo, Haney, Banks, & Jaffe, 1973), asserted, "It is difficult to imagine more extreme instances of deception than those provided by Zimbardo's experiments" (Baumrind, 1985, p. 167). A professor of pediatrics raised both ethical and scientific issues in his critique of the paranoia study reported earlier:

> The question to be considered here is the advisability of inducing paranoid behavior in a previously healthy individual. Aside from the other ethical questions . . . there is the questionable act of inducing a state about which we do not know a great deal, (Lewis, 1981, p. 9).

Science writer Morton Hunt (1982) centered his entire *New York Times Magazine* essay, "Research Through Deception," around our paranoia study (Zimbardo et al., 1981) while exploring the broader issue of social psychology's use of deception paradigms.

The debate within social psychology about the use and misuse of deception in experimental research has sensitized investigators about human subjects issues, and may be responsible for markedly reducing the number of studies employing deception in recent years. The advent of a cognitively focused social psychology also obviates the need to disguise experimental manipulations with "cover stories" and other forms of misdirection, since behavioral studies like those of Milgram (1974) and mine are replaced by deception-free, "quick-and-clean," paper-and-pencil questionnaire studies, where respondents only imagine how they might react to hypothetical scenarios. I believe that experimental social psychology still requires some behavioral research that involves "subjects" more personally and profoundly in studying a host of issues that are vital to the central themes of our discipline.

Readers are referred to my views on absolute versus relative ethical principles in human experimentation (Zimbardo, 1973) as summarized in reaction to published criticism of the SPE (Savin, 1973), and to my reply to Lewis (1981) about the ethics of the induced paranoia research (Zimbardo, 1981). Ethical issues of research using hypnosis are well presented by Coe and Ryken (1979). Here, I want to discuss briefly the following three points: (a) the necessity to employ some forms of deception in particular research paradigms when the phenomena of interest could not be investigated with-

out it; (b) the special demands imposed on researchers, who believe they must use deception and other ethically questionable procedures, to be extremely sensitive to all the ways they can minimize risks and promote the general well-being of their experimental participants, while also actively maximizing the potential of their research for scientific and societal gain; and (c) the need to increase the "gain factor" in the gain-loss equation for any ethically sensitive research, by insuring that the participants (and sometimes researchers) themselves derive maximum benefit from the power of "experiential learning" that may occur in such experiments.

A. WHY DECEPTION AND DISTRESS MAY BE NECESSARY TO STUDY THE "DARKER SIDE OF HUMAN NATURE"

It is my belief that one cannot sit on the side of the angels and study phenomena in the realms of social pathology or individual pathology using experimental paradigms that seek to discover causal relationships between situational, dispositional, and behavioral variables. By their very nature, such investigations move us beyond the boundaries of conventional research and force social scientists to face daunting ethical and moral dilemmas. In trying to understand the nature of the dynamic processes involved in powerful societal experiences—such as failures of bystanders to intervene in emergencies, group conflict and its resolution among children, blind obedience to unjust authority, the effects of anonymity or dehumanizing labels on aggression, the power of prison environments to elicit social pathology in good men, or the initiation of normal people into pathological ways of thinking and acting—some critical dimensions of the relevant situations must be functionally re-created by researchers, and experienced directly by participants. Those subjected to such procedures typically cannot know in advance all that will occur, otherwise, self-selection of those who stay versus those who quit distorts conclusions intended to generalize to all. For example, to demonstrate one of social psychology's enduring lessons, the power of the situation, individuals must experience its force first-hand from within its dynamic crucible. Reflective imagination cannot replace such direct involvement.

Recall that 40 psychiatrists predicted that fewer than 1% of U.S. citizens would go all the way up to 450 volts (only the sadists, they said) after they had listened to Milgram's experimental scenario. Aside from their dispositional bias (by virtue of medical school training), from their uninvolved and remote vantage point, they could not fully appreciate the situational forces impinging on the majority of average, normal, research subjects who delivered maximum shock to the victim. Or consider the proposed study where deception is the independent variable in establishing whether it could be eliminated in testing certain categories of causal hypotheses. To show that deception was superfluous, it would be necessary first to include a deception versus no-deception pair of research conditions. But that would not be permissible by current standards.

