A Sequential Analysis of Problem Solving

Using the Thought Listing Technique

By

Pat McGregor

CHAPTER 1

Introduction and Review of the Literature

Problems are an inevitable aspect of existence. The scope and immensity of the problems may vary greatly, but people will encounter problems throughout their lives. The manner in which they approach or accept problems as a part of life, the processes they undergo in resolving problems, and the way in which they accept the outcome of their actions would seem to be a fertile area for research endeavors. Psychology as a discipline of studying behavior, especially human behavior, would seem to have special interest in such an area of study. Indeed, some psychologists have devoted their energies not only to better understanding problem solving but also to training people to utilize enhanced problem solving strategies.

The present study will undertake further exploration of human problem solving. Specifically, ability to solve problems, confidence in problem solving ability, and self-statements of individuals who assess themselves as good, average, or poor interpersonal problem solvers will be analyzed to determine if there are differences.

The remainder of this chapter will focus on relevant literature. The first section contains a review of the concept of practical intelligence. The second section

1

will review the general area of problem solving, present definitions of problem solving, and examine the general contributions made by psychologists to this area. The third section will review the closely related area of decision making. Section four is concerned with the unique interest of counseling psychologists in problem solving. The more specific area of interpersonal or social problem solving is the subject of the fifth section. The sixth section focuses on the self-appraisal of interpersonal problem solving skills with attention directed specifically to the Problem Solving Inventory. Methodological issues related to process research are addressed in the seventh section, while the final segments of the chapter outline the relevance of the present study and the research hypotheses.

Practical Intelligence

In recent years, there has been a conceptual shift in views on intelligence. Part of this shift has been spearheaded by the work of Sternberg who defined intelligence as "purposive selection and shaping of and adaptation to real-world environments relevant to one's life" (Sternberg, 1984, p. 312).

Sternberg (1985) has recently proposed his own triarchic theory of intelligence. The subcomponents of the theory are the componential subtheory, the contextual subtheory, and the experiential subtheory. The componential subtheory is concerned with the mechanisms and structures

of intelligent behavior. There are several components: those that control information processing as well as monitor and provide feedback on it, those that carry out the results of the information processing, and those that encode new information and compare and combine this data with old information.

The contextual subtheory involves three types of functioning: 1) adaptation to the environment, 2) selection of a more amenable, optimal environment, 3) modification of the environment to better fit the person. In short, it deals with what is intelligent for an individual in a given context.

The final subtheory, experiential, is a more relativistic view on intelligence. Basically, the "amount" of intelligence devoted to a particular task is related to the individual's experience of that task. This is determined by the novelty of the task and the automatization of the task.

More recently, Sternberg (1986) has expanded his views on intelligence and forwarded the notion of practical intelligence. In developing this concept, he drew on the work of Neisser (1976) who differentiated between academic and social intelligence. In referring to the latter, he commented that, "Intelligent performance in natural situations might be defined as responding appropriately in terms of one's long-range and short-range goals, given the

actual facts of the situation as one discovers them" (p. 137).

This sort of intelligence, Sternberg and Wagner (1986) asserted, requires different types of assessment tasks from the more traditional academic intelligence tasks which they described as

> . . .1) being formulated by other people, 2) often being of little or no intrinsic interest, 3) having all needed information available from the beginning, 4) being disembedded from an individual's ordinary experience, 5) being well-defined, 6) have but one correct answer, and 7) often have but one method of correct solution (p. 52).

In contrast, Frederiksen (1986) pointed out that tasks involving practical intelligence

> . . . are often ill-structured: they do not provide all the information needed to solve the problem, there are no definite criteria for determining when the problem is solved, they are often complex. . . . [Furthermore], the problems rarely appear in multiple choice form. Responses are not necessarily motivated by a need to get the right answer, and performance can be described in terms of many dimensions other than the number of correct answers (p. 84).

Going beyond the broad definition of practical intelligence, researchers have investigated the characteristics of individuals who exhibit good practical intelligence. Prototype studies ask subjects to list characteristics of people who exemplify the quality being studied. One study (Sternberg, Conway, Ketron, & Bernstein, 1981) asked laypersons and experts in the field of intelligence to list characteristics of everyday intelligence. Factor analysis of laypersons' responses resulted in four factors: practical problem-solving ability, social competence, character, and interest in learning and culture. Factor analysis of experts' responses yielded three factors: practical problem-solving ability, practical adaptive behavior, and social competence. Another prototype study (Ford, 1986) found that subjects considered goal setting, decision making, planning, and problem solving important aspects of socially competent people.

Other researchers have investigated more specific characteristics that may be related to practical intelligence. Scandura (1977) suggested three domains that differentiate effective problem solvers from ineffective problem solvers. The first of these domains is content which is perhaps better understood as the person's capabilities or competencies needed to solve the problem. The second domain is the individual's cognitive processes

involved in attending, identifying subgoals, recalling relevant information from memory, developing steps to achieve the subgoals, carrying out these behaviors, and then evaluating the outcome. In other words, how well does the person apply accumulated knowledge or gain new knowledge given the problem situation, and what rules does the person use in applying this knowledge. Heppner and Krauskopf (1987) have drawn parallels between this second domain and the area of information processing, i.e., encoding information, setting goals, pattern matching, developing plans, and acting on plans. Scandura's third domain is individual differences which pertains to the unique processes and information that an individual brings to a problem situation. Individual differences related to problem solving may include biological structures, introversion-extraversion, cognitive style (e.g., field independence/dependence, conceptual complexity), values, self-appraisal, and self-regulation (Heppner & Krauskopf, 1987).

Other researchers (Goldner, 1957; Scribner, 1986) have discussed similar aspects of intelligence. These included problem formulation ability, flexibility in developing solutions, awareness of the environment, use of effort saving practices, and situation-specific knowledge.

Taking a closer look at capabilities involved in practical intelligence, Klemp and McClelland (1986) studied

competencies of identified outstanding senior managers in
different types of organizations. Based on in-depth
interviews, they identified common themes that
differentiated outstanding from average managers. The
competencies relevant to the present study were
planning/causal thinking, diagnostic information seeking,
conceptualization/synthetic thinking, and self-confidence
(seeing oneself as a leader, capable, and stimulated by
problems). These authors acknowledged that other
competencies such as interpersonal competence may exert an
influence but did not elaborate on these areas.

Problem Solving

Based on the previously cited research, it appears
that problem solving is a critical component of everyday,
practical intelligence. What, then, is problem solving?
First, a definition of the term "problem" is needed.
Rubinstein (1986) identified three conditions needed for a
problem to exist.

A perceived present or initial state

A perceived desired goal or end state

Perceived obstacles that prevent bridging the gap
between the present and goal state (p. 7).

Difficulty level of the problem is determined by the
insurmountability of the perceived obstacles. This may be
affected by four states: a well-defined initial state and
well-defined goal state, a well-defined initial state and

poorly-defined goal state, a poorly-defined initial state and well-defined goal state, or a poorly-defined initial state and poorly-defined goal state.

Problem solving, then, is a process involving cognitive activity (which is inferred from behaviors) directed towards resolution of a perceived problem (Mayer, 1983). The nature of this process has been the subject of a great deal of research. One common method is to identify stages in the problem solving process (Hayes, 1981; Horan, 1987; Mayer, 1983) which typically are viewed as occurring in the following sequence: realizing that a problem exists, understanding the nature of the problem, developing a plan for solution of the problem, carrying out the plan, evaluating the effectiveness of the solution for the given problem, and integrating the understanding of the experience for possible future application.

