CONSTRUCT USE AND SELF-ASPECT CHANGE IN RECOVERY
FROM CORONARY ARTERY BYPASS GRAFT SURGERY:
A PERSONAL CONSTRUCT ANALYSIS

DISSERTATION

Presented to the Graduate Council of the
University of North Texas in Partial
Fulfillment of the Requirements

For the Degree of

DOCTOR OF PHILOSOPHY

By

Avram J. Zolten, B.A., M.A.
Denton, Texas
May, 1992
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Cognitive ratings that use bipolar constructs based upon similarity and contrast have been shown to be biased towards the similarity pole in approximately a 62/38 ratio. This bias has also been known to shift in the contrastive direction for individuals who have psychiatric problems. This quantitative measure of cognitive change has a potential for characterizing cognitive changes that occur during the disease process, including recovery from disease. The present study investigated changes in self-aspect ratings and bipolar construct use in adult male veterans who had undergone coronary artery bypass graft surgery. Thirteen subjects participated in an inpatient cardiac rehabilitation program, and 13 subjects served as a no treatment control group. Data were collected from all subjects during their first post-surgery clinic appointment. Control subjects were then yoked to treatment subjects' first and last day of cardiac rehabilitation. Post-surgery data were then covaried out for all subjects and difference scores were compared. Results indicated that treatment
subjects' self-aspect and construct ratings were more negative than controls'. Results also indicated that all subjects rated core interpersonal self-aspects closest to the expected bias, while self-aspects related to cardiac recovery problems were rated in the most contrastive direction. The results finally suggested that the greatest degree of change for the treatment subjects were in emotionally generated constructs. The results suggested a preliminary validation for characterizing cognitive changes in the disease process by measuring shifts in bipolar construct ratings.
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CONSTRUCT USE AND SELF-ASPECT CHANGE IN RECOVERY
FROM CORONARY ARTERY BYPASS GRAFT SURGERY:
A PERSONAL CONSTRUCT ANALYSIS

Psychological considerations in the characterization of illness and injury have recently gained considerable respect and interest within the medical, psychological, and sociological communities (Twaddle, 1979). Growing away from the traditional philosophical structure of logical positivism that Western medicine traditionally had been most closely associated with, aspects of the pragmatics of clinical treatment have recently been reconsidered by health care professionals. According to Twaddle, Western medical conceptualizations of disease, illness, and injury have bowed to "even the most primitive forms, and treatments that have been developed that work in the alleviation of symptoms" (1979, p. 4).

Twaddle (1979) has also recognized that the rationale for the practice of medicine, including our understanding of both health and sickness have generally been consistent with the prevailing philosophy of the society in which it is practiced. He has suggested that the reigning logical positivistic orientation of the medical model was important during the first half of the twentieth century when the major problem facing medicine was the technical competence
of the practitioner. While technical improvement greatly increased the quality of care to the general public during this time, a considerable drop-off in the positive changes in life expectancy during the 1950's also occurred (Dengerink & Bakker, 1983), and has continued to the present. These authors have argued that this stagnation has forced a change in the overall philosophy of health care and concomitant conceptualizations of health, sickness, and illness. One result suggested by these authors, has been the emergence of behavioral medicine as a psychological integration for health care efforts.

Psychology's growth into the medical arena has required its own brand of philosophical self-reflection and adjustment, a process that is centuries long (Doster, 1988). Several authors (Achterberg & Lawlis, 1980; Zolten, 1989) have noted that there is a need to attend to the philosophical infrastructure with which the psychologist builds a model of being and behavior. Doster (1988) has noted that the range of convenience of the psychologist has been traditionally defined by mind/body dualism, owing to the religious and philosophical developments of the classical Greek schools, and its impact on the developing sciences. He suggested that because of this split, the mind became a matter for the philosophers and theologians (and later the psychologists) and body became the matter for scientists and physicians. Achterberg and Lawlis (1980)
have characterized the split of body and mind as a reified philosophical construct, more apparent than real. They have suggested that the link between thought and body processes are all encompassing, and one should conceptualize the human as having a "bodymind", an interactive approach to the relationship.

While an interactive approach has redefined the extent to which dualities have been resolved, the approach has not reduced the mind/body issue to one of monism. A monistic approach to psychology had been attempted by the behaviorist school during the first half of the twentieth century, reflecting the successful positivism of other sciences (Leahy, 1980). This approach, however, has had major shortcomings within the discipline of behavioral medicine where the application of integrative dualistic constructs has greater utility and explanatory power in the conceptualization and treatment of individuals (Zolten, 1989).

Integrating dualistic constructs has also been viewed as an important interpersonal issue as well as an intrapersonal issue. It has become clear to the health care practitioner that an understanding of both the practitioner's philosophy and the care seeker's philosophy are important in negotiating the appropriate mode of treatment (Kleinman, Eisenberg, & Goodel, 1978). Rosen and Kleinman (1983) have suggested that not only should the
health care practitioners be aware of their own personal, social, and cultural constructs, they should make themselves aware of the patient's personal, social, and cultural constructs, and work towards integrating the two. These authors have stated that the success of medical treatment is dependent upon the successful negotiation of these two construct systems, or, explanatory models.