In my research, on the "psychology of evil, "—deindividuation, vandalism, prisons, and cults (Zimbardo, 1978), and more recently, institutionalized training of torturers (Huggins, Haritos-Fatouros, & Zimbardo, 1999)—I have been interested in the social conditions responsible for recruiting good people to engage in evil deeds. The research focus was on elucidating the process of human transformation among those who believed they would never do such bad things ("the just people") into becoming those who crossed the line to do so (as "the unjust"). Such knowledge may be used to identify the situational variables and processes involved so as to avoid, escape, or change them. The current set of studies, which can be classified as experimental-social psychopathology, are designed to explore the earliest stages in the initial processes of arousal, confusion, and distress (in response to significant personal discontinuities) that I believe may be responsible for the transformation of normal individuals without "premorbid" personalities into those who begin to suffer from some forms of mental disorders. The goal is to recommend new diagnostic and treatment modalities to clinicians based on the underlying conceptions, as well as to better inform the public about how misattributions could lead to pathological reactions.

Critics of the SPE have argued that everyone already knows prisons are violent places, so why do a study that shows it again? However, what our research showed was that it was the situational features of prison-like environments, not the "negative" dispositions of guards or prisoners, which creates violence. This is a more subtle, and I believe, more important insight. Critical reading of our induced paranoia study led to a similar rejection of the need for this empirical demonstration that deafness can lead to paranoid behavior among otherwise normal people. The counterargument being, "it is a generally acknowledged clinical observation that unexplained deafness in older people induces suspiciousness" (Baumrind, 1985, p. 172). However, clinical *observation* may inform, but it does not confirm. Systematic, controlled experimental research is essential to go beyond anecdotes, observations, and correlational analyses if understanding causality and designing controls (in the form of therapeutic interventions) are among the goals of psychology and psychiatry. The field of psychology, and especially those who claim the higher moral ground, must answer the question I have asked myself often. Would it be better if none of the following "unethical" studies had ever been done: the Milgram (1974)

obedience studies; Latane and Darley (1970) and Darley and Batson (1973) unresponsive bystander studies; or the Stanford Prison Experiment (Haney & Zimbardo, 1998; Zimbardo, Maslach, & Haney, in press)? Is that knowledge gained about the human condition worth the alleged harm to the subjects, to society, and to the profession of psychology (as argued by Baumrind, 1985)?

At the core of the ethical dilemma for social scientists is creating a balance between what a given researcher believes is necessary for the conduct of socially or theoretically significant research and what will safeguard the well-being and promote the dignity of research participants. Since researchers' self-serving biases may push them toward more of the former than the latter, external reviewers need to serve as ombudspersons for the relatively powerless participants. But these IRBs must also act in the interest of "science" and "society" to determine whether, and to what degree, some deception, emotional arousal, or other aversive states can be permitted, assuming the negative impact of such procedures is not likely to endure beyond the confines of the experiment. Let's consider next how those competing interests were served in the present research.

B. SPECIAL CONSTRAINTS/DEMANDS IMPOSED ON ETHICALLY CHALLENGING RESEARCH

Throughout the many years of the current research program, I worked closely with Stanford University's Panel for Human Subjects in Behavioral Science Research to help develop and maintain the delicate balance between what I believed was theoretically novel and clinically significant experimental research on one side, and the necessity for minimizing risks to subjects while maximizing the educational value of their participation, on the other. Let me outline how and why I was allowed to conduct this research program and the ways in which I went beyond the tough demands of this IRB to raise the standard for debriefing and concern for the wellbeing of my research participants. It is my aim to communicate to both researchers and IRBs that ethically challenging research can still be conducted in an ethical fashion.

1. I appeared a number of times in person at the IRB to discuss the nature of the research, its methodology, and to consider alternative approaches. The entire committee met in my laboratory to view randomly chosen videotapes of pilot research subjects undergoing the experimental tasks. The committee also reserved the right to monitor any study in person or to view tapes on demand and to rescind approval if the monitor believed that subject reactions were extreme enough to warrant terminating the research.