As in the case of the larger area of practical intelligence, there appear to be content/competencies, psychological or cognitive processes, and individual differences that contribute to more effective problem solving. First, in terms of competency, does the individual have previously obtained specific knowledge that is pertinent to the present problem situation (Bransford, Sherwood, Vye, & Rieser, 1986). The problem solver may have encountered problems in the past that are similar in some aspects to the current problem.

Much work has focused on the cognitive processes involved in problem solving. Hayes (1981) placed importance on the function of memory in solving problems and focused on the roles of short-term and long-term memory. Memory chunks increase the capacity of short-term memory because information is treated as a unit rather than as discrete and unrelated bits of information. Recoding the information may be facilitatiave because more data can be added to each chunk. Retention in short-term memory can be hampered by either displacement by other information or decay over time. Rehearsal increases retention.

Long-term memory involves the three phases of encoding, storage, and retrieval. Encoding may be more powerful if the individual attends to several aspects of the information, e.g., semantic, visual, auditory. Additional encoding aids are answering questions about the information as well as recognizing categories, hierarchies, and principles in the information. Storage is disturbed by interference either from previously learned information or from information that is learned later. Hayes (1981) propose that overlearning and reviewing are the best methods to ameliorate the effects of interference. The effectiveness of the encoding and storage phases affect the ability to retrieve the data from long-term memory.

The complexity of the effects of memory on applied problem solving was the subject of work conducted by

Glucksberg and McCloskey (1981). These researchers found that it is relatively easy for individuals to decide that they do not know something when they have not stored any relevant information. However, when potentially relevant data has been stored, retrieving it and then deciding if it is indeed relevant slows decision response time dramatically.

Houtz and his colleagues (Houtz, Ringenbach, & Feldhusen, 1973) found that problem solving skills were distinct from skills related to many academic achievement tests. They discovered that problem solving was related to logical thinking and conceptual ability. Conceptual ability may be related to the importance some authors give to representation of the problem (Hayes, 1981; Pitt, 1983; Rubinstein, 1986). Rubinstein (1986) cogently described the importance of problem representation.

> The key point is that often we move too quickly
> into a problem-solving mode when we should spend
> more time on problem representation. Think of the
> word representation as if it were written in the
> form re-presentation. A problem well understood
> and well stated is often half solved. Understanding
> and clarity in statement can be aided by presenting
> a problem from one point of view and then
> re-presenting it from another. This enhances the

potential for alternative ways of perceiving a
situation and thinking about it (p. 6).
Examples of tools that aid representation are matrices,
diagrams, and graphs.

The above-mentioned relationship between problem
solving and logical thinking (Houtz, et al., 1973) may be
reflected in the ability to progress through the problem
solving stages previously identified. Hayes (1981)
identified several procedures the problem solver can use to
reach a solution. The first is a trial-and-error search
which may be used when there is no one path that appears to
be more promising than others. The second technique is a
proximity method which involves taking a step at a time
towards the goal. This method is divided into two
approaches, the hill climbing method which deals with only a
single dimension of the problem and means-ends analysis
which attends to several problem dimensions. The third
approach, the fractionated method, breaks the larger problem
into smaller parts. Knowledge-based methods, the final
approach to reaching a solution, can include purposefully
acquiring needed information, pattern matching, or using
algorithms.

Individual differences in problem solving may be
related to many dimensions (Goldner, 1957; Heppner &
Krauskopf, 1987). These may include, but are not limited
to, biological structures, introversion-extraversion,

cognitive style, values, self-appraisal and self-efficacy, locus of control, and overall rigidity or flexibility in the approach to solving problems.

In addition to the research already cited in this section regarding competencies, cognitive processes, and individual differences, there is one remaining issue that is important in examining problem solving ability. First, effective problem solvers appear to have a metacognitive awareness of their problem solving skills (Slife, Weiss, & Bell, 1985). These researchers examined differences between regular elementary school students and students identified as learning disabled in mathematics who were asked to work on math problems; IQ scores were similar for both groups. Students were given the opportunity to preview the math problems they were later asked to solve and asked to predict the number of problems they would be able to solve. Later, after completing the math problems, they were asked to review their work and mark incorrect answers. Learning disabled students were significantly worse both at assessing their problem solving skills and at monitoring their performance. Thus, as observers of their own behaviors and skills, effective problem solvers may have a more accurate picture of themselves than ineffective problem solvers.

Decision Making

As noted in the previous section, problem solving is a process whereby an individual tries to overcome obstacles

between an initial state and some goal state. Part of this process will probably present choice points which involves the area of decision making. The terms "problem solving" and "decision making" are sometimes used synonymously (Horan, 1987). Howver, there are some differences between the two. Problem solving is a more vague, generic process although there have been attempts to specify problem types and difficulty (Heppner & Krauskopf, 1987). Therefore, there are no strict, formal guidelines to use in solving a problem. Decision making theory, on the other hand, derives from mathematical decision models which provide a formal structure once parameters of the decision are known (Rubinstein, 1986). There are five components in a decision making model (Rubinstein, 1986).

1. Alternative actions, which decision makers control because they can select whichever action they wish.

2. States of nature, which constitute the environment of the decision model [and which] the decision maker does not control.

3. Outcomes, which are the results of a combination of an action and a state of nature.

4. Utilities, which are measures of satisfaction or valle that the decision maker associates with each outcome.

5. An objective, which is a statement of what

the decision maker wants (p. 235).

This model can then be used in a decision making

process which includes the following stages (Baird, 1978):

definition of the problem, listing of options, definition of

criteria (e.g., maximizing gains, minimizing losses),

analysis of options (involving quantification, computation,

estimation, and comparison), and, finally, choice of an

option.

There are two kinds of decision theories. One is

prescriptive which is concerned with how decisions should be

made in order to optimize outcomes with an emphasis on

models, rationality, and quantification. Descriptive

decision theory describes how decisions are made in the real

world.

Additionally, decisions can be made under four

different conditions (Baird, 1978; Busemeyer, 1985; Hayes,

1981; Rubinstein, 1986).

Decision under certainty - each action has one

known outcome.

Decision under risk - actions have more than one

outcome with known probabilities of occurring.

Decision under uncertainty - actions may have more

than one outcome with unknown probabilities of

occurrence.

Decision under conflict - actions and outcomes are

complicated by an opponent with both players

trying to maximize their position.

Each of these conditions requires different procedures in

making a decision. A brief overview of these procedures

follows.

Procedures used when decisions are made under

conditions of certainty can be subdivided into optimizing

methods (finding the best option) and satisficing methods

(looking for the first satisfactory option) (Hayes, 1981).

Optimizing strategies include dominance, lexicographic, and

additive weighting. In the dominance method the chosen

option is at least as good as other options but is better

than other options in one area. In the lexicographic

method, properties of options are ordered in terms of

importance. If one option is better at meeting the first

property, it is chosen. If there is a tie between options

on the first property, all other options are discarded and

the tying options are compared on the second most important

property, and so on. In the additive weighting method,

numerical weights are given both to the importance of the

property overall and the value of each option on that

property. After multiplying and summing the weights on each

option, the one with the highest numerical value is chosen.

