

Retrospective Phenomenological Assessment: Mapping Consciousness in Reference to Specific Stimulus Conditions

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A theoretical rationale and empirical methodology for mapping subjective experience in reference to specific stimulus conditions is presented. The methodology is called *retrospective phenomenological assessment (RPA)* and involves the retrospective completion of a self-report inventory in reference to an immediately preceding stimulus condition. The use of RPA for assessing the intensities and patterns of phenomenological experience associated with various stimulus conditions was evaluated in terms of the (sub)dimensions of consciousness mapped by the questionnaire. Three hundred and four individuals experienced a sequence of several different stimulus conditions and completed the self-report questionnaire in reference to each condition. The results indicated that RPA was both reliable and valid. Also supported was the principle of *stimulus-state specificity*, which states that across groups of individuals, the same stimulus conditions are associated with the same intensities and patterns of phenomenological experience (the same phenomenological state), while different stimulus conditions are associated with different intensity/pattern parameters. The use of RPA appears especially appropriate for mapping the various structures of subjective experience and for quantifying states and altered states of consciousness.

Historical Background

It was the father of American psychology, William James, who defined psychology as the study of consciousness. In his *Principles of Psychology* (1890/1950) James began by writing: "Psychology is the Science of Mental Life, both of its phenomena and their connections. The phenomena are such things as we call feelings, desires, cognitions, reasonings, decisions, and the like" (p. 1). At that time the structuralists, like Wundt (1897) and Titchener (1898), were investigating and theorizing on the structure of subjective experience, while functionalists, like James and Angell (1907), were trying to

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decipher the operations and functions of consciousness under real life conditions. Introspection was a common psychological methodology.

Yet it was not many years later that Watson (1913) pronounced the death of introspection—and was elected president of the American Psychological Association soon afterwards. In his classic paper of 1913, Watson proclaimed introspection's obituary:

Psychology, as the behaviorist views it is a purely objective, experimental branch of natural science. Its theoretical goal is the prediction and control of behavior. Introspection forms no essential part of its method, nor is the scientific value of its data dependent upon the readiness with which they lend themselves to interpretation in terms of consciousness. (p. 158)

Watson's protest against introspection and consciousness fit well with America's *Zeitgeist*. America's practical spirit was well suited for a functional and practical approach to psychology and behaviorism offered the American psychologist a paradigm that was both functional and extremely practical. It was not long before behaviorism swept America (Boring, 1950). From 1920 until the sixties behaviorism retained its hold over American experimental psychology. Those years of behaviorism, in contrast to the previous years of introspection, allowed psychology to make tremendous strides in becoming a scientific discipline. Behaviorism was a necessary and needed change against the pedantic and controversial researches of the introspectionists (Boring, 1953).

But just as introspection was superseded by behaviorism, so behaviorism began to be superseded by cognitive psychology. It was in the late fifties and early sixties that a shift from purely behavioral to more cognitive approaches in psychology began to make their appearance. Interest in such diverse areas as sensory deprivation, attention, sleeping, dreaming, and imagery prompted psychologists to turn their attention from purely overt behaviors to stimuli of a more covert, physiological, or cognitive nature (Holt, 1964).

Cognitive approaches to psychology became the heir to behaviorism's long-standing hegemony in experimental psychology. Such approaches attempted to retain the gains and methods of behaviorism, while adapting methodology and theory to embrace cognition and its component processes. As testimony to the burgeoning interest in cognition, the 1970's witnessed the birth of several new journals addressed specifically to cognition: *Cognition* (1971), *Memory and Cognition* (1973), *Cognitive Science* (1977), and *Cognitive Therapy and Research* (1977).

The emergence of cognitive psychology as a major force in the seventies was paralleled by a renewed interest in consciousness. The seventies saw a tremendous growth in the theorizing and research on consciousness and its various "altered states" (Tart, 1972) as induced by meditation (Naranjo and Ornstein, 1972), drugs (Harman, McKim, Magar, Fadiman, and Stalaraff,

1972; Pahnke, 1972), hypnosis (Weitzenhoffer, 1978), biofeedback (Brown, 1974), and many other induction procedures. Soon there were books on the nature of human consciousness (Ornstein, 1973); the psychology of consciousness (Ornstein, 1972); states (Tart, 1975), altered states (Tart, 1972), and alternate states (Zinberg, 1977) of consciousness; the highest state of consciousness (White, 1972); the spectrum of consciousness (Wilbur, 1977); expanding dimensions of consciousness (Sugarman and Tarter, 1978); the stream of consciousness (Pope and Singer, 1978); and the science of consciousness (Pelletier, 1978).

Contemporary Introspection (Phenomenological Assessment)

The emergence of cognitive psychology and the simultaneous renewed interest in consciousness has brought the return of introspection as an acceptable psychological methodology. Since its inception, a leading cognitive-behavioral journal, *Cognitive Therapy and Research*, has continued to publish articles using introspection or *phenomenological assessment* (as contemporary introspection is now called) in the assessment of cognition (Hurlburt, 1980; Rogers and Craighead, 1977), affect (Harrell, Chambless, and Calhoun, 1981; LaPointe and Harrel, 1978), and related processes (Kendall and Korgeski, 1979; Mahoney, 1977). In 1979 introspection was defended in the *American Psychologist*, by an article entitled "Behaviorism and the Mind: A (Limited) Call for a Return to Introspection" (Lieberman, 1979). Recently, introspection has been used to study daydreaming (Singer, 1978), modes of conscious experience (Klinger, 1978), the biological rhythms of waking fantasy (Kripke and Sonnenshein, 1978), and imagination (Singer, 1981).

Introspection as currently used in cognitive-behavioral and consciousness research is unlike the self-reflection practiced by turn-of-the-century introspectionists who often required up to twenty minutes to report on their subjective, 1.5 second experience. These introspectionists were also typically required to make up to 10,000 separate observations before they were considered adequately trained (Boring, 1953). In contrast, the new introspectionism is of the phenomenological variety in that it is "a free commentary on whatever cognitive material the subject is aware of" (Hilgard, 1980, p. 16). Not only do individuals not need to be trained for hours or days in the practice of introspection, but they do not need to be restricted to the rigid criteria used by the classical introspectionists to define and report internal experience.

This new type of introspectionism has certain elements in common with the descriptive phenomenology of Husserl (1913/1972) and the phenomenological psychologists (Valle and King, 1978). As with descriptive phenomenology, the new introspectionism involves a "detailed description of [the phenomena of] consciousness as they appear in consciousness" (Ashworth,

1976, p. 364). However, contemporary introspection seeks not only to describe the phenomena of consciousness, but to also *empirically quantify* these phenomena and relate them to human behavior and experience according to the scientific method.