2. 1 was required to personally conduct all the hypnosis training, and to be present as experimenter or observer in the control room during all experimental testing. In addition, I was required to be assisted by a clinical psychologist or to have one on call to cope with any emergency reactions that might arise.

3. An expert on hypnosis and psychopathology, Dr. David Spiegel of Stanford's Psychiatry Department, served as the IRB's ad hoc reviewer to evaluate the paradigm and the impact on participants based on viewing videotapes from various experimental conditions. He approved continuing the research.

4. Extensive pretesting of each aspect of our research methodology included lengthy discussions with participants about their immediate and delayed reactions, interpretations of the manipulations, and the adequacy of the debriefing procedure. All of this helped minimize risk and increase subject power. Those goals were achieved by (a) using the briefest possible duration of arousal (b) inducing arousal by means of minimal physical symptoms rather than "anxiety" priming; (c) cuing arousal to situationally specific stimuli unique to our laboratory setting; (d) developing "partially informed" consent forms (described below) for each separate component of our procedure; (e) utilizing a formally structured triple-phase debriefing; (f) not terminating the debriefing of any subject until the staff consensus was that he or she was responding again in a normal, healthy manner; (g) conducting 24-h phone call follow-ups for all experimental subjects, as well as long-term evaluations (up to a year later) in some studies; and finally, (h) enabling subjects to withdraw their data or to use it selectively after they had been thoroughly debriefed.

5. Subjects completed five separate consent forms, one each for hypnotic susceptibility screening; hypnosis enhancement training; any personality testing; the experiment proper; and use of their videotape data following participation. The partially-informed consent stated: "The researchers cannot fully disclose to you in advance all of the information about which you may experience. However, they promise to do so in a thorough debriefing session at the conclusion of your participation." They were also told orally and in writing that they could quit at any time without penalty even after signing the consent forms. Each form was completed just prior to engaging in the task so its content would be in the subject's awareness during the task. Consent to use the subjects' audio or videotaped reactions was separated into three categories of increasing public use, from only scientific data reduction to educational use in classrooms, and to professional use at scientific meetings. A fourth consent was requested to use the rest of their test data for scientific research purposes. Students were further informed that even after having given their consent, they could change their mind

at any time in the future, and whenever they withdrew their original consent in writing, we would destroy their data. Although none did the latter, there was variation in the degree to which they were willing to give consent to the various uses of their data.

6. A highly structured, thorough debriefing (lasting longer than the entire experiment, usually 45 min to 1 h) was conducted by either myself, a clinical psychologist (Carlo Piccione), or an advanced graduate student working closely with me (Susan Andersen or Lisa Butler). The three-page debriefing procedure outline made explicit that the researcher was to conduct the initial inquiry into the subject's emotional and physical state and beliefs about the nature of the research "within a supportive interview context between researcher and student participant." (For specific details about this and the other aspects of my IRB protocol, see Stanford Sponsored Projects Office Protocol: 8586-77; renewal of 845-101, 12/13/85).

The first part of the three-phase debriefing was conducted with the subject in the alert state, following lifting of hypnotic arousal, amnesia, and any search frame biases. Part 2 involved rehypnotizing subjects and instructing them to "disconnect" their arousal (and search frame explanations, where given) from the experimental stimulus cue so that those reactions would no longer be elicited by similar cues in their everyday lives. To ensure that these instructions were understood and internalized, the disconnect instructions were administered again in Part 3 when subjects were again in the alert state. The content of the debriefing included a full presentation of the experimental hypothesis, and of the purposes and justifications for using deception. We ended with the statement of our personal concern: "We are sorry for not fully informing you of our procedures in advance, but we hope you can appreciate that it would not be possible to study the effects of *unexplained arousal* if we explained everything first." Each subject was then fully "dehoaxed," by informing him or her that any behavior they displayed was due to the experimental manipulation and was not unusual or atypical in this setting, since most other students react comparably in the condition to which they had been randomly assigned (and thus any unusual reactions should not be seen as idiosyncratic or personally symptomatic). The "desensitization" then involved establishing that the mentalphysiological state of the subject was now comparable to what it had been initially, and if not, "the researcher must do all in his power to bring about that process of appropriate desensitization of distress and a return to normalcy."