In the nonoptimizing satisficing strategy, the decision

maker selects the first option that satisfies minimum

values.

Decisions under risk involve computation of probability of a chance event occurring. This discussion will not elaborate on the computation of probability.

Four strategies can be used in making decisions under uncertainty. Baird (1978) suggested that an individual's psychological make-up determines which strategy is employed. The maximax strategy is used by the optimist who determines the best possible outcome of each option and then selects the best among all the options. The pessimist selects the maximin strategy. In this approach the worst possible outcomes are determined, and then the option with the least worst outcome is chosen. The equally likely strategy assumes all events are equally likely to occur. The regret strategy is used when the decision maker focuses on the regret that may occur after a particular option is chosen; thus, an attempt is made to minimize future regret.

Decisions made under conditions of conflict fall in the province of game theory which is beyond the scope of this brief discussion. This category of decision making under conflict (between two adversaries) should not be confused with conflict in decision making.

This latter notion has been described in the work of Janis and Mann (1977) who defined decisional conflicts as being "simultaneously opposing tendencies within the individual to accept and reject a given course of action. The most prominent symptoms of such conflicts are

hesitation, vacillation, feelings of uncertainty, and signs of acute emotional stress whenever the decision comes within the focus of attention" (p. 46). These authors developed a model outlining response patterns associated with making decisions under conflict: 1) unconflicted inertia - a complacent continuation of action despite new information, 2) unconflicted change - an uncritical adoption of a new course of action, 3) defensive avoidance - a temporary escape from conflict through procrastination, shifting responsibility to another, or rationalizations that bolster the least objectionable alternative, 4) hypervigilance - a frantic and impulsive grasping for a solution, 5) vigilance - a careful search for and weighing of alternatives prior to making a choice (Janis & Mann, 1982). Einhorn and Hogarth (1981) suggested that conflict may be greater at the action-taking phase of decision making than at the cognitive phase because of the inherent greater commitment implied with acting on something.

Classical theories of decision making view the decision maker as being able to see the decision field from an essentially superhuman perspective.

> This man is assumed to have knowledge of the
> relevant aspects of his environment which, if not
> absolutely complete, is at least impressively clear
> and voluminous. He is assumed also to have a
> well-organized and stable system of preferences,

and a skill in computation that enables him to

calculate, for the alternative courses of action

that are available to him, which of these will

permit him to reach the highest attainable point

on his preference scale (Simon, 1955, p. 99).

This decision maker was seen as an optimizer. Starting in

the 1950s, Simon (1955, 1956, 1978, 1979) challenged the

classical theory and replaced it with the concepts of

"bounded rationality" and "satisficing". Man, he proposed,

was not only a more limited processor of the environment but

also had limited computational skills. Further, man is more

of a satisficer who ends the search for options once one is

found that meets requirements than an optimizer who

continues the search until the best possible option is

found.

Since this seminal work by Simon, other researchers

have joined in the study of how people make decisions.

Among the most notable are Tversky and Kahneman (Kahneman &

Tversky, 1973; Tversky, 1972; Tversky & Kahneman, 1974,

1981) whose work concentrated on the inconsistencies,

biases, and heuristics, or rules of thumb, that people use

in making choices. Through the use of heuristics, the

decision maker can make more economical and efficient

decisions, but the decisions can also have systematic and

predictable errors associated with them. Other researchers

(Keren & Wagenaar, 1985; Lanning, 1986; Wallsten & Barton,

1982) have started making empirical inquiries into the more
theoretical work of Simon and Tversky and Kahneman.
Hopefully, through the development of a systematic body of
research, a clearer view of the complex process of decision
making will begin to emerge.

Counseling Psychology and Problem Solving

Historically, counseling psychology has a particular
interest in problem solving. This interest has been
expressed in the area of career counseling which has been a
strong component since counseling psychology became a
discipline (Osipow, 1982). Career counseling has many
aspects associated with it such as increasing awareness of
self through exploration or assessment of values, interests,
and abilities, gathering information about occupations,
evaluating the impact of familial, cultural, and societal
expectations and norms, and choosing a compatible lifestyle.

Crites (1976) proposed that the three major outcomes of
career counseling are: 1) to help the client decide on a
career, 2) to increase the client's decision making skills,
and 3) to facilitate the client's general life satisfaction.
The focus on decision making skills is common to all
theoretical approaches to career counseling (Crites, 1974;
Hazler & Roberts, 1984). The very process of making
decisions, rather than the content of the decision, has
become the focus of many career counselors who see a
corollary to making better decisions in life which, in turn,

is related to a more effective and satisfactory life.

Perhaps the career theorist who placed greatest emphasis on decision making and choice was David Tiedeman (Tiedeman & O'Hara, 1963). His model of career choice was based entirely on decision making. He combined the common stages of decision making (recognizing a problem exists, exploring alternataives, choosing an alternative) with the cognitive concepts of differentiation and integration. He used the latter terms to refer to the processes of recognizing the individual aspects of decision alternatives (differentiation) and combining one's own perceptions and goals with those of the social environment (integration). Thus, the individual is able to distinguish between aspects of self and environment and is able to integrate his or her own goals with group goals in an ever continuing processing cycle which leads to optimal results.

More recent researchers have continued investigating vocational decision making. Harren and his associates (Harren, 1966, 1979; Harren, Kass, Tinsley, & Moreland, 1978) have conducted research on Tiedeman's theoretical work. They have found that his outline of a decision making process with accompanying stages does seem to match the way college students approach actual career decision making. Further, they suggested that counselors should identify which stage clients are in in order to provide the most facilitative interventions. Thus, assessment of the

client's status using a decision making framework becomes the crux of career counseling (Harren, et al., 1978; Mendonca & Siess, 1976; Phillips & Strohmer, 1983).

Beyond the specific area of career counseling, some counseling psychologists have suggested that problem solving and decision making are issues central to the discipline (Borgen, 1984; Janis & Mann, 1982). Indeed, Gelatt (1962) proposed that decision making should be used as the theoretical framework for counseling. This notion has been repeated by more recent counseling psychologists. In an article aimed at defining the profession, Fretz (1982) stated, "Counseling psychology is a speciality whose practitioners help people improve psychological well-being, resolve crises, and increase ability to solve problems and make decisions" (p. 15). In predicting future trends in the field, Ivey (1980) said, "Decision making will become increasingly recognized as a central core of the . . . counseling approach" (p. 13). Echoing the notions reviewed earlier on practical intelligence, there seems to be an accepted view that well-adjusted individuals are better able to face and resolve problems in their lives. Therefore, a goal of counselors working with less-adjusted people should be to positively affect their problem solving skills. Although Heppner (1978) concurred with these researchers regarding the importance of problem solving, he concluded that little is known about how people solve problems.

Interpersonal Problem Solving

In the past two decades, an area of problem solving has become more prominent in psychology; this is the area of interpersonal or social problem solving. Two groups of investigators (Platt, Spivack and their associates and D'Zurilla, Nezu and their associates) provided the impetus for research on this topic in the early 1970s.