Reliability and validity. It is of interest that classical introspection became obsolete due to its failure to demonstrate adequate reliability and validity. According to Boring (1953) classical introspection

went out of style after Titchener's death (1927) because it had demonstrated no functional use . . . and also because it was unreliable. Laboratory atmosphere crept into the descriptions, and it was not possible to verify, from one laboratory to another, the introspective accounts of the consciousness of action, feeling, choice, and judgement. (p. 174)

Controversies over imageless thought (Ach, 1905) and Titchener's stimulus-error (Boring, 1921) cast further doubt over the validity of classical introspection and it became, as Boring said, functionally useless.

As in the past, there is currently much controversy over the reliability of introspective data. Nisbett and Wilson (1977) have indicated that with regard to accessing cognitive processes, introspective access "is not sufficient to produce generally correct or reliable reports" (p. 233). Smith and Miller (1978), on the other hand, suggest that the assessment of cognitive processing may not be as inaccessible as Nisbett and Wilson indicate.

Nisbett and Wilson may be partially correct when relating individuals' attributions or cognitions to their actions. But when asked to describe, not the reasons (the why), but the content (the what) of their subjective experience, people are much more accurate, as Ericsson and Simon (1980) and Lieberman (1979) have indicated. Lieberman's summary of the literature has indicated that although phenomenological assessment can sometimes be misleading or wrong, the classical and modern literature of introspective research has shown that such

data can be highly reliable and useful, helping not only to predict specific behavior, but to discover fundamental principles of learning and performance (e.g., Weber's law, and the role of imagery in verbal memory). (p. 332)

The question of the accuracy of phenomenological assessment also suggests that validity may be difficult to confirm. Although the research reviewed by Ericsson and Simon (1980), Klinger (1978), and Lieberman (1979) indicates that introspective data can be both valid and useful, Rachlin (1974) and Skinner (1974) have strongly questioned the value and validity of introspective reports and have gone so far as to proclaim them superfluous.

Polemics notwithstanding, the question of the validity of introspective data must be based upon empirical research. As with other areas of psychological

research, the validity of introspective or phenomenological data will finally reside "in ruling out artifacts, in replications, and ultimately, in the usefulness of data or theory for making possible other forms of prediction and perhaps, control" (Klinger, 1978, p. 227). Because of the covert nature of subjective data, however, questions of validity will probably be harder to investigate than with overt behaviors. Hence a critical, empirical assessment of the validity of phenomenological assessment is also necessary.

Retrospective phenomenological assessment. Since behaviorism defined its variables in terms of specific behaviors and stimulus settings, the reliability and validity of such variables could be more easily observed, assessed, and evaluated than could cognitions, affects, images, or awareness levels. This suggested to the senior author that by combining the strengths of behaviorism's overt variables with introspection's covert events, phenomenological assessment might be made more reliable and valid. By evaluating phenomenological experience in reference to specific behaviors and stimulus settings, we hoped to increase the reliability and validity of phenomenological assessment by tying it to observable and repeatable stimulus conditions. (A stimulus condition is any stimulus environment in which the participant is involved, including the participant's own behavior, and any experimental manipulations enacted upon the individual.)

Such a methodology would retrospectively assess subjective experience in reference to specific stimulus conditions and allow for the various structures of phenomenological experience (i.e., imagery, cognition, attention, affect) to be investigated and evaluated in reference to those conditions. As long as the assessment is based on accurate retrieval from memory, the research evidence indicates that such retrospective verbalization can be both reliable and valid (Ericsson and Simon, 1980). Such an assessment might also allow one to map the relationship between a stimulus condition and its corresponding phenomenological state.

By asking individuals to retrospectively assess their phenomenological experience during a given stimulus condition, the method of *retrospective phenomenological assessment* (RPA) might not only (a) yield an introspective methodology that is both reliable and valid, but (b) allow for the various structures of subjective experience to be systematically assessed, and (c) generate a methodology for assessing and quantifying *states of consciousness*.

States of Consciousness

The concept of state of consciousness has had a less than respectable history. In 1907 Angell attacked the "more extreme and ingenuous conceptions of structural psychology" as the result of "an unchastened indulgence in what we may call the 'state of consciousness' doctrine" (p. 64); a doctrine that yielded introspective data "dependent upon the particular exigencies and

conditions which called them forth" (p. 67). Angell believed that when analyzing for the elements of a particular state of consciousness, what the observer noticed was a function of the stimulus setting and condition which called them forth.

Angell's distrust of the concept of state of consciousness is currently echoed by Hilgard (1980). Hilgard has noted how "discussions are not entirely clear about the concept of state [of consciousness]" (p. 21), not to mention the "problems in defining and characterizing altered or alternate states" (p. 22). Even Tart (1972, 1975, 1977) has indicated his dismay at the lack of precision in defining and operationalizing exactly what a state or altered state of consciousness is. Tart suggests that this lack of precision has led to a great deal of confusion, so that many people now use "the term, state of consciousness, to simply mean whatever is on their mind" (1977, p. 110).

Part of the problem involves definition. States of consciousness have been defined as being different from other states of consciousness (Krippner, 1972; Ludwig, 1972). Yet the ways in which such states are different from one another have not been systematically addressed. It has also been suggested that neurophysiology could help define and map the nature and structure of consciousness (Hilgard, 1969; Kamiya, 1968). Recent evidence, however, on the lack of a relationship between the occurrence of the "alpha experience" (Kamiya, 1968) and the strength or density of the EEG alpha activity "calls into question the entire enterprise of 'mapping consciousness' neurophysiologically" (Plotkin, 1979, p. 1145).

These results suggest that neurophysiological approaches may be inappropriate for assessing the subtleties of conscious experience. On the other hand, using retrospective phenomenological assessment may be more appropriate. Angell (1907) has indicated that the elements of a state of consciousness are a function of the nature of the stimulus condition being assessed. The elements of a state of consciousness, however, are the various aspects of subjective experience an individual is experiencing (Boring, 1933). Comparing variations in subjective experience across stimulus conditions activating different aspects of that experience would allow for the various aspects of phenomenological experience to be systematically assessed. If RPA can be used to provide operational parameters by which subjective experience can be defined and assessed, and provided a state of consciousness can be defined in terms of such parameters, RPA can be used to quantify the state of consciousness associated with a given stimulus condition.

Defining and quantifying a state of consciousness. Drawing upon cybernetics, a state can be defined as "any well-defined condition or property that can be recognized if it occurs again" (Ashby, 1963, p. 17). Using this definition and the suggestions of Singer (in Zinberg, 1977) and Tart (1975), a state of consciousness can be defined as the particular intensity and pattern of associated phenomenological parameters that characterize one's subjective con-

scious experience during a given time period. To the extent that these parameters can be recognized when they occur again, states of consciousness associated with particular stimulus conditions can be scientifically investigated.