Rosen and Kleinman (1983) have suggested that a constructive interaction between both the patient's and the physician's constructs of health, disease, and illness would be a valid and productive approach to understanding the disorder that has brought the two individuals together. Here, the authors have distinguished between illness, defined as the way the disease is perceived, labeled, experienced, expressed, and coped with by the patient, their support network, and particularly, their family. The authors defined disease as the response and reorganization necessary when the patient brought their complaints to any health care provider. This would not mean that the patient's response would have to be to the Western medical system, for the complaint from the patient could have been about spiritual, physical, or social issues, and the service provided from professionals recognized within any culture.

Of particular concern for Rosen and Kleinman (1983) is what has appeared within the Western biomedical system. Health care professionals have tended to engender a form of
entity to the disease, they have treated the disorder as alien to the individual carrying it. Here, the sufferer has been assigned to "get rid" of whatever it is that was ailing the person. These authors have discussed the advantages of the Western medical approach, and have noted the development of expertise within the positivist efforts of medical science. They have, though, repeatedly brought to issue the limitations of Western medical science. One solution that these authors have suggested is that the interaction of ongoing coping responses including cultural, social, psychological, and physical, with Western remedial practices, would provide for greater compliance with care providers' regimens. One could imagine that a Q.I.D. adherence for some patient's blood pressure medication would be 75% for a patient who insisted on praying during one regular administration time every day of treatment.

The authors have recommended that systematic elicitations of a patient's explanatory model be a part of standard evaluation procedure. They also have recommended that practitioners be flexible, or propositional in their diagnoses and conceptualizations. Implicit in this line of thought has been a minimal competency definition for the care provider. Here, a care provider would have to be responsible for at least the patient's meaning of health, their meaning of illness, and the care provider's health, disease, and remediation construct systems. At the level of
understanding the patient's conception of his disorder, Kleinman et al. (1978) have noted that many ethnospecific nosologies for disorders have validity, and the ethnomedical regiments succeed at rates comparable to Western medicine.

With regard to practitioners' conceptions of their clients' health or wellness, Maslow (1968) has suggested that interaction with service seekers has generally been truncated by our focus on the patient's disorder at the expense of his order. He has suggested that perceptions that are generated through motivation that is need disinterested versus need interested, provide greater opportunity for the experience of the natural quality of the percept, along with a great sense of dichotomy, the polarities, and interdependencies.

One way that has emerged within the constructivist research to build a literature upon the relationship of information provided by both poles of a individual's constructs has been the quantitative research generated by the interest in the golden section hypothesis (Adams-Webber, 1979; Berlyne, 1971). Named the golden section because it was noted as early as Pythagoras (cited in Adams-Webber, 1979) that a rectangle constructed with this proportion could be halved ad infinitum where each half would retain the exact proportion of the parent. Both of the above authors have argued that information processed in the specific contrast ratios of the golden section reaches a
maximum informing value, and suggested further that
decisions based upon information processed using this
formula are robust and can be found throughout nature.

The golden section hypothesis has rested upon the
simple proportion of approximately 62/38. More
specifically, the proportion of interest has been generated
by the square root of five minus one divided by two. This
proportion has been shown to have some very special
qualities. Berlyne (1971) has noted that this proportion
can be found throughout our spatial culture, as well as
noting that psychophysicists starting with Fechner (1876)
have found that objects that varied along this proportion
have been rated as more pleasing than others.

Adams-Webber (1979, 1982), in articulating Kelly's
dichotomy corollary, has developed a considerable empirical
foundation that has implicated the golden section hypothesis
as an important, naturally occurring phenomenon in human
construction. Kelly (1955) suggested that all constructs
contained two poles, and that the elements of each pole were
defined through similarity and contrastive processes.
Adams-Webber (1979) has added that maximum information might
be received in using constructs if the similarity and
contrastive aspects of the information were processed in the
proportions that were consistent with the golden section
hypothesis. Benjafield and Adams-Webber (1976) have
documented that individuals use the proportions roughly
equivalent to the golden section ratio in Q-sort construct building, semantic differential reports, and related bipolar techniques. In experiments with repertory grids, using similarity and contrasting poles in the dichotomous building of constructs, Adams-Webber (1979) has reported in these studies that optimal functioning occurs when similarity/contrast poles of a personal construct approach the 62/38 proportions of the golden section. This is consistent with Kelly's original formulation in that he argued that similarity between two objects and contrast to one other object was the basis for every personal construct.

Adams-Webber (1985) and Romany and Adams-Webber (1981) have noted that the poles of a construct are used more variably by preadolescent subjects, and that the proportions of the golden section appear to stabilize during adolescence. Evidence has also been generated that shifts in the proportion of information in the construct's use toward the contrastive end is characteristic of agoraphobics, depressives, and others with psychiatric disorders (Space & Cromwell, 1980). These authors have argued that when individuals face invalidation, the nominal pole slot changes with the contrastive pole and the individual risks falling into the habit of construing through the negative portion of constructs, leading to a negative perception of the events that surround them.
The above review of constructivist research has suggested that the use of golden section might have utility in construct processes related to the health care context, and to Western biomedical approaches to illness, disease, and health. If similarity accounted for the majority of information that we have traditionally relied upon when we have been physically successful and validated (health), it would have to follow that because physical injury or illness would be an invalidating experience, injury and illness situations could place an individual at risk for slot change within a wide variety of constructs. This disorganizing, or loosening, as Adams-Webber (1982) has characterized it, would be an indication of system breakdown, and loss of integrity.