Platt and Spivack (1972) hypothesized that everyday problem solving ability should be positively correlated to mental health functioning. Therefore, they believed, psychiatric patients and other identified problem populations should exhibit less effective problem solving ability than normal controls. This ability was composed of several skills: 1) recognition of problems facing people in everyday life, 2) generation of alternatives, 3) development of means-ends thinking which involves a step-by-step approach to solutions, 4) awareness of consequences of behaviors, and 5) awareness of motivational or causal factors involved in interpersonal problems (Platt, Spivack, Altman, Altman, & Peizer, 1974).

This group of researchers focused on identifying differences in problem solving ability between normal and impaired groups. The second body of research (reviewed later in this section) developed by D'Zurilla and Nezu concentrated on confirming the existence of stages in the problem solving process through developing training models.

In order to test their hypotheses, Platt and Spivack developed a measure of problem solving thinking, the Means-End Problem Solving Test (MEPS; Platt & Spivack, 1972). This test consists of ten interpersonal problem scenarios that provide the beginning and end state of the situation and has the test taker provide the middle (the means to arrive at the given end state). The stories are scored on the number of relevant/irrelevant means as well as on the elaboration of subgoals, obstacles, and temporal factors (Butler & Meichenbaum, 1981). Forms of the test have been developed for young children, adolescents, and adults.

Using the MEPS or variations of its story content, researchers have studied the problem solving ability of various groups. Platt and Spivack (1972) found that psychiatric hospital inpatients were less effective problem solvers (i.e., provided fewer relevant means) than normal controls (psychiatric hospital staff). Age and educational level were similar for both groups. Brodbeck and Michelson (1987) found that normal female controls and female agoraphobics showed no difference in their ability to develop means-end strategies. Howver, using other problem solving measures, they found that agoraphobics used fewer effective and more avoidant problem solving responses than did the controls.

Several studies have focused on problem solving in

children. Richard and Dodge (1982) examined differences in elementary school boys who were classified as being popular, isolated, or aggressive. They found that the isolated and aggressive boys generated significantly fewer solutions than the popular boys. Additionally, when asked what their first solution would be, there were no differences between group in the effectiveness of this solution. However, the popular boys chose significantly more effective second solutions than did the other two groups. Therefore, if an initial effective solution was somehow thwarted, the problem boys had less effective alternative solutions to act on.

In another study, Platt and his associates (Platt, et al., 1974) investigated problem solving ability of adolescent psychiatric inpatients and normal controls (high school students). Results indicated that the controls differed significantly from the inpatients on the ability to generate alternative solutions to hypothetical problem situations, the ability to develop means (sequential steps) towards a solution, and the ability to see a problem situation from others' perspectives (role taking). They did not find group differences in recognition of common problems that beset people, causal thinking (a focus on the possible causes of problems), emotional or intrapersonal factors (such as depression or anxiety) and awareness of consequences of actions. The authors suggested that failure to find group differences on these dimensions may be due to

developmental issues (i.e., there may be no discrimination between groups of adolescents on causal and consequential thinking) or that other factors (defense mechanisms and personality characteristics) interact and affect the ability to measure problem solving skills.

Although there is little evidence to justify this latter hypothesis, Pitt (1983) in investigating solution of chemistry problems also proposed that there are developmental differences between tenth graders and college juniors on problem solving ability. In her study, tenth graders were less effective in defining the problem, developing hypotheses, and combining information.

Depression is one area of psychological impairment that several problem solving researchers have investigated. Gotlib and Asarnov (1979) compared four groups (nondepressed and depressed university students and nondepressed and depressed university counseling center clients) on performance on anagrams and the MEPS. They found a negative correlation between depression (as measured by the Beck Depression Inventory) and problem solving ability (MEPS scores). There was no relationship between anagram and MEPS performance or anagram and depression level. These authors concluded that depressed individuals may suffer a specific problem solving deficit (problems of an interpersonal nature). Another study (Nezu & Ronan, 1988) provided longitudinal evidence that effective problem solving

moderates the impact of stress-related depression. Based on research findings, Nezu (1987) recently proposed a new formulation of depression with a problem solving foundation. He stated that

> . . . experiencing negative life events can lead to the occurrence of a wide range of problems, both of which are postulated to function as sources of stress. If these stressors are effectively coped with (i.e., if the problems are resolved), then mild (temporary) depressive symptoms will occur, or no depressive symptoms will appear at all. However, if individuals are ineffective in their problem-solving attempts, then the probability of moderate-to-severe depression is increased (p. 130).

Furthermore he pointed out that ineffective problem solving can lead to future negative life events and problem situations. Deficits in problem solving can occur at any place in the problem solving process.

This problem solving process is the second major research area that was referred to earlier in this section and has been the primary focus of D'Zurilla and Nezu. Beginning with the seminal work (D'Zurilla &Goldfried, 1971), they proposed five stages in the problem solving process. These stages are 1) problem orientation or "set", 2) problem definition and formulation, 3) generation of

alternatives, 4) decision making, and 5) solution implementation and verification. Their formulation included interactions between the individual's cognitive, emotional, and behavioral components as well as interactions between the individual and his or her environment (D'Zurilla & Nezu, 1987). In fact, the importance they placed on the environment was evident in their criteria of evaluating solutions. The chosen alternative should be one that has "the best chance of maximizing positive consequences and minimizing negative ones" (Nezu & D'Zurilla, 1979, p. 270). This is taken directly from the notion of optimizing in decision theory discussed earlier.

In evaluating consequences, four categories of outcome are stressed: short-term, long-term, personal (i.e., effects on oneself), and social (i.e., effects on others and the community). In estimating likelihood, there are two considerations. One is the likelihood of a particular course of action producing a particular effect on the individual and/or the social environment in question. The second is the likelihood that an individual confronted with the problem will be capable of implementing the particular course of action effectively. (Nezu & D'Zurilla, 1979, p. 270).

These two authors have conducted a series of experiments (D'Zurilla & Nezu, 1980; Nezu & D'Zurilla, 1979;

1980; 1981) designed to clarify their proposed problem solving stages and to aid in developing training programs that would enhance problem solving ability. Overall, they found that specific training in problem definition and formulation, generation of alternatives, and decision making components resulted in more effective solutions to test problem situations. Based not only on their findings but also on a review of other research, they (D'Zurilla & Nezu, 1982) presented problem solving training as a possible treatment approach.

Other work has yielded confirming results. Attention to specific objectives or goals has increased the number of alternatives generated but only when the objectives were attended to on a one-by-one basis rather than as a larger group of objectives (Pitz, Sachs, & Heerboth, 1980). In another study chronic psychiatric patients received training in five components of the problem solving process (similar to D'Zurilla and Nezu's five stages). After training was completed, the subjects' performance on solving sample problem situations was comparable to that of a normal control group. Follow-up conducted one month and four months after completion of training indicated that subjects were still using the components and that effectiveness was still comparable to controls when tested on written, hypothetical situations. Dixon and his associates (Dixon, Heppner, Petersen & Ronning, 1979) found that training

affected the quality of solutions to problems.

Although work in the area of interpersonal problem solving has been burgeoning, there are valid criticisms of the research that has been conducted. Tisdelle and St. Lawrence (1986) pointed out that more work needs to be done on D'Zurilla and Nezu's problem solving stages because little is known of the relative contribution of each stage to effective problem solving. Furthermore, real life problems, they proposed, rarely follow such a neatly ordered progression for solution because of their often vague, ambiguous nature. Finally, generalization of training effects to real problelms needs much more investigation.