A retrospective methodology for quantifying the structure of subjective experience in terms of specific phenomenological parameters has previously been reported (Pekala and Levine, 1981). The methodology involves the completion of a self-report inventory, the Phenomenology of Consciousness Questionnaire (PCQ), in reference to an immediately preceding stimulus condition. The PCQ is a 60-item inventory with each item consisting of two statements separated by a Likert scale. Thirty-seven of the items assess nine dimensions (and associated subdimensions) of consciousness. These include: altered experience (time sense, perception, body image, and meaning), altered awareness (state of awareness, self awareness), attention (direction, absorption), imagery (amount, vividness), internal dialogue, positive affect, negative affect, volitional control, and memory. Generated by cluster analysis rather than factor analysis (Hunter, Note 1), these (sub)dimensions represent aspects of subjective experience easily recognized.

This methodology seemed quite appropriate to assess the structures of subjective experience. By computing intensity scores for each of the dimensions, the intensities of subjective experience associated with the dimensions can be quantified and statistically assessed via *t*-tests and analyses of variance (Keppel, 1973). By computing a correlation matrix between the dimensions and converting that matrix to a covariance matrix, the Box (1950) test can be used to assess for pattern differences among dimensions (Pekala and Levine, 1982; Timm, 1975; Winer, 1971).

The use of the PCQ to map states of consciousness associated with several different stimulus conditions was investigated (Pekala and Levine, 1982). Two hundred and forty-nine subjects experienced the stimulus conditions of eyes open sitting quietly (E01) and reading erotica (RE) during an initial experimental session and eyes open sitting quietly (E02) and relaxation/meditation (RM) during a second experimental session.

Across the four stimulus conditions coefficient alphas for the nine dimensions of consciousness averaged .76 for E01, .79 for E02, .72 for RE and .70 for RM for a mean alpha of .74. These results indicated that the participants were completing the PCQ in a reliable manner. The stability or internal consistency of the coefficient alphas across the four stimulus conditions also indicated that the dimensions appeared to be relatively stable structures of subjective experience.

Dimension intensity and pattern differences among conditions were investigated. Although several intensity differences were found between the two baseline conditions (E01 and E02), there were no significant pattern differences as measured by the Box (1950) test. The stimulus conditions of reading

erotica and relaxation/meditation, in comparison to baseline, were found to be significantly different in regard to intensity parameters. Thus the RE condition, in comparison to E01, was associated with greater and more vivid imagery, more positive affect, more absorbed attention, and less internal dialogue. The RM condition, on the other hand, was associated with a greater alteration in state of awareness, greater altered experiences, more inward and absorbed attention, less self awareness, and decreased volitional control, positive and negative affect, imagery amount, and internal dialogue than E02. In addition, both treatment conditions, in comparison to baseline, were also found to be associated with significant changes in pattern among dimensions as measured by the Box test.

Since the relaxation/meditation condition, vis-à-vis baseline, was associated with a significant change in pattern coupled with the subjects' perception of being in a radically different state of consciousness (as measured by the state of awareness subdimension), it fit Tart's (1975) criteria for an altered state of consciousness. Since the erotica condition, in comparison to baseline, was also associated with a significant pattern change but no perceived alteration in state of awareness, it fit Tart's criteria for an identity state of consciousness.

Although the results indicated that retrospective phenomenological assessment "can be a reliable and valid means for mapping such subjective experiences as daydreaming, meditation, relaxation, hypnosis, guided imagery, drug intoxication, etc." (Pekala and Levine, 1982, p. 69), there was a major problem. The baseline condition, upon repetition, was found to be associated with mild, but significant, intensity differences for several of the dimensions of consciousness. It was unknown if this difference was the result of practice or habituation, or if it was due to the same stimulus condition, upon repetition, being associated with different intensities of phenomenological experience.

Stimulus-state specificity. In order to compare the various intensities and patterns of phenomenological experience across different stimulus conditions, it is necessary for the same stimulus condition to be associated with the same intensities and patterns of phenomenological experience, i.e., the same phenomenological state. If the same stimulus condition, across groups of individuals, is associated with different phenomenological states, then it becomes impossible to compare differing stimulus conditions/phenomenological states with one another since there is no consistently repeatable baseline with which to compare them.

On the other hand, if a specific stimulus condition is associated with a particular phenomenological state, then different stimulus conditions can be evaluated for differences in phenomenological state among them. The association between a given stimulus condition and its corresponding phenomenological state can be labeled that of *stimulus-state specificity* if a given *stimulus*

condition has a *specific* phenomenological state associated with it.

If the association is replicated across groups of individuals for various stimulus conditions, then it can be labeled the principle of stimulus-state specificity. Concretely defined, this principle states that across groups of randomly selected individuals, the same behaviors in the same stimulus settings (the same stimulus conditions) will be associated with the same intensities and patterns of phenomenological experience (the same phenomenological state), while different stimulus conditions will be associated with different intensities and/or patterns of phenomenological experience.

Validation of this principle and its use with a self-report inventory in retrospective phenomenological assessment should help to (a) determine the nature, function, and organization of the attentional, perceptual, imaginative, affective, volitional, and cognitive structures of subjective experience across different stimulus conditions, and (b) permit concepts like state of consciousness (Tart, 1975) and altered state of consciousness (Tart, 1972) to be quantified and investigated in reference to induction procedures purportedly involved in producing alterations in conscious experience.

The Present Investigation

In this study we have attempted to refine and expand the 37-item PCQ, replicate the reliability and validity results obtained with earlier research, and examine and test the principle of stimulus-state specificity. Several subsidiary issues were also addressed. These included: (a) whether a shortened version of the expanded 37-item PCQ would be as reliable and valid as the expanded questionnaire, (b) to what extent eye closure (in comparison to eyes open) would alter phenomenological state and (c) to what extent the sequence or order of experiencing stimulus conditions alters the phenomenological nature of those conditions.

For this purpose, the following hypotheses dealing with reliability, validity, and stimulus-state specificity were made:

- (1) An expanded and refined version of the 37-item PCQ will be found to be more reliable than the original 37-item PCQ.
- (2) An abbreviated version of the expanded and refined questionnaire will be found to be as reliable at mapping the dimensions of consciousness as the 37-item PCQ.
- (3) The abbreviated questionnaire will be able to validly assess and discriminate variations in phenomenological experience across similar and dissimilar conditions. More specifically, the following are predicted:
 - (a) Across the same condition, the (sub)dimensions of the abbreviated version of the questionnaire will yield the same results as the (sub)dimensions of the longer version.