Kelly (1955) developed a method of self-evaluation based upon similarity and contrast. The role construct repertory grid (repgrid) was designed to uncover personal constructs through a process of social role articulation. Personal construct theorists and therapists (Harter, Alexander & Neimeyer, 1988) have recognized the clinical utility of these personal constructs and have recognized the importance of both the interpersonal implications of these intrapersonal representations and the related intrapersonal structure and processes suggested by the model of social role.
Doster and Watson (1987) have demonstrated that constructs articulated from social roles can also predict functional intrapersonal relationships. Based upon characterizations of various personality theorists (Jourard, 1963; Berne, 1964) that self structure consists of many identifiable parts, this method has produced an intrapersonal repgrid that has provided reliable representations of a "community of selves" that directly measures the cognitive distance among several aspects of the self. No previous research has been conducted on the empirical qualities of the community of selves repgrid with regard to the golden section hypothesis, the nature of personal construct articulation (similarity and contrast) and its flexibility in potential range for self-aspect and therefore self-evaluation generated. A pilot study was developed to test both construct-use anchors and illness and injury self-evaluation (Zolten & Doster, 1990). This study suggested that normal self-evaluation did tend to cluster around a score of -1.06, or the 38th percentile of a 13 point Likert scale where the similarity pole was -6. Initial results have also indicated that, at least during illness and injury role induction, people tend to self-evaluate with greater contrast and invalidation.

Applying this theory and methodology to real physical disorders has been the ultimate goal of this present project. Because of its extensive prevalence and incidence,
cardiovascular diseases have been selected as the target population for study. Cardiovascular disorders have been the leading cause of death for adults according to epidemiological surveys (World Health Organization, 1976), and although incidence rates have fallen during the last ten years, coronary heart disease remains the leading cause of death in many industrialized countries (Maeland & Havik, 1989).

Coronary heart (or artery) disease (CAD) has been one of the most thoroughly studied of the cardiovascular diseases, from both medical and psychological points of view. CAD most often leads to chronic hypoxia of the cardiac tissue, which in turn produces cardiac ischemia (tissue injury), and myocardial infarction (tissue death). Once the cardiac tissue has died, it does not regenerate, and is eventually replaced by fibrous, nonelastic connective tissue that reduces the contractility of the heart as a working unit (Guyton, 1986). Chronic reduced cardiac output has traditionally been related to problems included in the following areas: loss of energy, loss of strength, loss of endurance, dizziness, loss of sex drive, congestive heart failure and edema, among others (Maeland & Havik, 1989). Medical interventions for CAD include pharmacologic treatments designed to clear the obstructed coronary arteries for mild to moderately obstructed arteries, widening of the coronary vessels with a balloon catheter for
moderate to severe obstructions in otherwise healthy hearts, or coronary artery bypass graft (CABG) surgery for severely obstructed coronary vessels (Guyton, 1986).

Psychological adjustment to CAD, myocardial infarction, and CABG have also been well documented. Cassem and Hackett (1971) have noted that short-term psychological adjustment to myocardial infarction (MI) appears to have the following characteristics. These authors have suggested that the initial emotional reaction of the cardiac patient is generally anxiety and fear of death during the first two days of hospitalization. These emotional responses are said to activate a denial response which peaks at about the second day. The authors have further suggested that as patients realize the implications of illness, depression emerges as the dominant affect.

Denial has received individual attention as a coping mechanism for CAD. Some studies have indicated that psychological denial, in moderation, can be beneficial to the cardiac patient's recovery (Levenson, Kay, Monteferrante & Herman, 1984). These authors separated coronary care unit patients into major, partial, and minimal denial groups based upon patient reports of emotional distress. The study found that those in the partial denial group has the shortest hospital stays, and lower inpatient mortality than the other two groups. The authors have suggested that denial may be a constructive coping mechanism in the acute
phase of illness because it protects the patient from overwhelming emotional reactions.

In the chronic phase of recovery, anxiety and depression have also appeared in the literature as the most common problems experienced by CAD patients. While the first weeks after hospital discharge have often been characterized by increased levels of emotional distress, limitations due to weakness and fear of recurrence have been associated with restricted behavior patterns and depression. Maeland and Havik (1989) have reported that although this type of depression usually subsides during the first six to twelve months after discharge, some 20-35% of the survivors of MI have reported long-term emotional problems.

Other aspects of psychological adjustment have been noted in the literature. For example, Jones, Chang, Esmore, Spratt, Shanahan, Farnsworth, Keogh & Downs (1988) found that patients who underwent cardiac transplant surgery reported significant changes in their body image upon recovery of physical function. More recently Van Dixhoorn, Duivenvoorden, Pool & Verhage (1990) found that significant feelings of invalidity were reduced in MI patients who underwent relaxation therapy. Although Van Dixhoorn et al. (1990) have presented data on physical invalidity, no mention was made of construct invalidity, a phenomenon that can be measured by the repgrid.
Waltz (1986) has suggested that interpersonal core roles are important to understand in characterizing the adjustment to myocardial infarction. In a national study of married male MI patients, he followed patients and their spouses for three years after their first MI. He found that emotional quality of the marital relationship predicted differences in self-esteem and personal competence, as well as perceptions of having effectively coped with the aftereffects of the heart attack. He further found that indicators of high vs. low marital intimacy, as well as chronic marital role strains, both predicted the quality of life in adjusting to cardiac disease.