Subjects then completed a form describing what they now knew about the nature of the research and the true cause of their reactions. If there was any indication that our debriefing had not been adequate, the subject was rehypnotized and given the relevant instructions to enhance memory,

mood, or understanding. Following all this, subjects gave their consent for data use, were asked to maintain experimental secrecy, and were given the office and home phone numbers of the principal investigator and clinical psychologist to call if they experienced any unusual reactions.

7. Further respect for our research subjects was shown by providing them with special training in several hypnotic phenomena unrelated to the research, but of potential value to them personally, such as concentrated focus during academic study and testing, stress management, pain control, and self-esteem building.

8. All potential subjects completed a Medical Evaluation Survey, Health Survey, and premeasure of manifest anxiety and/or selected scales of the MMPI. No student was included in the research sample who (a) had scored outside the "normal-average" range on any of these measures, (b) was experiencing any symptoms; (c) was in therapy or on psychiatric medication; or (d) who gave any indication of being in other than "good, well, or great" health at the start of an experiment.

1. Reframing the CostlBenefit Equation for Ethical Analyses of Research

In my 40 years of research and teaching experience, it has been my consistent impression that the majority of students engaged in research using deception-and given adequate debriefing-find it more interesting than most other research they participate in as part of an introductory psychology course requirement. They are less distressed at being fooled than they are surprised that they could be deceived. Moreover, they readily appreciate the reason why deception was necessary for testing a particular hypothesis, when the justification for the "cover story" is carefully presented. In addition, some of this research elicits "dramatic" individual reactions during the study, such as agreeing to take more painful shock when in a high dissonance condition, or giving shock to another woman when the subject is in a deindividuation condition. Those reactions become part of the experiential learning of the participants to understand how and why they behaved so. This is in contrast to most other research where any participant's minimal experimental reactions are not individually salient but must be aggregated across all subjects to demonstrate any effect.

In our research program, we conducted follow-up surveys several weeks and up to a year after each study, with subjects indicating the positive and negative effects of each part of their experience in the research. For example, in a 1-year follow-up survey of the "three bias study" study (with a high 74% return rate) none of 37 subjects reported any negative effects of the hypnosis training whereas 26 (70%) reported positive effects. When

asked about any lasting effects of participating in the discontinuity experiment proper, most reported that it had none, but 5 (14%) reported positive effects, and only one reported a minor negative effect of remembering a TAT slide that had made him upset during the experiment. Finally, students reported on the personal value, if any, of having participated in this research on a 100-pt scale, where "0 = of no value, preferred not to participate"; "50 = moderate value, about as much as typical psych. experiments"; and "100 = of great value, pleased that I participated." The mean for these 37 students was a high 83.0, with a positively skewed range of 60-100. Thus, all subjects rated the value of being in one of the currently reported studies as higher than the other research in which they had participated (four other required studies in their introductory psychology course).

Among the gains reported from having had this unique experimental treatment and debriefing are the following personally valuable changes reported by some participants in this follow-up survey: (a) "Now I can notice these `strange' things in myself if they ever come up, also I can see these results applied to friends and relatives" (People Bias Condition); (b) "increased self-awareness, ability to focus, more self confidence and ability to control my emotions" (Body Bias Condition); and (c) "learned how to relax and how to prepare myself for potentially tense or stressful situations" (Environment Bias Condition). Such mindful reactions seem to me like more than simply dissonance-reduction reactions following a tension-filled experience.

Following the SPE we got similarly positive feedback from our former prisoners and guards. They reported that they learned more about themselves from their atypical behavior in that mock prison than from most other ordinary situations they experienced regularly (see Zimbardo, 1975). Moreover, in some individual cases, participating in the study profoundly changed their entire lives in prosocial ways. For example, one ex-prisoner became a forensic psychologist working in the California prison system to improve prisoner-guard relationships (for other examples see Zimbardo, Maslach, & Haney, in press). Also noteworthy is the impact of such research on the researchers who may also be changed in positive ways by their experience (see Haney & Zimbardo, 1998; Zimbardo, et al., in press). We also felt that it was incumbent on us to go beyond simply publishing our research in academic journals to optimizing its impact on opinion leaders and by "giving it away to the public" in various ways (see Miller, 1980).