- (b) In comparing eyes open sitting quietly (baseline) and relaxation/meditation across the same group of participants, the same differences in dimension intensity and pattern results will be found between conditions as were found with earlier research when these conditions were compared.
 - (c) In comparing an erotic fantasy with baseline across the same group of participants, similar differences in dimension intensity and pattern results will be found as was demonstrated in the earlier study, even though at that time baseline was compared with reading erotica.
- (4) Across several different groups of participants, the same stimulus conditions will be associated with the same (nonsignificantly different) intensities and patterns of phenomenological experience, while different stimulus conditions will be associated with intensities and/or patterns of phenomenological experience significantly different from one another.
- (5) The conditions of eyes open and eyes closed sitting quietly will be associated with significant differences for various dimensions of consciousness and a significant pattern change among dimensions when these conditions are compared. Order of presentation will have a significant effect upon the intensity of various dimensions, but no significant effect on the pattern among dimensions.

Method

Research Participants and Experimenter

The research participants were 304 introductory psychology students (217 females and 87 males) who participated in return for credits toward their final grade. Of the 311 original volunteers, seven presented incomplete data and were dropped from the analysis. The experimenter was a psychology major in her senior year of undergraduate study. She knew about the general nature of the study, but was unaware of the specific hypotheses to be tested.

Materials

Dimensions of Consciousness Questionnaire (DCQ). The 37-item PCQ was revised. For any dimension or subdimension of the PCQ containing less than four items, additional items, similar in content, were written so that each (sub)dimension consisted of four items. The dimensions of positive and negative affect were expanded from four and three items, respectively, to eight items each; this was done to include subclasses of affect associated with each dimension. Thus, positive affect had two items each dealing with joy, sexual excitement, love, and peace/calmness; while negative affect had two items each assessing anxiety, guilt, depression, and anger.

Two dimensions of consciousness that were assessed in previous research (Pekala and Levine, 1981) that did not reach criterion level reliability, i.e., rationality and alertness, were again included with additional items written so that each of these dimensions were composed of four items. An additional dimension of four items dealing with arousal/relaxation was also included.

The revision of the PCQ became an inventory of 80 items composed of the same dimensions and subdimensions as the 37-item PCQ plus the dimensions of alertness, rationality, and arousal. Items for the DCQ were arranged in a randomized block design, so that no two items of similar content would be adjacent. The dipoles of each item were also oppositely arranged. Thus, the items of a particular dimension or subdimension had half of those items with the left dipole addressed to more normal subjective experience, while the other half of the items had the left dipole addressed to more altered subjective experience as defined by Fishkin and Jones (1978).

Abbreviated Dimensions of Consciousness Questionnaire (ADCQ). Besides the larger inventory of eighty items, a shorter questionnaire of forty items was constructed. The abbreviated questionnaire had two items from each of the dimensions or subdimensions of consciousness, except for four items from the dimensions of volitional control and memory.¹

Pairs of items composing a particular dimension or subdimension for the shortened questionnaire were chosen as follows: If the (sub)dimension of the 37-item PCQ consisted of only two items, those were the items used. If the (sub)dimension was composed of three or more items, those two items having the highest correlation with one another were chosen. For those items just written on which there were no statistical data, items most similar in content were chosen. Rather than including all the items for the four pair of positive and negative affect items, only those dealing with sex and anger were used.

Items for the ADCQ were constructed of exactly the same items, arranged into two different sequences. As with the PCQ, both the DCQ and ADCQ had five pair of duplicate items of similar or identical content interspersed throughout the questionnaires; this permitted assessment of intratest consistency for individual participants.

Procedure

The research participants were seen in six groups averaging approximately 50 people per group. They were seen at the same place and time of day within a two week period. At the beginning of the session the general nature of the study was explained to them:

In this study I am interested in learning about your stream of consciousness, your subjective experience of yourself and the world around you. During this study I will be

¹In the event certain major dimensions would cluster together, all resulting dimensions would be composed of four items, except for memory and control. Hence all four items from these dimensions were used. (Only those two items correlating highest with each other were used to compute dimension intensity scores for these dimensions.)

asking you to engage in different short activities and then will ask you to write about your experience. I will ask about the sensations, perceptions, emotions, thoughts, images, and awareness levels that you experience during these short time intervals.

The experimenter then presented an instruction sheet that explained to the participants the nature of their task and also defined the major concepts of the questionnaire. Consent forms were then completed. To gain some practice at introspection, the research participants were told to close their eyes and sit quietly for one minute. Afterwards they completed a 10-item practice questionnaire, which was very similar to the DCQ, in reference to the one minute period. The short questionnaire was then reviewed with them so they could determine if they were completing it properly. They were also advised that since introspection into one's subjective experience is something that may be difficult, they were not to hurry, but were to take their time and thoughtfully complete the questionnaire when asked to do so.

The participants were then told:

For the next few minutes I'd like you to sit quietly and think about whatever you like. I'd like you not to read, write, talk, or close your eyes, however. I'll be sitting outside the room during this time and after several minutes, I'll be back in and ask you to write about your experience like you did for the practice session. Any questions?

After these instructions were repeated the experimenter left the room. She returned four minutes later and had the participants complete the DCQ in reference to the four minute period of sitting quietly.

The experimenter then told the participants that they would be asked to experience several other conditions and would be required to write about them as they did before. Although all individuals first experienced the sitting quietly with eyes open (EO) condition just described, each of the six groups of participants received a different sequence of second and third conditions, both of which were followed by completion of the ADCQ in reference to that condition. The six groups of participants and the sequence of conditions they experienced are listed in Table 1.

The instructions for the second and third EO conditions were the same as the instructions for the initial EO condition. The instructions for the sitting quietly eyes closed (EC) condition were the same as for the EO condition, except the participants were told to close their eyes. As with the EO condition, instructions for all the other conditions were repeated once.

For the erotic fantasy (EF) condition, individuals were told to close their eyes and reexperience the most erotic sexual experience that they could remember. The experimenter left the room, returned four minutes later, and asked the research participants to complete the ADCQ in reference to the time period specific to the fantasy.

The relaxation/meditation (RM) condition consisted of standard progres-

Table 1
 Sequence of Conditions Experienced by
 the Six Groups of Participants

Group Number	Number of Participants	First Condition	Second Condition	Third Condition
1	67	eyes open (EO)	eyes closed (EC)	eyes open (EO)
2	55	eyes open (EO)	eyes open (EO)	eyes closed (EC)
3	60	eyes open (EO)	eyes closed (EC)	relaxation/meditation (RM)
4	36	eyes open (EO)	eyes closed (EC)	eyes closed (EC1)
5	45	eyes open (EO)	eyes closed (EC)	an erotic fantasy (EF)
6	41	eyes open (EO)	eyes closed (EC)	eyes closed (EC2)
Questionnaire Used:		DCQ	ADCQ, Form 1	ADCQ, Form 0

sive relaxation instructions to which a four minute meditational interlude was added. The condition began with the experimenter explaining the technique of progressive relaxation and demonstrating how the different muscle groups of the body were involved in achieving relaxation. She then read the progressive relaxation instructions while the individuals tensed and relaxed the different muscle groups of their body with their eyes closed. After this the experimenter paused for four minutes while the participants relaxed to their breathing. When the session was over, the participants completed the ADCQ in reference to the time period while they sat relaxing to their breathing.