The purpose of the present study is to integrate the theory of the golden section, and of personal constructs in general, with the current findings regarding psychological adjustment to CAD. Although the course of psychological adjustment has been well documented from a gross clinical perspective, empirical analyses of the infrastructure of these phenomena are generally lacking in the literature. Further, while it has become clear recently that cardiac patients who participate in cardiac rehabilitation show positive changes in weight, diet, cholesterol, and exercise habits (Maeland & Havik, 1989), similar studies characterizing psychological adjustment have not been done. Therefore, the proposed study has been designed to address both the issue of empirically characterizing the cognitive
infrastructure of psychological adjustment using repgrid methodology, and to compare the outcomes of patients who choose to participate in cardiac rehabilitation with those who do not choose to participate. It is expected that cognitive distortions characterized by shifts from similarity to contrast on repgrid constructs will resolve over time for all patients, and that this will occur to a greater extent in patients who participate in a cardiac rehabilitation program.

The present study will use a repgrid variation designed by the author. The present variation is designed to compare the structural qualities of individuals' traditional role constructs, constructs that represent body parts, and constructs of hypothetically little relation to either of the previous, those of primary colors. Body constructs have been implicated as important to the self evaluative process (Adams-Webber, 1980; Furnham & Alibhai, 1983). Adams-Webber (1980) has suggested that physical constructs are used in a contrastive way. Furnham and Alibhai (1983) have suggested that constructs of body shape operate within the norms of a given culture's construct system. When body shapes violate the consensually validated cultural norms, individuals within that culture rate those shapes as less desirable. These rating differences are not observed when groups from other cultures rate the same body shapes. Extending these results from an intercultural to intraculture perspective,
would suggest that as a patient moves from a culture of health to a culture of disease, illness, or injury, constructs of body representations will seem alien and therefore undergo rating changes. The present repgrid is designed to empirically elicit constructs that are relevant to the body.

**Hypotheses**

**Hypothesis one.** Based upon general theory regarding the golden section hypothesis, it is expected that contrastive evaluations of self-aspect and construct ratings will resolve over time for all patients.

**Hypothesis two.** A treatment effect will be observed, that is, shifts from contrastive to similarity will be greater for the cardiac rehabilitation group than for the control subjects.

**Method**

**Subjects**

Subjects were recruited from cardiology units of the Veteran's Administration Medical Center, Little Rock, Arkansas. The following diagnoses were considered appropriate for inclusion in the present study: Status/post myocardial infarction, and Status/post coronary artery bypass graft. Subjects were excluded from the study if they met any of the following criteria: current or previous history of psychiatric diagnosis or organic brain syndrome, concurrent psychological treatment during study enrollment,
previous history of coronary artery bypass graft surgery, a service connected disability of 30% or greater, or previous enrollment in the VAMC cardiac rehabilitation program. Finally, subjects were excluded for intellectual limitations that prevented comprehension of instructions and/or evaluations made with the repgrid.

Measures

A variant of Doster and Watson's (1987) community of selves repgrid was designed to provide comparisons of personal constructs and self experience based upon the similarity and contrast of the judgments of body parts, colors, and some of the traditional role relationships that are part of Kelly's (1955) original repgrid. In general, repgrids depict relationships among an individual's personal constructs, and have traditionally been used as a measure of cognitive organization and complexity. The empirical structure of various modified versions of Kelly's (1955) original repgrid has been shown to have relatively stable qualities (Doster & Watson, 1987; Fjeld & Landfield, 1961). Information regarding each subject's age, education level, race, occupation, and marital status was also collected.

Procedure

Subjects with CABG diagnoses were recruited from the post CABG clinic conducted three to four weeks following discharge from surgical service. Prospective subjects were oriented to the proposed research after group
screening/patient education conducted by the staff psychologist. Patients who were interested in participating were administered a repgrid at that time.

Subjects from medical units with confirmed diagnosis of myocardial infarction were contacted upon transfer from the coronary care unit to the coronary step-down unit. These prospective subjects were oriented to the proposed research individually and patients who expressed an interest in participating were also administered a repgrid by the principal investigator. Data collected during the initial contact for both groups comprised Time 0 (T0) baseline data. Data were also collected at this time regarding demographic information.

The repgrid was readministered to treatment group patients at the conclusion of their first day of cardiac rehabilitation. Because the duration of time before entering into this program was dictated by availability of beds and was different for different subjects, no treatment controls (those who declined cardiac rehab but agreed to participate in the present study) were yoked to treatment subjects for time to entry and contacted for readministration by telephone. This first readministration for both groups comprised pretreatment Time 1 (T1).

Both treatment and yoked controls were contacted for a third administration after nine (9) days, corresponding to the day before discharge from the cardiac rehabilitation
program for the treatment subjects. Data collected during this third administration comprised the posttreatment Time 2 (T2). After this administration was completed, all subjects were debriefed and any questions they had were addressed.

The present repgrid variation was constructed the following way. First, subjects were asked to enter the name of their mother or person who played the role of mother in the title section of column one of their repgrid. In a similar fashion, the names of other personally relevant individuals were placed in columns two through four. Columns five through nine were titled arms, back, legs, stomach, and heart respectively. Finally, the words red, blue, and green were all placed on column ten (a complete version of the patient instructions can be found in Appendix A under step one).