In their critique of the interpersonal problem solving literature, Butler and Meichenbaum (1981) paid particular attention to assessment of problem solving skills. They felt the MEPS was somewhat limited in contributing knowledge because the story outcomes are always positive and are always provided. This restricts information that could be gained regarding the subjects' outcome expectations and the positive or negative value of that expectation. They also emphasized the need for ecological validity of test situations, i.e., situations that are relevant and meaningful to the subjects being tested. The drawback is, of course, that standardization of tests across research projects is diminished.

Recommendations for future research included more

attention to self-appraisal which "may carry a good deal of predictive weight for the successful performance of problem-solving behaviors" (Butler & Meichenbaum, 1981, p. 219). These authors added, "We would further expect self-appraisal factors to interact with aspects of situational appraisal (nature and difficulty of problem, expectancies for positive or negative outcome, and attibutions of success or failure)" (p. 200). Tisdelle and St. Lawrence (1986) stated that

> . . . current methods of data analysis may be overly constricted. Descriptions of thought content and frequency counts of cognitive categories may blind researchers to the process or function of thought. . . . Sequential analysis of thought patterns may reveal rich information with important theoretical and treatment implications. . . . Therefore, the pattern of an individual's self-statements may be an important consideration (p. 352).

These issues will be addressed in the present study. First, a self-apraisal instrument will be utilized. This instrument, the Problem Solving Inventory, will be reviewed in the next section. Second, sequential analysis of subjects' thoughts will be conducted. Methods for obtaining and analyzing such data will be reviewed in a later section.

The Problem Solving Inventory

Feeling that there was a paucity of instruments that
evaluate problem solving, Heppner and Petersen (1982)
developed the Problem Solving Inventory.

The basic purpose of the Problem Solving Inventory
(PSI) is to assess people's perceptions of their
problem solving behaviors and attitudes. The term
"problems" refers to personal problems that
occasionally confront people, such as feeling
depressed, getting along with friends, choosing a
vocation, or deciding whether to get a divorce.
The instrument reflects the evaluative awareness
of one's problem-solving abilities or style. Thus,
the PSI provides a global appraisal of oneself as
a problem solver (Heppner, 1986, p. 3).

In developing the test, items were used that had face
validity for the five problem solving stages (general
orientation, problem definition, generation of alternatives,
decision making, and evaluation) (Heppner, 1986). After
administering the test, the developers performed a
principal components factor analysis that yielded three main
factors. The problem solving confidence factor reflects an
overall self-assurance about problem solving activities; the
approach-avoidance factor refers to a tendency to approach
or avoid problem solving activities; and the personal
control factor taps the perceived control over emotions and

behaviors while engaged in solving problems.

In his analysis of the test data, Heppner (1986) found that items representing the five problem solving stages loaded randomly across the three factors. He concluded that dimensions exist that underly people's evaluation of their problem solving that are not restricted to any specific stage in the process.

In their validation of the PSI, the developers (Heppner & Petersen, 1982) found that the PSI was not correlated with measures of intelligence, academic achievement, or social desirability. Additionally, they found no correlation with the PSI and Platt and Spivack's MEPS. They proposed that these two problem solving measures tap different aspects of problem solving: self-evaluation of one's actual problem solving as opposed to developing means for hypothetical problem situations.

Several studies have investigated various aspects of problem solving using the PSI. One study (Heppner, Reeder, & Larson, 1983) examined the relationship between PSI scores and several areas: self-concept, personal goals and standards, negative self-statements, enjoyment of abstract thinking, and coping strategies used in stressful situations. Negative self-statements were measured by a questionnaire which presented 51 items containing maladaptive thoughts and feelings with the respondent rating how frequently he or she had experienced the thoughts or

feelings. Self-appraised effective problem solvers, as compared to self-appraised ineffective problem solvers, reported more self-esteem, a more unified view of themselves, fewer dysfunctional thoughts, less agreement with irrational beliefs, and more problem-focused and fewer self-blame strategies related to stressful situations. Furthermore, perceived effective problem solvers reported that they enjoyed and engaged more in the process of thinking.

Another study (Heppner, Hibel, Neal, Weinstein, & Rabinowitz, 1982) also examined differences between self-perceived effective and ineffective problem solvers through the use of a structured interview. They discovered that those who viewed themselves as effective problem solvers differed in cognitions, behaviors, and affect. Specifically, the self-perceived successful problem solvers

> . . . rate themselves as more motivated to solve
> their problems, expected to be more successful,
> perceived both their ability and amount of effort
> as being more important in solving problems (and
> luck less important), rated themselves less
> impulsive and avoidant in solving problems, more
> systematic, persistent, and serious in their
> problem-solving efforts, delay gratification more,
> and perceived problems as a normal part of life
> (p. 583).

A further difference between the two groups was that those who rated themselves as better problem solvers also reported fewer personal problems on the Mooney Problem Checklist.

In other studies that examined differences between self-appraised effective and ineffective problem solvers, additional distinctions have been found. Effective problem solvers attribute the source of personal problems as being their responsibility and resulting from their failure to solve the problem or their lack of effort in trying to solve the problem (Baumgardner, Heppner, & Arkin, 1986). The authors suggested that attributions of this type may strongly affect the previous cited finding that effective problem solvers reported themselves as being more motivated and persistent in trying to solve problems. This would seem to make sense if these individuals see the problem as originating because of their efforts. Nezu (1985) found that self-perceived effective problem solvers "reported less depression, less trait and state anxiety, a more internal control orientation, less frequent problems, and less distress associated with these problems" (p. 135).

These results fit with the findings of other researchers. Phillips and her colleaguse (Phillips, Pazienza, & Ferrin, 1984) found that rational (systematic and logical) decision makers more readily approached problems than avoided them when compared to intuitive (emotional, impulsive) and dependent (denial of

responsibility and more external locus of orientation)
decision makers. The rational and intuitive individuals
also appeared to experience more confidence in being able to
solve problems than the dependent people. In their study of
decision making, Schweiger, Anderson, and Locke (1985) found
that subjects who performed more poorly on a decision making
task attended more to negative emotions, persisted in using
previously successful strategies even when they no longer
worked, and used more illogical thought processes.

Self-perceived problem solvers may experience greater
self-efficacy; that is, they may initially believe that they
have the ability to perform behaviors that will lead to
successful outcomes. Bandura (1977) presented two concepts
that affect a person's behavior which, in turn, influences
outcomes. "An outcome expectancy is defined as a person's
estimate that a given behavior will lead to certain
outcomes. An efficacy expectation is the conviction that
one can successfully execute the behavior required to
produce the outcomes" (p. 193). This is relevant to the
rsearch cited in this section because "expectations of
personal mastery affect both initiation and persistence of
coping behavior" (Bandura, 1977, p. 193).

Because they have a more internal orientation,
self-appraised problem solvers may feel that they have more
control in their lives, a quality which Rubinstein (1986)
believed was related to successful problem solving.

Furthermore, as they use a more systematic, cognitive
approach to their problems, these individuals may search for
more information regarding the problem and consider both
pro's and con's of solutions to problems, processes that
have been found to be related to accurate confidence ratings
of performance (Koriat, Lichtenstein, & Fischhoff, 1988;
Peterson & Pitz, 1988). Confidence in performance is
related to Bandura's (1977) notion of outcome expectancy.