The problem with the usual cost-benefit analysis of ethical decisions regarding research is that the costs to the subjects are tangible, real, and upfront. The alleged benefits to science and society are probable and delayed, if any. Many experiments don't work, don't even get published, don't get noticed, don't have action or policy implications, don't change anything. Therefore, those that do add special demands on the researchers to use all their resources to disseminate their message widely, to become advocates of their viewpoint, and even willing to act as social-change agents for their recommendations (see Zimbardo, 1975).

Perhaps an appropriate way to conclude this section is to return to the critique of deception research by science writer Morton Hunt (1982) in his provocative *New York Times Magazine* essay. Hunt used as the journalistic device for his piece an in-depth analysis of one student-subject, Steve K., in the induced paranoia study, who was distressed during the study by feeling paranoid, but upset after the study because he had expected to be called back to be in further research using hypnosis and was not. Two years after his research participation, Steve is described by Hunt as looking back "on the period of his participation in Zimbardo's research as one of the high points of his life thus far" (p. 145). That his experience with induced mood changes and deception made this young man think deeply about the ethics of research, is evident from his final statement to the investigative reporter: "I agree with people who say it's not right to deceive human beings; it's not right to treat people as if they were mice. But I agree with Professor Zimbardo that he couldn't do his work on paranoia and deafness without deceiving his subjects, because if they knew what was going on, they wouldn't react the same as if they didn't. I can see both sides. That's my dilemma, and I don't think there's any simple answer to it, only complicated ones" (p. 145).

VI. Conclusions and Reflections

So there you have it—a simple conceptual model elaborated to incorporate and integrate social, cognitive, and clinical concepts, with a set of supporting experimental evidence. Enough of the predictions advanced from Discontinuity Theory have been validated to warrant its serious consideration, refinement, and extension by other scholars, experimenters, and clinicians. After 30 years of working on this program of research, I feel comfortable in drawing some tentative conclusions, and in proposing some reflections about future research and applications. I will start with a few grandiose ones and work down to the more mundane.

The seeds of madness can be planted in anyone's backyard, given transient perturbations in the life cycle of ordinary experiences. I think the general approach proposed here can help rescue the study of psychopathology from the confines of psychiatry and clinical psychology since it

that fundamental cognitive, social, and cultural processes are involved in its development. Bringing the knowledge we have in those realms to bear on a fuller understanding of the mechanisms involved in the transformation of normal behavior into dysfunctional, symptomatic behavior can yield important insights regarding prevention, diagnosis, and treatment. Rather than seeking to find evidence of "premorbid" personality factors in those with "mental disorders," we need to switch out of this medical model to a more socially oriented, public health model that seeks to find situational vectors of individual and societal disturbance.

We have seen that the basic motivational trilogy of needs to understand, to belong, and to sustain self-esteem, which sometimes lead to scientific discoveries, friendships, and heroic deeds, can at times also fuel the machine of madness, when misused. Violations of expectations about matters central to one's self-image can trigger a cascade of cognitive, emotional, and motivational processes that, taken together, may start that person down the path to madness. While acknowledging the role of genetic and biological factors in some forms of psychopathology, I believe we need to chart their limitations in our understanding of how the human mind and spirit may be radically transformed by certain personal and social experiences. This research, and the model giving rise to it, has shown that specific types of symptoms, such as paranoia, phobia, or hypochondria, can be predicted by knowing the nature of a person's cognitive search biases that are activated when trying to make sense of personal discontinuities.