Using Kelly's (1955) original method of construct elicitation, subjects were then asked to attend successive pairs of names, and were asked to consider each pair of people along with themselves. With each successive triad generated, the subject was instructed to find a similarity that two of the members shared, along with a difference that characterized the third individual, and place both similarity and difference on the right side of the repgrid respectively titled "similarity" and "difference." The resulting bipolar constructs, hereby referred to as "constructs", were separated by a 13 point Likert scale
ranging from negative six to positive six. This method yielded three interpersonally derived constructs that will hereby be referred to as the interpersonal constructs.

Next, each subject was asked to attend to successive groups of three body part titles beginning with columns five, six, and seven. In a similar fashion, the subjects were asked to find a similarity that two of the members shared and a difference that characterized the third body part. This method yielded three constructs that were related to body or organ perception that will hereby be referred to as body constructs.

Finally, each subject was asked to attend to the three colors that were written in column ten of the repgrid. Again, the subject's task was to find a relevant similarity and difference. This generated one construct based upon the colors and will hereby be referred to as the color construct.

After all seven constructs had been entered on the repgrid by the subject, the principle investigator then folded the top of the repgrid over to replace the previously derived and supplied titles with new titles supplied for the self evaluation phase of repgrid administration. During this phase, subjects were asked to consider three classes of self experience. More specifically, the first group of new titles comprised a group of self-aspects that had been cited in the recent literature as relevant to cardiac prone
behaviors or adjustment to cardiovascular disease (Nail, King & Johnson, 1986). These included the following self-aspects: Anxious, depressed, and, angry. Each subject was asked to rate each self-aspect with the constructs generated earlier. This group was to be referred to as cardiac self-aspect.

The next group of self-aspects were derived from Berne's (1964) original formulation of core interpersonal roles. Here, subjects were asked to consider child, adult, and parent, as self-aspects to be rated with the previously derived constructs. This group of constructs was then referred to as interpersonal self-aspect.

Finally, a group of self-aspects were generated to attempt to characterize health and sick roles. This group, consisting of healthy, sick, and hurt, as self-aspects to be rated, was then referred to as health role self-aspect.

Experimental Design

Subject data was organized into a one between (treatment vs. control), two within (constructs by selves) analysis of covariance with T0 scores serving as the covariate to control for individual and group differences in T0 self-aspect ratings and construct usage. Each self-aspect and construct was summarized by finding the arithmetic average, yielding sixteen summary scores for each repgrid. These summary scores were further combined in the following way. Summary scores that corresponded to the
method of elicitation (i.e., interpersonal constructs, body constructs, cardiac self-aspect, interpersonal self-aspect, and health self-aspect respectively) were further combined and arithmetically averaged. Color constructs were left in the same form after the first average was derived. The resulting data summarization yielded three construct summary scores and three self-aspect summary scores that were entered into the covariance matrix (see Figure 1, Appendix E).

Results

Data were collected from January to June of 1991. During this time, 80 patients were seen in the cardiac surgery clinic. Of these, 36 patients were excluded from the present study for the following reasons: 30% or greater service connected disability, 17; history of cerebral vascular accident, 6; history of insulin dependent diabetes mellitus, 5; CABG and aortic surgery, 4; CABG complicated by MI, 2; intellectual limitations, 2. Of the 44 patients that remained eligible, 18 declined to participate, and two patients dropped out of the study before the protocol had been completed, yielding 24 CABG patients who participated.

Twenty-four MI patients were seen by the principle investigator during their stay on the cardiac step-down unit. Of these, only two patients agreed to participate in the study, and only one of these two was interested in enrolling in the cardiac rehabilitation program.
Demographic data representing the 26 patients enrolled in the present study was organized and placed in Table 1 (Appendix D). Included in this table was information regarding the average latency, in days from the initial contact and administration at T0, to the first day of enrollment in cardiac rehabilitation for treatment subjects and yoked T1 times for controls. T-tests were performed on distributed data to determine group differences prior to the analysis of covariance, and to test the success of the yoking procedure. As can be seen in Table 1 (Appendix D), a significant difference was obtained when comparing the average education of the two groups, with treatment subjects reporting significantly greater education than controls. In order to determine if this difference in educational level had any significant impact upon the ratings generated, education was correlated with each of the variables in the covariance matrix. Of the 18 summary construct and self-rating scores, education significantly correlated to only one (interpersonal self-aspect ratings at T0), and was therefore thought to not significantly influence the ratings generated from the analysis of covariance.

Each of the 26 subjects generated three repgrids, each of which contained 63 construct and self-aspect ratings. This yielded a total of 189 ratings for each subject, and 4914 ratings that comprised the data set. A summary of this data was placed in Table 2 (Appendix D).
In general, this data confirmed that a rating bias towards negativity was found in the present sample. More specifically, while interpersonal core roles were rated in the most negative direction, almost at the target of -1.06 defined by the golden section hypothesis, cardiac self-aspect ratings were the most positive, which might have been anticipated given the nature of the subjects' experiences. Regarding construct ratings, it was of interest that color constructs, elicited in an attempt to provide a control measure, were rated in the most positive direction. The grand mean of the data set was -0.438.