Interpreting the results from these research endeavors,
when self-appraised effective problem solvers are compared
with self-appraised ineffective problem solvers, the former
group appears to experience fewer personal problems in their
lives, view successful resolution of their problems as being
directly related to their efforts, believe that problems
are a normal part of life, enjoy engaging in cognitive
activities, and use more adaptive strategies (i.e., more
systematic and less impulsive).

Methodological Issues

The call for sequential analysis of subjects' thoughts
during problem solving (Tisdelle & St. Lawrence, 1986)
parallels the recent increase of research in psychology
involving sequential analyses. Several authors have written
articles in an attempt to educate psycholgists in a general
way about sequential analysis (Highlen, 1986; Lichtenberg &
Heck, 1986; Wampold, 1986). Others have described types of
behavior sequences that are appropriate for such analysis

(Margolin & Wampold; 1981; Martin, 1984). While yet other
authors (Castellan, 1979; Gottman & Bakeman, 1979; Notarius,
1981) have written about the actual statistical procedures
that can be used in analyzing sequential data.

Given, then, that sequential analysis is becoming
increasingly utilized in psychological research, there are
several methods that can be employed in gathering the data.
Because of the nature of the current research, the focus in
this section will be on gathering data on intrapersonal
rather than interpersonal (e.g., dyadic) behavior sequences.

Martin (1984) discussed three procedures for assessing
cognitions: process tracing, stimulated recall, and
cognitive training. In process thinking, the subject thinks
aloud while performing some experimental task. This
procedure will be referred to as the "think aloud" approach.
Scandura (1977) suggested that this procedure may be useful
in studying problem solving specifically. In stimulated
recall, audio- or videotapes are made of the subject while
he or she is involved in a task. Later, the subject reviews
the tape and responds to experimenter instructions (e.g.,
recalling thoughts that occurred to him or her during a
specific point on the tape). The third data gathering
method, cognitive training, involves training subjects to
become aware of their reactions and signal when they are
occurring without disrupting the ongoing activity. For
example, the subject might be taught the differences between

several types of reactions, increase personal awareness of these reactions in training sessions, and then signal through a code (e.g., one finger tap for one type of reaction, two taps for another, etc.) when these reactions occurred. The remainder of this section will provide a more detailed review of the first two data gathering methods. Because of the complicated nature of the third method, it will not be discussed further.

Genest and Turk (1981) provided an overview of the thinking aloud approach and described several techniques that could be used.

Continuous monologues - subjects verbalize all of their thoughts while simultaneously performing a task.

Random sampling of thoughts - subjects record thoughts that occur within a given time period. The time period is often signaled either directly by the experimenter or by an electronic beeper.

Event recording - subjects record whenever a previously defined reaction occurs.

Rating scales - subjects rate reactions on scales that have been developed previously.

Reconstructive procedures - this procedure is equivalent to Martin's (1984) previously mentioned stimulated recall.

Several researchers have used the thinking aloud technique in their work on problem solving or decision making. Goor and Sommerfeld (1975) studied the creative processes involved in problem solving by audio recording subjects' resolutions of experimental problems. Subjects had been selected based on creativity scores. Tapes were transcribed dividing the responses into three-second intervals with content coded as being in one of seven categories. Analysis was conducted on both frequencies of catagories and sequences of categories of high and low creative students. Results indicated that high creative subjects had higher frequencies in generating new information or hypotheses, developing or working on a hypothesis, and self-reference or self-criticism; these subjects had lower frequencies for silence. Results of pattern analysis were less clear.

Schweiger and his colleagues (Schweiger, Anderson, & Locke, 1985) had business students audiotape their decision making processes in a business management simulation. They found that causal analysis (looking for causes of results) was positively correlated to quality of decision while blindly repeating previously successful decisions, errors in thinking or lack of reason, and self-doubt and negative emotions were negatively correlated with decision quality.

While studying group decision making processes, Kaplan and Miller (1987) also used a thinking aloud approach by

tape recording the group's discussion of the decision task.
Tetlock (1986) has used a written variation of the thinking
aloud technique in assessing cognitive complexity in
decision making. Based on his study, he concluded, "What
people think (the basic values they hold and the types of
problems they are trying to solve) may often constrain how
they think (the complexity of their reasoning)" (p. 824).

The stimulated recall procedure has also been used in
research. Ickes and his associates (Ickes, Robertson,
Tooke, & Teng, 1986) believed that their work supported
listing thoughts through stimulated recall as a valid
procedure because results were positively correlated with
behavioral and personality measures. A second study
(Asendorpf, 1987) also indicated that stimulated recall can
successfully elicit covert processes (cognitions and
emotions) that correspond to subjects' performance on more
objective measures of personality characteristics. A third
study (Peterson, Swing, Braverman, & Buss, 1982)
successfully used stimulated recall with grade school
students to assess the cognitive processes that occur during
classroom instruction.

A different data gathering technique was used in two
studies of assertion which employed a compromise between
eliciting free responses of subjects and using a structured
response questionnaire by developing a questionnaire based
on free responses obtained during pilot studies. In these

studies, following exposure to assertive situations, subjects were asked to rate statements on the degree of influence they exerted during the experimental situations.

Caccioppo and Petty (1981) advocated the use of a different method, thought listing, in assesing cognitions. In this technique, subjects are asked to list their thoughts regarding a stimulus or experimental task. They discussed several dimensions that can be used to classify responses: 1) polarity of response, 2) source of information the subject uses in the response, 3) target of the response, 4) irrationality of the response, 5) saliency of response, 6) emotionality of response, and 7) reality of response. Scoring can be done by independent raters, by the subjects themselves, or both groups. They stated that results of this third method of scoring have been strongly correlated in past studies. However, some subjects may experience difficulty in classifying their thoughts. These authors suggested that thought listing is a valuable technique in assessing sequences of cognitions.

One experiment (Caccioppo, Glass, & Merluzzi, 1979) indicated that thought listing is indeed a viable technique for gathering cognitive data. This study used two groups of subjects, high heterosocially anxious males and low heterosocially anxious males. Subjects, on an individual basis, were told they would be required to participate in a dyadic interaction with an unknown female student.

Following a brief contrived delay after this information was
given, subjects were asked to list all their thoughts about
the upcoming interaction (which, in fact, did not occur).
After listing their thoughts, subjects were then asked to
rate each thought as favorable toward themselves,
unfavorable toward themselves, or neutral. Independent
raters also scored the responses. Using frequency counts of
the categories of self-statements, they found that high
heterosocially anxious men had more negative self-statements
than low heterosocially anxious men.

In summary, researchers have found thinking aloud,
stimulated recall, and thought listing are viable techniques
for gathering data on covert processes. However, there are
also precautions (Genest & Turk, 1981) that accompany these
techniques. First, subjects may not report all of their
thoughts. Second, it may be difficult for subjects to
verbalize everything they experience internally because of
the limitations of language. Third, these techniques often
require the time-consuming task of transcribing subject
reports. Fourth, there may be a mass of data for the
researcher to organize and classify. Finally, there is a
general caveat that applies to many research tasks. In
order for the results to be generalizable outside the
experimental situation, tasks that approximate the real
world of the subjects should be selected (Levin, Louviere, &
Schepanski, 1983).