It should also be evident that hypnosis is a powerful methodological tool for manipulating motivational, cognitive and affective states. As such, it deserves wider utilization by social psychologists and other researchers for its many values that go beyond the realm of the relatively small number of psychologists who primarily study hypnosis itself. In a similar vein, I think that this report also makes clear the possibility of studying dynamic aspects of human functioning in rigorously focused laboratory research. The once active area of experimental psychopathology needs to be revived, and can, with the current research program serving as an exemplar. It is possible to conduct "ethically challenging" research, like my own, by working closely and sensitively with IRBs. Without prospective studies of the first stages in the development of symptomatic thinking, feeling, and acting, how can we ever really know about the origins of psychopathology? Surely, not from the traditional historical reconstruction of what must have been predisposing and precipitating factors derived from the long delayed recall of clients and patients. Beyond the statistically significant effects reported in my research are the dramatic, qualitative transformations in behavior that I observed among intelligent, normally functioning colleges students

that I knew reasonably well (from intensive contacts in our training sessions). Suddenly, they became inarticulate, confused, hyperactive, angrily banging on the desk, in near tears, frightened, picking away at a scab, anxious, or developing an uncontrollable muscle tic. That is the stuff of madness in the "real world," the origins of which we must understand in order to act against it more effectively.

However, it is equally important to note that within a minute of lifting the amnesia suggestion, and restoring memory for the source of the discontinuity, we witnessed dramatic, sudden reversals of the delusions that our subjects had been maintaining with conviction and vigor. Typically, there was a moment of confusion, followed by smiling, laughter, or shows of amazement by the debriefed subjects about the fact that they had believed so strongly in their false interpretation of what they were experiencing. The formation of delusions, along with other symptoms of psychopathology, revealed in our laboratory model using hypnosis to create subjectively compelling anomalies in personal experience, presupposes attributional explanations at work. One test of that assumption is offered by Kihlstrom and Hoyt (1988) who propose,

> If the attributional explanation is correct, delusions should form, as they did in the Zimbardo experiment, when subjects are amnesic for the hypnotic suggestion that is the true source of their experience; but they should drop the delusion as soon as the amnesia suggestion is canceled, and memory restored. (p. 99)

That is precisely what we found in every one of the hundreds of "discontinuity subjects" we have studied.

Let's consider next some *limitations* of this research. Obviously, the generalizability of the findings I have reported are constrained by reliance on a subject population that was highly hypnotizable, able to experience amnesia, and to follow posthypnotic suggestions. Because this trait is not shared by the majority of adults, caution must be exercised in how far one is willing to go beyond the evidence presented. However, since there are no reported data relating hypnotizability to virtually any other trait or personal attribute, it is unlikely that our most important findings were due to the operation of some pathological thought process characteristic of the special subject population we have utilized. Also the many predicted differential outcomes in conditions to which high hypnotizables were assigned randomly argue against a main effect of hypnotizability. Nevertheless, we need to develop other methods of inducing discontinuities that do not rely on hypnosis so that our conceptual assertions are not limited by any of its properties. Also, it is well to explore situations where naturally

occurring discontinuities might be expected, so that prospective studies can be done with pre-post-assessments.

Another limitation comes from the use of relatively small size samples drawn from college student populations. We can assume they are generally biased toward being "explanatory-prone" when faced with discontinuities, rather than not thinking about them. We might seek out other convenient populations for future controlled laboratory research, which better represent the general population. More serious limitations on my theory itself come from its culture-bound nature. It is clearly based on an individualistic cultural orientation, in which self-image is vital, and people seek explanations for discontinuities through personal cognitive searches, rather than collective ones. Only cultural extensions of this theory will inform us of what may prove to be fascinating differences across societies in how people deal with their significant violations of expectations.

A further limitation to be faced are the severe constraints imposed by IRBs on conducting future research to replicate these studies, or to move the theory in new directions. Just as I anticipate getting some negative feedback from readers of this chapter not satisfied with the ethical resolutions reported in the previous section, I wonder how many other social psychologists would be willing to undergo the high costs incurred in doing such experimental research by satisfying the demands of their IRBs?

There are a number of *extensions and refinements* of the ideas presented here that we and other researchers might consider in our future research.