An analysis of covariance with T0 construct and self ratings used as covariates revealed that the treatment group ratings differed significantly from the controls, $F(1,23) = 4.95, p = 0.03$. While a pretreatment to posttreatment effect approached significance ($F[1,24] = 3.01, p = 0.09$), significant differences were not found among any of the other main variables. Figure 2 (Appendix E) one depicts the relationship of combined ratings for treatment and control subjects. As can be seen, the difference scores for the control subjects were greater, and further, in a more positive direction, than the treatment subjects.

The analysis of covariance further found a significant interaction between ratings (constructs vs. self-aspects) and levels (the three levels of both constructs and self-aspects), $F(2,47) = 3.74, p = 0.03$. This relationship was
depicted in Figure 3 (Appendix E) showing the wide range of self-ratings, collapsed across time, with cardiac self-aspect consistently rated in the most positive direction, and interpersonal self-aspect rated in the most negative direction. Construct ratings, on the other hand, appeared to be rather consistently rated in the negative range.

Finally, the analysis of covariance revealed a significant treatment by time by rating by level interaction, $F(2,48) = 3.60, p = 0.03$. This interaction was depicted in Figures 4 A-D (see Appendix E), which characterize the rating by level interaction for each group at both times one and two. As can be seen in these Figures, while the form of rating relationships depicted in figure two were generally maintained, figure 4C shows that the ratings generated by the treatment group for color constructs were significantly more negative than their previous ratings or the ratings of the control group at either time. Again, it was of interest to note that the only movement from pretreatment to posttreatment was found in a construct generated in an attempt to provide for some type of nonreactive control.

Discussion

The results confirmed the second hypothesis that cardiac rehabilitation patients would generate ratings that were significantly more negative than controls. This treatment effect was further seen to interact with ratings,
levels, and time, to partially support the first hypothesis. As was noted in Figure 3, part C (Appendix E), color construct ratings moved in a significantly negative direction for the treatment group at the posttreatment time, while the control group's ratings remained essentially the same.

Also as noted earlier, this movement in the expected direction was not expected to occur in a construct generated to provide a construct rating control. However, a review of the elements generated by the color construct building procedure (what the subjects labelled as similar and different when they were considering the colors red, green, and blue) revealed that for both groups the elicitation technique generated bipolar constructs that were generally emotional in nature. Constructs like Proud/Sad, Peaceful/Angry, and Pleasant/Grouchy were found on the repgrids of both treatment and control subjects. In fact, 11 of the 13 constructs generated by the control group, and 10 of the 13 constructs generated by the treatment group were overtly emotional in nature. This indeed suggests that a considerable amount of movement in the expected direction occurred for the treatment subjects as a result of the time spent in the cardiac rehabilitation program.

While emotionally generated constructs showed movement in the expected direction, emotional self-aspects sampled in this study (cardiac self-aspect) did not. In fact, the
broad range of self-aspects sampled in this study remained quite stable throughout the course of the study. A more formal comparison of different emotional self-aspects might have revealed differences.

Also missing from the results of this study was a robust time effect. While Space and Cromwell (1980) found a shift from similarity to contrast in their samples of psychiatric populations, no data were offered to characterize the course of and/or duration of this effect. During the present study, it was assumed that changes in construct use and self-aspect ratings would coincide with general health status. This did not appear to occur. In fact, it appeared that, with the exception of color construct use, both constructs and self-aspect ratings remained relatively stable throughout the duration of the study. Of particular interest, were the general accuracy of the core interpersonal self-aspect ratings, with mean ratings very close to -1.06, and the positivity of the cardiac self-aspects that did not significantly change. One possibility that may have accounted for this was the relatively short time that subjects were followed during the course of this study. The notion that fundamental changes in personal construction might not occur in the course of a few weeks after a lifetime of routine construct use and unchanging views of the self were also suggested by the cardiac rehabilitation team's limited success at changing
patients' habits including diet, exercise, and smoking preference.

Also important from this perspective though, was the suggestion that some self-aspect systems appeared unaffected by the disruption of the cardiac problems. Interpersonal core roles appeared to remain very close to the predicted values based upon the golden section hypothesis. It would have been interesting to attempt to tie these self-aspects to the more troubling ones, the cardiac self-aspects in particular, during the rehabilitation phase of this study. This would have been an intervention that might have met with approval from both Kelly (1955) and Kleinman et al. (1978) because this would have been an attempt to work within the individual's own system of self-relationships with minimal imposition from the outside.

Adams-Webber's (1980) findings that physical constructs were used in a more contrastive way were not directly challenged in the present study, and it would have been difficult to make the case that the body constructs generated in the present study were a reliable measure of physical constructs. A review of the bipolar elements similar to the review of the color construct elements revealed considerable heterogeneity in the types of labels used by the subjects. While some constructs like Strong/Weak, and Flexible/Stiff were often generated and would have fit into this category, other nonphysical
constructs like Good/Bad, Working/Not working, and Accident prone/Coordinated were also generated with the technique. This problem could have been solved by supplying the subjects with previously agreed upon constructs, although this would limit the phenomenological aspects of this objective phenomenological endeavor.