Summary

   Based on a review of the literature, problem solving
and its accompanying component, decision making, are areas
that have been the subject of a great deal of theoretical
and empirical research. Recent formulations of practical
intelligence place much emphasis on the ability to solve
problems that occur in everyday life. Counseling
psychologists have also placed importance on the ability of
adaptive individuals to effectively solve problems in their
lives.

   Reflecting the critical aspect of problem solving,
researchers have expanded their efforts regarding problem
solving. Emphasis is no longer exclusively placed on
academic types of problems; interpersonal problems have also
become valid areas of research. Along with this new
emphasis, investigators have developed new assessment
measures and techniques or utilized old procedures. For
example, the thinking aloud and cognitive training methods
of data gathering retain some aspects of the introspective
methods used in psychology's earliest laboratories.

   However they approach their task, researchers are
formulating theories and gathering data on how people solve
problems. An information base is being developed and added
to at a rapid pace.

Purpose of the Study

   As the review of the literature indicated, a

substantial body of research on problem solving is being developed. One aspect of the subject deals with interpersonal problem solving which is the focus of the present investigation. Much of the previous research in this area dealt with delineating stages of the problem solving process, comparing problem solving ability of maladjusted and normal people, and discovering differences between self-appraised effective and ineffective problem solvers.

The purpose of the present study is to further investigate differences between self-appraised effective and ineffective problem solvers. However, this study will also look at a third group of subjects, those who score in the midrange on the PSI. The group, who will be referred to as average problem solvers, presumably respresents a sizeable portion of the population, and, therefore, their responses are of interest.

Specifically, the current study will examine the quality of problem resolutions, confidence in problem resolution, and thoughts and feelings experienced during problem resolution of three groups of subjects. Subjects will be placed into one of three groups (effective, average, ineffective) based on their scores on the PSI. The confidence ratings and sequential analysis of thoughts and feelings are unique components of this study.

Hypotheses of the Study

The research questions is: Do self-appraised effective, average, and ineffective problem solvers differ in the quality of problem resolution, the confidence they have regarding their resolution, and the sequence of thoughts and feelings experienced when presented with a hypothetical problem situation.

The following hypotheses will be investigated:

1. There will be a significant difference between self-appraised effective, average, and ineffective problem solvers on the quality of solution to a hypothetical interpersonal problem.

2. There will be a significant difference between self-appraised effective, average, and ineffective problem solvers in rating confidence in effectiveness of their problem resolution.

3. Self-appraised effective, average, and ineffective problem solvers will exhibit significant differences in the sequence of positive, negative, and neutral thoughts and emotions experienced during resolution of a hypothetical problem situation.

CHAPTER 2

Method

<u>Subjects</u>

Subjects were students attending a large public
university in the southwest. Volunteers were recruited
from undergraduate psychology classes and were provided
either extra course credit or a monetary reimbursement
($5.00) for their participation.

A total of 71 students volunteered for the study. Data
for four of these students was not included in the analysis.
One vision-impaired student chose not to complete the
required forms; data from all foreign students (N = 3) was
excluded because of language ability limitations.

The final sample consisted of 67 subjects which
included 21 males and 46 females. Mean age of the subjects
was 24. Distribution among class levels was 10 sophomores,
16 juniors, 35 seniors, 5 masters level students, and 1
special student.

<u>Instruments</u>

The Problem Solving Inventory (Heppner & Petersen,
1982) is a self-rating instrument designed to assess problem
solving behaviors and attitudes. Thirty-two items are
presented in a 6-point Likert format. Individuals who score
low on the PSI respond to items in a way indicative of

effective problem solvers, whereas those who score high on the PSI respond in a manner associated with ineffective problem solving. Factor analysis of the PSI revealed three factors: problem solving confidence, approach-avoidance style, and personal control. Reliability estimates of internal consistency (.90) and test-retest stability (.89) have been conducted. The PSI appears to be related to an internal locus of control and is not correlated with intelligence or social desirability (Heppner & Petersen, 1982).

Problem resolution of a hypothetical problem situation was scored on a 7-point scale. The standard for an effective solution included: relevance to the problem situation (i.e., addressing the problem), a clear outline of the solution, a solution that was realistic in its implementation and outcome effectiveness, a nonhostile solution, and provision for alternatives if the primary solution was inadequate.

Subjects were asked to rate their confidence in the effectiveness of their problem resolution. This self-rating was done on a 7-point scale.

After listing thoughts and feelings they would experience in the problem situation, subjects were asked to evaluate and score these thoughts and feelings as positive toward self (scored as a "+"), negative toward self ("-"), or neutral toward self ("0").

Procedure

Subjects were tested in small groups. They were
provided with questionnaire packets that contained all
instructions and assessment materials (Appendix). Materials
were presented in the following order: PSI, presentation of
five hypothetical interpersonal problem situations, problem
resolution sheet, confidence rating sheet, thought listing
form, and thought rating instructions. Subjects worked at
their own pace except on two timed sections (problem
resolution - 5 minutes and thought listing - 4.5 minutes).

Presentation of the five hypothetical situations
included instructions to rank order the problems in terms of
personal difficulty that would be experienced in each
situation. Problem situations were developed based on the
investigator's clinical experience with university students
and were validated as being appropriate by university
counseling center staff. Problem resolution, confidence
rating, thought listing, and thought rating were confined to
the one problem the individual ranked as most personally
difficult. This procedure was used in order to make the
target situation as personally meaningful and relevant as
possible.

Subjects were divided into three groups based on PSI
scores. Individuals with the 15 lowest scores were combined
in a group labeled self-perceived effective problem solvers
(PSI X = 57.47; SD = 8.7); the 15 highest scorers were

labeled self-perceived ineffective problem solvers (PSI X = 106; SD = 12). This division procedure is similar to that used by other researchers (Baumgardner, et al., 1986; Heppner, et al., 1982, 1983). All remaining subjects composed a third group, average problem solvers (N = 37; PSI X = 83.38; SD = 5.49).

In addition to the subjects' evaluation and rating of their thoughts and feelings, the investigator also rated their thoughts and feelings using the same scoring procedure (+, -, 0). During this scoring process, the investigator was blind to PSI scores. Overall, there was an 82% agreement of ratings by subjects and the investigator. Most of the disagreements either were due to an apparent misunderstanding by some subjects of the neutral category or a more obvious misclassification (e.g., scoring "wanting to run away" as positive, scoring "unattractive" as positive). This data was coded in strings as they were listed by the subjects.

Design and Analysis

For Hypotheses 1 and 2, PSI scores were used as the independent variable. The dependent variable for Hypothesis 1 was the Problem Resolution score. The dependent variable for Hypothesis 2 was the Confidence Rating.

In testing Hypothesis 3, a 3 X 3 frequency matrix was developed on all possible first order sequences of thoughts (e.g, a positive thought followed by a positive thought, a

positive thought followed by a negative thought, etc.) for each of the three PSI groups. These frequency tables were then converted into three 3 X 3 probability matrices. In this third hypothesis, investigator-scored thoughts and emotions were used for analysis rather than subject-scored data since it was believed that the former provided a more accurate scoring.