-To assess and study the operation of naturally existing explanatory search biases

-To compare reactions to discontinuity among experimental subjects for whom the induced search bias is either congruent or incongruent with their own preferred search bias, starting with a standard 2 x 2 design

-To study the social dimension of Discontinuity Theory, its normalizing aspect, its role in joining or starting nontraditional groups, such as cults and antisocial movements

-To study the behavioral search process that may, for example, lead to addictive and destructive behaviors as one outcome of drinking, taking drugs, or other actions designed to reduce the distress of unexplained arousal

-To study cultural variations in processing discontinuities

-To create conditions that facilitate self-disclosure of discontinuities so as to better study the strategies and tactics used in this special form of interpersonal communication

-To more fully explore the social pathology side of the predictions advanced in Table II.

To study hemispheric differences in brain functioning with EEG recordings and fMRI effects of unexplained arousal.

There are some *practical applications and extensions* of the line of thinking advanced in this chapter that I would like to highlight briefly. Although costly, patients should receive medical checkups prior to any final, serious psychiatric diagnosis, treatment, and commitment to mental health facilities. For example, hearing tests, and providing hearing aids to the partially deaf, could prevent and treat early stages of paranoia better than psychotherapy and medications. Therapists might be encouraged to be more sensitive to establishing timelines for causal sequences related to the possible origins of mental disorders in their clients/patients. They should also be more aware of the explanatory search biases of those they treat, as well as recognizing their own biases toward overemphasizing inner, dispositional determinants, while minimizing situational influences on mental and behavioral functioning. They also need to combat the biased conceptual frameworks their training may have imposed on their attributional thinking.

At a more general level, greater efforts need to be made in education to extend the basic kinds of critical thinking skills of scientists to the general population, so as to reduce the faulty thinking often associated with trying to understand personal and natural discontinuities. The canons of the scientific method should be integrated into school curricula so that, for example, students learn why correlation is not causation, why it is wrong to seek only confirmatory evidence for theories, why it is essential to consider the fullest possible range of alternative explanations, and not to become a biased theorist prematurely. We should also develop educational modules with a variety of violation-of-expectation exercises, demonstrations, and experiments to promote training in the process of searching for explanations within the context of discovery of how our physical, social, and psychological worlds work.

The dynamic role that intellectual discontinuities play in scientific discoveries is clearly illustrated in Albert Einstein's reply to a student's inquiry about the nature of productive thinking. She had asked many noted intellectual figures of the time, "When do productive thinking processes arise, and what occurs in such a sharp, lively process?" That student later became the renown psychologist Erika Fromm, who recently found that lost letter, and published it in the *American Psychologist* (Fromm, 1998). Einstein noted that while inertial frames are equivalent in mechanics and optics, it should also have been so in electrodynamics, but such equivalence appeared to be "unachievable" within the theoretical framework of electrodynamics. Einstein goes on to frame his self-analysis of the motivating effect of perceiv-

ing this anomaly in terms that support the underlying assumptions of my Discontinuity Theory:

> The desire to discover and remove it [the defect in the traditional theory] led to state of psychic tension in me, which after seven years of fruitless search was released through the relativization of the concept of time and distance. It was similar for the general theory of relativity . . . . It was always the search for a logically simple meaning of empirically established relationships, propelled by the conviction that there existed a simple logical meaning. (Fromm, 1998, p. 1198; Einstein's letter was written in 1932).

Finally, this theory and research has a broader realm of applicability for all of us. Because well-adjusted individuals, our research participants, could so readily move across the line between sanity and madness for a while, it should increase our compassion for the mentally ill and reduce our tolerance for stigmatizing them as deviants in our society. We need to recognize the fluidity of the boundaries between normal and abnormal, between wellness and illness. Doing so may enable us to begin to see the "righteous Us" and the "wrong-headed Them" as kindred spirits trying to make sense of the puzzles and challenges of human existence.

Perhaps the following assertion by the poet, Ralph Waldo Emerson, from his *Essays and Lectures* (1983) may serve as a fitting thematic conclusion to this chapter, and the appropriate book-end to its opening literary quotations.

> The sun shines and warms and lights us, yet we have no curiosity to know why this is so but we ask the reason of all evil, of pain, and hunger, and mosquitoes, and silly people . . . [and of our personally significant discontinuities].

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