The poor success in recruiting MI patients was also unexpected during the course of this study. Several important differences were observed when comparing the MI patients to their CABG counterparts. First, the MI patients were seen individually, and while they were still inpatients. Interviews with several of these patients revealed that their primary concern at the point of contact was to stabilize and gain discharge from the hospital. CABG patients, on the other hand, had been discharged for several weeks at the point of first contact, and were seen as a group by the treatment team. Interviews with them revealed that they were experiencing significant physical changes, and regardless of their desire to enter into the cardiac rehabilitation program, many wanted to know how much they would be capable of as their recovery progressed. Furthermore, every CABG patient enrolled in the present study had an extensive medical history, which often included previous MI's. Even for those who did not have a history of MI, all were previously hospitalized more than once for complaints of chest pains, and were subsequently worked up
by cardiology service. This workup included both noninvasive procedures like exercise stress testing, and invasive procedures like coronary angiography. When seen by the principle investigator for this study, few of the MI patients had been exposed to such an extensive medical workup, and it was of interest to note that the two MI patients who agreed to participate did have this experience base. It is strongly suspected that some or all of these issues played an important role in the lack of success in recruiting MI patients.

In general, however, the model of Adams-Webber's (1979) golden section hypothesis was supported by the present study. Both construct and self-aspect ratings were found to be shifted away from the expected -1.06, and towards the positive direction for a population of patients who were experiencing the loss of integrity associated with a major disease process. Further, those patients who participated in an inpatient cardiac rehabilitation program rated self-aspects and used constructs in a manner much closer to the expected values derived from the golden section hypothesis.

Further validation of this model might be gained by following cardiac patients the following ways. First, as noted above, some fundamental difference between MI and CABG patients were noted during this study, and empirical characterization of these patients might provide insight into the psychological changes that occur when an individual
has a heart attack. The present study has suggested that the changes in self-aspect ratings may be the most fruitful area in which to look for these changes, although denial (Levenson et al., 1984) and invalidity (Van Dixhoorn et al., 1990) have been implicated as important features of psychological adjustment but were not included in the present analysis.

Second, as noted above, the length of time that subjects are followed might be increased considerably. Certainly, the present study might have benefitted from a six month follow up after the posttreatment T2 data were collected, but the present study was constrained by employment factors outside of the control of the principal investigator. Given greater time to track and intervene with cardiac patients one might gain greater understanding for their individual explanatory systems, intrapersonal relationships, and areas of strength and weakness that might be used to promote healthy change.

Certainly, the relationship between emotionally derived constructs, cognitively derived constructs, and other constructs deserves a closer look. The notion that the present finding of change in the color construct system was unexpected suggests that the results based on these findings should be interpreted conservatively, and replication of the phenomenon be attempted.
APPENDIX A

INFORMED CONSENT
Informed Consent

Name of Subject __________________________________________

Construct use and self-definition during cardiac rehabilitation

1. This study is designed to measure cognitive aspects of patients with heart injury and the rehabilitative process. You will be asked to think about various aspects of yourself and evaluate these aspects several times during your rehabilitation. These evaluations are based upon similarities and differences that are important to you and no other participant will use your evaluative scales. These evaluations are commonly used in studies of how people put their thoughts together and are not intended to be stressful to participants in any way. The risk involved in participating in this study is minimal.

2. Participation in this study is voluntary, is not a part of your treatment, and your refusal to participate will not affect the treatment you receive during your recovery or rehabilitation. Your questionnaires will not be used to identify you during research, and you will remain anonymous when the data are analyzed. You may also choose to withdraw from participation at any time without affecting the care you receive. If you wish to withdraw, please contact A.J. Zolten at 370-6664, or Michael Hazelwood, Ph.D. at 661-1202, Ext. 1558. It may become necessary for the investigator to terminate your participation in this research. Again, this will not affect your care in any way.

3. This research may provide psychologists, cardiologists, and rehabilitation specialists useful information regarding the specific thinking processes and self definitions used by cardiac patients during their recovery and rehabilitation. If you have any questions regarding this study and/or your participation, please call A.J. Zolten at 370-6664 or Michael Hazelwood, Ph.D. at 661-1202, Ext. 1558. Approximately 60 cardiac patients will be asked to participate in this study.

4. "I understand, in the event of complication, physical injury or illness resulting from the proposed research, that only acute and essential medical treatment is available. This institution will not provide monetary compensation for wages lost as a result of injury, hospitalization, and professional services."

If you have any questions about your rights as a research subject or concerning a research-related injury, please feel free to call the Institutional Review Board representative at (501) 686-5667.

I have read the above statement and have been able to ask questions and express concerns, which have been satisfactorily responded to by the investigator. I understand the purpose of the study as well as the potential benefits and risks that are involved. I hereby give my informed and free consent to be a participant in this study.

Signed ____________________________  Signed ____________________________

Subject  Witness

Date ____________________________  Date ____________________________
APPENDIX B

CONSTRUCTION OF THE REPGRID
Construction of the Repgrid

Step one

Find the slanted lines in the upper left-hand corner of your answer sheet. Enter the names and objects provided below.