Results

Reliability of the Dimensions of Consciousness Questionnaire (DCQ)

It was predicted that the DCQ would be more reliable than the 37-item PCQ. This prediction was assessed (a) in terms of the five pair of reliability

items of similar or identical content embedded in the DCQ, and also (b) in terms of coefficient alphas for each of the dimensions and subdimensions of consciousness.

Item-pair reliability. To determine the participants' intratest consistency, Pearson r correlations and difference scores were computed for each participant's responses to the five pair of reliability items. Pearson r correlations for these five reliability pairs averaged .69 across all individuals during the EO condition and ranged from .46 for state of awareness to .85 for internal dialogue. (Dimensions composed of ten items with an average Pearson r of .69 would yield a coefficient alpha of .96.) Difference score values, representing the absolute difference between the two intensity ratings for the items of each item-pair averaged .89 across all five pair for all participants with average values ranging from .59 for internal dialogue to 1.29 for state of awareness.

Cluster and factor analyses. The reliability of the various (sub)dimensions of the questionnaire was also assessed by means of coefficient alphas. Before the coefficients were computed, however, the data from the participants' responses to the DCQ were cluster and factor analyzed to obtain unidimensional scales.

All of the items of the DCQ for all individuals were submitted to an oblique multiple groups cluster analysis with communalities in the diagonals of the correlation matrix (Hunter and Gerbing, 1979). After this initial cluster analysis, each cluster was tested for unidimensionality, i.e., the extent to which the items of the cluster "share a common core—the attribute which is to be measured" (Nunnally, 1978, p. 274). This was done by an analysis of the items of each cluster: (a) making sure the items of a given cluster had the same general meaning, (b) checking the degree to which the cluster loadings of the items within each cluster had the same general pattern, and (c) checking the extent to which items within each cluster paralleled, in terms of cluster loadings, the items outside that particular cluster (Hunter, Note 1).

Items not meeting these criteria were eliminated and the resulting items reanalyzed with another oblique multiple groups cluster analysis "until a set of unidimensional scales [were] obtained" (Hunter and Gerbing, 1979, p. 8). This process of confirmatory cluster analysis resulted in the elimination of six items (two from positive affect, and one each from negative affect, imagery amount, imagery vividness, and self awareness).

To determine if there were any aspects of subjective experience not being appropriately mapped by the cluster analytic approach, the DCQ was also submitted to an exploratory factor analysis (Hunter and Gerbing, 1979). A principal components factor analysis, followed by Varimax rotation, was performed on all eighty items of the DCQ with factors extracted having eigenvalues of greater than 1.0. Fifty-one percent of the variance was accounted for by thirteen factors. The obtained factors, almost invariably, were composed of items that clustered together in terms of the dimensions

and subdimensions arrived at by cluster analysis.

Coefficient alphas. Since the resulting 74-item DCQ was composed of unidimensional cluster analytic (sub)dimensions, coefficient alphas were computed for each dimension and subdimension. Alphas ranged from a high of .89 for imagery to a low of .77 for volitional control and arousal. Coefficient alpha, averaged across all eleven major dimensions (excluding alertness), was .81.² Alphas for all subdimensions averaged .78.

Reliability of the Abbreviated Dimensions of Consciousness Questionnaire (ADCQ)

It was predicted that an abbreviated version of the DCQ would be as reliable as the 37-item PCQ. Pearson r correlations for the five pair of duplicate items for Form 1 of the ADCQ (given to 304 participants during the EC condition) averaged .76.³ Pearson r correlations for Form 0 of the questionnaire (given to six groups of individuals during one EO, one EF, one RM, and three EC conditions) yielded an average value of .75. Values ranged from .60 and .61 for the item-pair of state of awareness to .84 and .82 for the item-pair of internal dialogue for both forms, respectively, of the questionnaire. Average difference score values were slightly lower than those reported for the DCQ.

Coefficient alphas for the (sub)dimensions of the ADCQ were computed, along with the alphas for the (sub)dimensions of the DCQ composed of only those items the same as the ADCQ (shortened DCQ). Alphas averaged .78 for the eleven major dimensions of Form 1 of the ADCQ, .81 for Form 0 of the ADCQ, and .78 for the shortened DCQ.

Validity

In order to determine the validity of the (sub)dimensions of the questionnaire at discriminating among similar and dissimilar stimulus conditions, the intensity ratings for each (sub)dimension were first quantified for each participant for each condition. This was done by averaging each participant's responses to all items that made up a particular (sub)dimension per the recommendations of Hunter and Gerbing (1979).

Comparability of DCQ and ADCQ. To determine if the (sub)dimensions of the DCQ and ADCQ would be equally effective at discriminating subjective experience across groups of individuals, the first two groups of participants' experiences during the EO condition were compared using all the items of the

²As with the results of the PCQ, the alertness dimension was dropped as a reliable dimension of consciousness due to its low reliability ($\alpha = .53$).

³All item-pairs of the ADCQ were the same as the DCQ except for a different item for the item-pair of state of awareness.

DCQ and only those identical with the ADCQ (shortened DCQ).⁴

Using all items of the DCQ, significant differences ($p < .05$) between groups were found for only three subdimensions, that of time sense, self awareness, and state of awareness. When using the shortened DCQ, significant differences between groups were found for the subdimensions of self awareness and state of awareness. The (sub)dimensions of time sense and negative affect approached significance, however. These results suggest both questionnaires are very similar when discriminating subjective experience across groups of individuals.

The various (sub)dimensions of the DCQ were also compared against the (sub)dimensions of the ADCQ (using the shortened DCQ) via paired *t*-tests across all 304 individuals in the EO condition. Over half of the twenty-one comparisons were significantly different at the .05 level, indicating that the two questionnaires are not assessing identical (sub)dimensions as far as intensity parameters are concerned.

Intensity comparisons. The dimension intensity values of the EO and RM conditions of Group 3 were compared via paired *t*-tests attempting to replicate the results of earlier research. Across all nineteen subdimensions and dimensions found significantly different with the 37-item PCQ, the ADCQ obtained significant differences in seventeen of these and all were in the direction as found with the PCQ.⁵ Omega squared, the percentage of variance attributable to the experimental manipulations, averaged 18%. Phenomenologically, the RM condition, in comparison to the EO condition, was associated with less and less vivid imagery; more absorbed and inward attention; less positive affect; more altered experiences dealing with body image, perception, time sense, and profound and unusual meanings; greater alterations in self awareness and state of awareness; less negative affect; decreased memory, internal dialogue, rationality, and volitional control; and increased body relaxation (decreased arousal).