Enter the first name of:

1. Your mother or the person who has played the part of your mother

2. A person with whom you have worked for associated who, for some unexplainable reason, appeared to dislike you.

3. The person whose point of view you found most objectionable.

4. Your brother nearest your own age, or the person who has played the part of such a brother

5. Your arms

6. Your back

7. Your legs

8. Your stomach

9. Your heart

10. Red

11. Blue

12. Green
Step two

Below your list of names and objects, find row A. Notice that row A has two highlighted squares. Look at the names above the highlighted squares. Think carefully about yourself and these two people. As you think of the three you, try to find one way in which two of you are alike and different from the other. Write the way in which the two of these people are alike in the space provided at the right under SIMILARITY. Write the way in which the different person differs in the space marked DIFFERENT. Move to the next row and follow the same instructions until you have used all of the people on the slanted lines.

Now consider the parts of the body listed on the top of your paper. Again, think carefully about the first three of these body parts and try to come up with a similarity that two of these share, and some aspect of the third that makes it different from the other two. Again, write the similarity and difference in their appropriate columns. Use the following groups to build your constructs (arms, back, legs), (back, legs, stomach), and (legs, stomach, heart).

Finally, consider the set of three colors listed on the top of your answer sheet. Again, try to find some type of similarity that two of these colors share and a difference held by the third color.
Step three

Fold the answer sheet over at the top so that the printed top replaces the names and objects that you wrote in. The NEW TITLES are a list of ways you may have experienced yourself. At times you may find yourself to be an "anxious" or "angry" person, or have found yourself being an "adult" or "parent."

The descriptions you have written under COMPARISONS can now be used as rating scales to describe the various ways you experience yourself. Notice that between your descriptions is a rating scale. Starting with the first column, the VULNERABLE ME, try to use the COMPARISONS to rate how that part of you feels right now.

USE A ZERO (0) RATING WHEN NEITHER DESCRIPTION FITS YOUR EXPERIENCE OF YOURSELF OR WHEN YOU ARE UNSURE OF YOUR EXPERIENCE.
APPENDIX C

SAMPLE REPGRID
APPENDIX D

TABLES
Table 1

**Demographic Information for Subjects Enrolled in the Study**

<table>
<thead>
<tr>
<th></th>
<th>Treatment</th>
<th>Control</th>
<th>T</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>56.2 years</td>
<td>60.2 years</td>
<td>1.15</td>
<td>NS</td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>11</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Divorced</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Widowed</td>
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<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Education</strong></td>
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<td>10.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>T0-T1 Latency</strong></td>
<td>24.46 days</td>
<td>28.0 days</td>
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**Note:**
- T: t-statistic
- P: p-value
- NS: Not Significant
Table 2

Mean Ratings of Constructs and Self-aspects for Treatment and Control Groups

<table>
<thead>
<tr>
<th></th>
<th>TREATMENT TIME</th>
<th>CONTROL TIME</th>
<th>Mean</th>
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</thead>
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<tr>
<td></td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>con1</td>
<td>-0.538</td>
<td>-0.594</td>
<td>-0.746</td>
</tr>
<tr>
<td>con2</td>
<td>-0.695</td>
<td>-0.621</td>
<td>-0.530</td>
</tr>
<tr>
<td>con3</td>
<td>-0.538</td>
<td>-0.046</td>
<td>-0.761</td>
</tr>
<tr>
<td>selfA1</td>
<td>+0.100</td>
<td>+0.212</td>
<td>-0.169</td>
</tr>
<tr>
<td>selfA2</td>
<td>-1.589</td>
<td>-1.028</td>
<td>-1.176</td>
</tr>
<tr>
<td>selfA3</td>
<td>-0.669</td>
<td>-0.376</td>
<td>-0.282</td>
</tr>
</tbody>
</table>

Note. con1 = interpersonal construct, con2 = body construct, con3 = color construct, selfA1 = cardiac self-aspect, selfA2 = interpersonal self-aspect, selfA3 = health self-aspect.
APPENDIX E

FIGURES
To T, T
Baseline Pre-treatment Post-treatment

<table>
<thead>
<tr>
<th>Treatment</th>
<th>T₀</th>
<th>T₁</th>
<th>T₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Construct Ratings</td>
<td>Same Measures</td>
<td>Same Measures</td>
<td>Same Measures</td>
</tr>
<tr>
<td>3 Self-aspect Ratings</td>
<td>Yoked</td>
<td>(Yoked)</td>
<td>(Yoked)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Control</th>
<th>T₀</th>
<th>T₁</th>
<th>T₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Construct Ratings</td>
<td>Same Measures</td>
<td>Same Measures</td>
<td>Same Measures</td>
</tr>
<tr>
<td>3 Self-aspect Ratings</td>
<td>(Yoked)</td>
<td>(Yoked)</td>
<td>(Yoked)</td>
</tr>
</tbody>
</table>

Figure 1. Schematic outline of the present experimental design.
Figure 2. D-scores for treatment and control groups collapsed across rating and levels illustrating the treatment effect.
Figure 3. Mean ratings of constructs and self-aspects collapsed across time and treatment groups. Numbers on the x-axis indicate level 1 (interpersonal constructs and cardiac self-aspects), level 2 (body constructs and interpersonal self-aspects), and level 3 (color construct and health self-aspects).
Figures 4A-D. Mean ratings for constructs and self-aspects for treatment and control subjects at pre-treatment Time 1 and post-treatment Time 2. Of note is the significantly more negative mean rating of constructs at level three in Figure 4C.
REFERENCES


Waltz, M. (1986). Marital context and post-infarction quality of life: is it social support or something more? *Social Science and Medicine, 22*(8), 791-805.