The dimension intensity ratings for the EO and ER (erotic fantasy) conditions of Group 5 were compared via paired *t*-tests attempting to replicate the findings of earlier research. The present research replicated seven of ten previously significant comparisons, all in the same direction, while also yielding four other significant comparisons. Phenomenologically, the EF condition was associated with more imagery and more vivid imagery; more inward attention; more positive affect; greater altered meaning; less negative affect; better memory; and less talking to oneself than the EO condition. Omega squared averaged 8%.

⁴Since the DCQ was only given in one condition, the items of the DCQ and those items of the DCQ the same as the ADCQ can only be compared within that condition.

⁵The progressive relaxation instructions used were considerably shorter than the instructions used with the PCQ.

Pattern comparisons. To assess for pattern differences the Box (1950) test was used. The Box test is a multivariate analog of Bartlett's test of the homogeneity of variance for the univariate case (Winer, 1971). It is a statistical procedure used to test the hypothesis that two covariance matrices are random samples from the same population. Correlation matrices that are composed of the correlations of the (sub)dimensions of consciousness with each other are constructed for each condition. The correlation matrices are then converted to covariance matrices and the determinants of the covariance matrices for each condition are computed. Since a "second-order determinant has a natural interpretation in terms of area, while the third-order determinant is related to volume" (Shields, 1968, p. 169), an n -order determinant of an n -dimensional covariance matrix yields a value representing the topographical "space" or pattern of association between the n -dimensions of consciousness quantifying the phenomenological state of a given stimulus condition.

These determinants are used to calculate algorithms that, via the Box test, allow the assessment of significant differences between covariance matrices as a function of χ^2 or F (Timm, 1975). By means of this methodology it becomes possible to determine if the covariance (correlation) matrices, and hence the patterns among (sub)dimensions of the various stimulus conditions, are significantly different from one another (Pekala and Levine, 1982).

The correlation matrices for the EO and RM conditions (and all subsequent matrices) were composed of all the major dimensions of the DCQ except for imagery, attention, and awareness, whose corresponding subdimensions were used instead. Conversion of the correlation matrices to covariance matrices and comparison of the covariance matrices associated with the EO and RM conditions yielded an $F(105, 42,800)$ value of 1.42 which was significant at $p < .001$. Omega squared was 18%. Utilizing the same procedure while comparing the EF and EO conditions yielded an $F(105, 24,300)$ value of 1.28. This was significant at $p < .05$ and had an omega squared of 3%.⁶

Stimulus-State Specificity

To determine if the same stimulus conditions are associated with the same intensities and patterns of phenomenological experience while differing conditions are associated with differing intensities and/or patterns of phenomenological experience, intensity and pattern comparisons were performed on the data from the last four groups of participants (Groups 3 through 6). Groups 1 and 2 were not used since their second and third conditions were

⁶The Box test was devised for two independent groups. When it is used with correlated groups, as was done here, it is a more conservative test for differences than when used with independent groups.

counterbalanced for order.

Intensity comparisons. One way analyses of variance were performed for the last four groups of individuals for all dimensions and subdimensions of consciousness for the first, second, and third sequences of conditions, i.e., the eyes open (EO), eyes closed (EC), and mixed (MX) conditions. (The MX group consisted of two EC, one EF, and one RM condition.) The data analyses were performed using all the individuals in each of the groups, and then with only 36 individuals per group. Random sampling to reduce each group to 36 participants was done in order to equate the number of individuals involved in the intensity comparisons with the number of individuals involved in the pattern comparisons. (The Box test was utilized with an equal number of individuals in each group.) Since there were negligible differences when comparing the analyses involving unequal groups with those involving equal groups, only the latter analyses will be reported.

Whether using the DCQ or the shortened DCQ to assess for intensity differences for the 21 (sub)dimensions, across the four groups of individuals during the EO condition, only one comparison was found to be significant. When using the ADCQ to assess for intensity differences across the four groups during the EC condition, again only one comparison was found to be significant. Since alpha was set at .05, the significant comparisons are most likely due to chance.

Concerning the MX conditions, across the four groups, 15 of 21 comparisons were significant and omega squared averaged 12% across all eleven major dimensions. The RM condition was the most different of the four conditions when using the Tukey-HSD procedure for post hoc comparisons, followed by the EF condition. Table 2 tabulates these comparisons.

Pattern comparisons. To assess for pattern differences among the same and differing conditions, the Box test was employed. Neither of the Box test comparisons for the four groups of participants in the EO condition ($F(315, 28,560) = 1.06, p < .05$) nor the EC condition ($F(315, 28,560) = 1.04, p < .05$) reached statistical significance. However, the Box test comparison across the group of mixed conditions yielded a significant effect ($F(315, 28,560) = 1.36, p < .001, \omega^2 = 19\%$).

Pair-wise Box test comparisons between each of the four conditions of the mixed conditions group were then computed. Since the comparisons were post hoc, alpha was set at .01. There were significant pattern differences for three of the six comparisons: the two EC conditions compared to the EF condition, and the EF and RM conditions compared. (The other three comparisons approached significance, $p < .05$)

Table 2
Dimension Intensity Comparisons Across Four Stimulus Conditions

Dimensions	Condition Means ^a				F Ratio ^c
	Eyes Closed ^b	Eyes Closed	Erotic Fantasy	Relaxation/Meditation	
Imagery	3.42 ^d	3.58 ^d	4.12 ^d	1.72 ^e	20.68***
Amount	3.31 ^d	3.74 ^d	4.13 ^d	1.64 ^e	17.90***
Vividness	3.51 ^d	3.42 ^d	4.11 ^d	1.81 ^e	15.71***
Attention	3.65 ^d	4.39 ^e	4.16 ^e	4.32 ^e	2.78*
Direction	3.68 ^d	4.44 ^e	4.49 ^e	4.72 ^e	3.45*
Absorption	3.61	4.33	3.82	3.92	2.02
Positive Affect	1.67 ^d	1.93 ^d	4.26 ^e	0.63 ^f	33.47***
Altered Experience	1.77 ^d	1.96 ^{de}	2.12 ^{de}	2.43 ^e	2.77*
Altered Body Image	2.35	2.61	2.99	3.18	2.36
Altered Perception	1.44	1.29	1.86	1.60	1.30
Altered Time Sense	1.96 ^d	2.51 ^{de}	2.18 ^d	3.43 ^e	5.79***
Altered Meaning	1.33	1.40	1.46	1.51	0.09
Altered Awareness	2.31 ^d	1.88 ^d	2.22 ^d	3.24 ^e	7.04***
Altered State of Awareness	2.34 ^d	1.88 ^d	2.25 ^d	3.23 ^e	4.93**
Altered Self Awareness	2.28 ^d	1.89 ^d	2.18 ^d	3.25 ^e	5.70***
Negative Affect	1.35	1.46	1.16	0.89	1.30
Memory	4.29 ^d	4.44 ^d	4.79 ^d	3.64 ^e	5.05***
Internal Dialogue	3.36 ^d	3.38 ^d	2.47 ^{de}	1.94 ^e	4.84**
Rationality	3.97	3.85	4.39	3.79	1.13
Volitional Control	2.96 ^d	3.14 ^d	3.43 ^d	1.89 ^e	6.39***
Arousal	1.79 ^{de}	1.32 ^d	2.35 ^e	0.78 ^f	11.70***

^aDimension intensity values range from none or little (rating equals 0) to much or complete (rating equals 6).

^bAll conditions having a particular superscript (d,e,f) are significantly different from conditions without that superscript.

^cdf = 3, 140 *p < .05 **p < .01 ***p < .001

Other Results

Significant dimension intensity differences were predicted when comparing the first two groups of individuals for conditions and order. Group 1 ($n = 67$) and Group 2 ($n = 55$) experienced the EO and EC conditions in counter-balanced order for the second and third group of conditions. Two-way analyses of variance (using conditions and order as independent variables) were performed using all participants in both groups and then only 55 participants per group by randomly eliminating 12 individuals from Group 1. Since there were negligible differences between analyses, only the latter will be reported. Alpha was set at .01 since no specific predictions were made.

The EC condition was associated with significantly more imagery; more inward and absorbed attention; and greater alterations in time sense, meaning, and state of awareness than the EO condition. Omega squared, averaged across all (sub)dimensions, was 6%. Significant effects for order were found for negative affect and absorbed attention, while significant interactions between conditions and order were found for negative affect, self awareness, and absorbed attention. Omega squared, averaged across all (sub)dimensions, was less than one percent.

Although pattern effects were predicted when comparing conditions, they were not expected when comparing for order. Contrary to prediction, significant pattern effects were not found for type of condition ($F(105, 36,900) = 0.84, p > .05$), nor for order ($F(105, 36,900) = 0.83, p > .05$).

Discussion

Reliability

The Dimensions of Consciousness Questionnaire (DCQ). The results for the five pair of reliability items indicated that the participants were responding to the items in a reliable manner. This is consistent with the reliability results of earlier research with the PCQ and with the reviews by Ericsson and Simon (1980) and Lieberman (1979) who suggested that introspective data can be reliable.

Coefficient alpha, the other measure of reliability used, assessed not only the individuals' accuracy at completing the questionnaire, but also the internal consistency or unidimensionality of the dimensions mapped by the DCQ. An average alpha of .81 for all major dimensions mapped by the DCQ compares favorably with an average alpha of .76 for the nine major dimensions of the PCQ. With alphas ranging from .77 to .89 for the DCQ's major dimensions, it can be concluded that the dimensions appear to be composed of items internally consistent, which presupposes that the participants were accurately completing the questionnaire.

Cluster and factor analysis. Cluster analysis was used to try to create clusters of unidimensional content while factor analysis assessed aspects of subjective experience that may have been missed by the cluster analytic approach. The factor analysis demonstrated a slightly different clustering of items than did cluster analysis, although no new clusters appeared to be created by the factor analytic approach. This result is consistent with the fact that factor analysis will tend to blur distinctions between clusters arrived at by confirmatory cluster analysis (Hunter and Gerbing, 1979).

Whereas cluster analysis allowed for concepts like attention, imagery, and awareness to be kept quantitatively separate into specific (sub)dimensions, factor analysis combined items of differing (sub)dimensions, making the resulting factors very hard to name. These results suggest that cluster analysis offers a means to define aspects of subjective experience that may be more easily conceptualized than when using factor analysis. This conclusion is consistent with the theorizing and research of Hunter (Note 1).

Abbreviated Dimensions of Consciousness Questionnaire (ADCQ). It was expected that an abbreviated version of the questionnaire would be as reliable as the 37-item PCQ. Average Pearson r 's for Forms 0 and 1 of the ADCQ (.76 and .75) and average alphas for the two forms of the ADCQ across all major dimensions (.81 and .78) indicated that the abbreviated version is as reliable as the 37-item PCQ and almost as reliable as the longer DCQ itself.

The ability of the shortened questionnaire to tap the various dimensions of consciousness almost as well as the longer version in about half the time suggests that it may be quite appropriate for mapping subjective experience when there is not a great deal of time to do so, or when repeated assessments and fatigue may be a factor.

Validity

Validity was assessed by (a) determining if the DCQ and ADCQ were assessing the same aspects of subjective experience, and (b) determining if the ADCQ would replicate previous results with the PCQ when comparing relaxation and reading erotica in reference to baseline.

Comparability of DCQ and ADCQ. Near identical discriminations for the various (sub)dimensions of consciousness were found when using the DCQ or the shortened DCQ (ADCQ items). These results indicate that the questionnaires are approximately equivalent in terms of yielding the same results when comparing groups of participants. Since the DCQ was only administered in one condition, the extent to which the DCQ and ADCQ will yield the same results when assessing different stimulus conditions must await future research.

Although the DCQ and ADCQ are comparable, they are not identical. Significant differences for over half of the (sub)dimensions when comparing

the DCQ to the shortened DCQ across all participants suggest that the DCQ and ADCQ are not assessing identical (sub)dimensions of consciousness. This is not unexpected, however.

Discriminant and construct validity. The (sub)dimensions of the ADCQ possess discriminant validity to the extent that the dimensions can discriminate among stimulus conditions according to the various aspects of subjective experience expected to be different in differing stimulus conditions. The RM condition, in comparison to baseline (EO), was associated with greater alterations in body image, time sense, meaning, self awareness, and state of awareness; more inward attention; and decreased arousal, volitional control, rationality, internal dialogue, memory, negative affect, positive affect, and imagery amount and vividness, all in the expected direction. These results replicated earlier research and indicate that the (sub)dimensions possess not only discriminant validity, but also construct validity, since the (sub)dimensions appear to be validly assessing the constructs for which they were developed.

The comparisons between the EF and EO conditions support the above conclusions. Most of the comparisons found significant with earlier research when comparing reading erotica and baseline were replicated when assessing slightly different conditions with the ADCQ, i.e., an erotic fantasy and baseline.

Retrospective Phenomenological Assessment (RPA)

The results from the present and previous research indicate that a retrospective self-report methodology, such as that employing the questionnaires described previously, is a reliable and valid means for assessing and quantifying subjective experience in reference to specific stimulus conditions via the intensity and pattern parameters obtained from the questionnaires' items. Future research is needed, however, to assess RPA in reference to time periods less than and greater than the 4-minute period used in the present research.

Benefits. RPA does not disrupt or "freeze" one's stream of consciousness. At the turn of the century this argument was the primary contention of the functionalists. Their thesis was that an assessment period of several seconds, as used by the structuralists (and also used in contemporary thought sampling, e.g., Hurlburt, 1980; Klinger, 1978), was so short that it eliminated the most essential aspects of consciousness, its process and evanescent nature (Angell, 1907).

A time period of several minutes, on the other hand, should not disrupt the flow or stream of consciousness and hence not affect or change the phenomena during the act of measuring. By sampling a several minute time period, RPA will also tend to eliminate, via memory loss, transient and random events, making it easier for "state" properties of consciousness to become

evident and thus allow for such properties of consciousness to be more easily investigated.

Since neurophysiological methods for charting consciousness have been called into question (Plotkin, 1979), another means is needed to map consciousness. RPA represents a means to do so that does justice to the richness and complexity of phenomenological experience. In addition, using RPA in conjunction with neuro and electrophysiological methodologies may be the most efficacious means to understanding consciousness since both objective and subjective aspects of consciousness can be evaluated (Pekala and Ipacs, Note 2).

Limitations. RPA is not without its limitations, however. By retrospectively completing the self-report questionnaire, participants must remember the nature of the preceding period and report on it accurately. Although the results indicated that the data individuals reported was internally consistent, it was not known to what extent memory loss may have precluded a completely accurate assessment of the criterion time period.

Thus, this method of retrospective verbalization needs to be assessed and validated against concurrent verbalization (reporting on subjective events as they occur). Nevertheless, the possible lack of data due to memory loss does not invalidate the data obtained:

Incompleteness of reports may make some information unavailable, but it does not invalidate the information that is present. In an often cited remark, Duncker (1945) observed that 'a protocol is relatively reliable only for what it positively contains, but not for that which it omits' (p. 11). (Ericsson and Simon, 1980, p. 243)

Stimulus-State Specificity

Benefits. One of the problems with classical and modern introspection has been the difficulty of establishing adequate reliability and validity. A correspondence between subjective events and overt behaviors (in a particular stimulus setting) would not only help to increase the reliability of introspection but also help to increase the validity of phenomenological assessment. Subjective experience can then be differentially and systematically investigated by varying the behaviors, neuropsychophysiological variables, and environmental stimuli of different stimulus conditions, which, in turn, should permit the various structures of phenomenological experience such as attention, imagery, and cognition to be evaluated and compared.

The use of RPA, in conjunction with the principle of stimulus-state specificity, also allows for particular stimulus conditions to be quantified in terms of intensity and pattern parameters so that concepts like state of consciousness and altered state of consciousness can be investigated. This methodology can be used:

to compare states of subjective experience associated with such procedures as hypnosis, meditation, EEG biofeedback, progressive relaxation, drug intoxication, etc., to determine the extent to which these induction procedures are associated with altered states such as an 'alpha high' (Kamiya, 1968) or a 'trance state' (Weitzenhoffer, 1978) that are significantly different from nonaltered states of consciousness. (Pekala and Levine, 1981, p. 44)

Limitations. The principle of stimulus-state specificity only holds across groups of randomly selected individuals. It does not apply to individual assessments. Relatively low test-retest reliabilities from earlier research (Pekala and Levine, 1982) indicated that individuals have moderate variation in subjective experience when that experience is in reference to a previously experienced stimulus condition. Although this finding was probably due to habituation to some extent, the relatively low reliabilities were also due to the fact that there is intraindividual variation in phenomenological experience.

Recent evidence also suggests that although there are no sex differences for the various (sub)dimensions, individuals who differ from one another in terms of certain personality characteristics have significantly different intensities and patterns of phenomenological experience (Pekala, Wenger, and Levine, Note 3). Individuals who scored low, medium, and high on absorption, a trait correlated with hypnotic susceptibility ($r = .38$), were found to differ significantly in regard to the intensities and patterns of phenomenological experience reported during eyes open and eyes closed sitting quietly.

Methodologically, the principle of stimulus-state specificity may only hold when the (sub)dimensions of consciousness are assessed molarly, in the rather general, nonmeticulous manner of the items of the DCQ or ADCQ. All of the questionnaire items ask the subject to make judgements regarding nontrivial aspects of subjective experience. Very specific judgements, as were done by the classical introspectionists, may not only make it harder to attain adequate reliability, but may also lead to more significant differences in the (sub)dimensions across groups of individuals experiencing identical stimulus conditions. As with any other area of research, the method of observation and evaluation determines the nature of the data obtained. It also appears that there is a minimum subject limit for evaluating stimulus-state pattern effects, although this methodological limit only applies to pattern (and not intensity) comparisons.⁷

Other Results

The design of the study permitted the assessment of differences in phenomenological experience evident by merely closing one's eyes. The results

⁷When the number of participants per group is less than five times the number of dimensions, recent research (Pekala and Steinberg, Note 4) suggests that there may be a significant effect for pattern differences that is a function of the multivariate nature of the data analysis.

indicated that eye closure (in comparison to eyes open) was associated with significant alterations in imagery, attention, awareness, and altered experiences. This finding may help to explain the initial importance of eye closure in hypnosis (Hilgard, 1965) and induction procedures leading to alterations in subjective experience. It also suggests that variations in a single behavioral event can lead to significant alterations in phenomenological experience.

Even though intensity differences between the two conditions were in evidence, the fact that pattern differences were not suggests that alterations in intensity for various dimensions of consciousness do not necessarily lead to pattern changes. Tart (1977) has theorized that it is primarily pattern, and not intensity, parameters that define a particular state of consciousness. Using Tart's criteria to differentiate altered states of consciousness from other states, i.e., changes in pattern among the structures of consciousness, and the *subjective sense of (being in) an altered state of consciousness (SSAS)*, then the eyes closed condition was not an altered state in comparison to the eyes open condition.

On the other hand, the relaxation/meditation condition was associated with both a significant pattern change and a significant SSAS, as measured by the state of awareness subdimension. Hence it would be considered an altered state of consciousness in comparison to baseline. The erotic fantasy condition was associated with a significant pattern change, but a nonsignificant SSAS. It fits Tart's criteria for an identity state of consciousness (Tart, 1977). These findings replicate the results of earlier research (Pekala and Levine, 1982).

Conclusions

The retrospective use of self-report questionnaires like the DCQ and ADCQ permits the researcher to reliably and validly map phenomenological experience. In addition, the association of a particular phenomenological state with a specific stimulus condition, labeled the principle of stimulus-state specificity, should lead to a greater understanding of the structures of subjective experience since such experience is tied to observable and repeatable stimulus conditions.

The aforementioned research suggests that subjective experience can be evaluated and quantified to determine the nature, function, and organization of the various structures of phenomenological experience in differing stimulus conditions. In addition, concepts like states of consciousness and altered states of consciousness can be investigated by comparing phenomenological states associated with induction procedures purportedly involved in the alteration of conscious experience with procedures not producing such effects. Since the creation of any new methodology not only brings controversy but increased research, it is hoped that RPA and stimulus-state specificity can serve as useful heuristic devices to further explore the interface of mind

and behavior and elucidate an area of inquiry that has intrigued humankind for centuries.

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