CHAPTER 3

Results

Hypothesis 1

Hypothesis 1 stated,

There will be a significant difference between
self-appraised effective, average, and ineffective
problem solvers on the quality of solution to a
hypothetical interpersonal problem.

This hypothesis was tested using a one-way analysis of
variance (ANOVA) with the independent variable being PSI
scores and dependent variable being the Problem Resolution
score. Results of this test were not significant. Summary
data are included in Table 1.

Table 1

One-way Analysis of Variance (Problem Resolution by PSI)

Source	df	SS	MS	F Ratio	F Prob
Between Groups	2	12.553	6.276	1.403	.253
Within Groups	64	286.223	4.472		
Total	66	298.776			

Hypothesis 2

Hypothesis 2 stated,

There will be a significant difference between

self-appraised effective, average, and ineffective

problem solvers in rating confidence in

effectiveness of their problem resolution.

This hypothesis was tested using a one-way ANOVA with PSI

score as the independent variable and Confidence Rating as

the dependent variable. Results of this test were

significant (See Table 2). Therefore, there is a difference

between groups in terms of the confidence they had that

their problem solution would, in fact, be effective.

Table 2

One-way Analysis of Variance (Confidence Rating by PSI)

Source	df	SS	MS	F Ratio	F Prob
Between Groups	2	19.478	9.739	8.504	.0005
Within Groups	64	73.297	1.145		
Total	66	92.776			

A post hoc Scheffe test indicated that there were

differences (p < .05) between self-appraised effective and

ineffective problem solvers and between self-appraised

average and ineffective problem solvers.

Hypothesis 3

Hypothesis 3 stated,

Self-appraised effective, average, and ineffective

problem solvers will exhibit significant differences

in the sequence of positive, negative, and neutral

thoughts and emotions experienced during resolution

of a hypothetical problem situation.

This hypothesis was tested using a differences in

proportions test suggested by Bruning and Klintz (1977) when

data are in the form of probability matrices. Combined

frequency matrices for the three problem solving groups are

provided in Tables 3, 4, and 5. Probabilities are shown in

parentheses. The difference in proportions test is based on

the calculation of Z scores with a $Z > 1.96$ representing a

significant difference $(p < .05)$ between proportions.

A difference in proportions test of first order

sequences of interactions resulted in six significantly

different proportions (Table 6). Because of the small

frequencies in two of these cells, four will be discussed.

In interpreting these results, it appears that it is

significantly more probable that

1. effective problem solvers follow a positive

   thought with another positive thought than

   ineffective problem solvers,

2. effective, compared to ineffective problem solvers

   follow a positive thought with a negative thought,

Table 3

Sequential Matrix for Self-appraised Effective Problem
Solvers

		Consequent			
		+	−	0	Totals
	+	62(.83)	6(.08)	7(.09)	75
Antecedent	−	9(.22)	30(.73)	2(.05)	41
	0	5(.42)	1(.08)	6(.12)	12
	Totals	76	37	15	N=128

Note. Frequencies and probabilities (in parentheses) are
both shown.

Table 4

Sequential Matrix for Self-appraised Average Problem
Solvers

		Consequent			
		+	−	0	Totals
	+	86(.71)	33(.27)	2(.02)	121
Antecedent	−	46(.27)	117(.70)	5(.03)	168
	0	5(.50)	3(.30)	2(.20)	10
	Totals	137	153	9	N=299

Note. Frequencies and probabilities (in parentheses) are
both shown.

Table 5

Sequential Matrix for Self-appraised Ineffective Problem
Solvers

		Consequent			
		+	−	0	Totals
	+	21(.64)	10(.30)	2(.06)	33
Antecedent	−	14(.15)	71(.78)	6(.07)	91
	0	3(.27)	5(.45)	3(.27)	11
	Totals	38	86	11	N=135

Note. Frequencies and probabilities (in parentheses) are
both shown.

Table 6

Difference in Proportions Z Scores Based on Probability
Matrices

Sequence	Groups 1 & 2	Groups 1 & 3	Groups 2 & 3
+/+	1.90	2.17*	−.77
+/−	−3.25*	2.97*	.34
+/0	2.26*	.53	1.22
−/+	−.65	.99	2.20*
−/−	.38	−.63	1.38
−/0	.63	−.44	1.50
0/+	−.38	.75	1.08
0/−	−1.34	−2.03*	.71
0/0	−1.46	1.13	− .38

Note. Group 1 = effective, Group 2 = average,

Group 3 = ineffective problem solvers.

*p < .05

3. average problem solvers follow a positive
    thought with a negative thought than effective
    problem solvers, and

4. average problem solvers follow a negative
    thought with a positive thought than
    ineffective problem solvers.

Additional difference in proportions tests were
calculated for consequences across all three possible
antecedents. In other words, regardless of whether the
antecedent is positive, negative, or neutral, is it more
likely, for example, for one group to have a positive
consequent thought in this two-stage sequence. Results of
these tests are provided in Table 7. Significant
differences (p < .05) indicate that it is more probable that

1. effective problem solvers will end the sequence
    with a positive thought than either average or
    ineffective groups; average problem solvers have
    a higher probability than ineffective problem
    solvers of ending with a positive thought;

2. ineffective problem solvers will end the
    sequence with a negative thought than either
    effective or average problem solvers; average
    problem solvers are more likely to end the
    sequence on a negative note than effective
    problem solvers; and

Table 7

Difference in Proportions Z Scores for Consequences
(Across all Antecedents)

Consequence	Groups 1 & 2	Groups 1 & 3	Groups 2 & 3
+	2.46*	5.07*	3.54*
-	-4.19*	-5.68*	-2.52*
0	3.68*	1.08	-2.31*

*p < .05

3. effective problem solvers will have a neutral
   consequence more often than average problem
   solvers who, in turn, are more likely to have a
   neutral consequence than ineffective problem
   solvers.

CHAPTER 4

Discussion

The purpose of the present study was to examine
differences between types of problem solvers. An inventory
of self-appraised problem solving skills and attitudes was
used to differentiate three groups, self-perceived
effective, average, and ineffective problem solvers.
Subjects were asked to complete three tasks: solve a
hypothetical problem, rate the confidence they had in their
solution, and list and score thoughts and feelings they
would experience if they were actually in the problem
situation. The hypotheses stated that there would be
significant differences between the three groups on quality
of problem resolution, confidence in effectiveness of
problem resolution, and patterns of thoughts and emotions.

Based on results of data analysis, there were no
significant differences between groups on problem
resolution. Thus, the first hypothesis was not confirmed.
However, the second hypothesis was confirmed; groups did
differ in the confidence ratings. Specifically,
self-appraised problem solvers were more confident of their
solution than ineffective problem solvers, and average
problem solvers were more confident than ineffective problem
solvers.

The third hypothesis was partially confirmed. Six of
the possible 27 conditional probabilities were significantly
different. The conclusions are that self-appraised
effective problem solvers are more likely to have
positive-positive and positive-negative sequences than
ineffective problem solvers. Average problem solvers are
more likely to have a positive-negative sequence than
effective problem solvers, and average problem solvers are
more likely to have a negative-positive sequence than
ineffective problem solvers.

Additionally, in reference to the third hypothesis,
there is greater probability that self-perceived effective
problem solvers will end a two-stage sequence or first-order
transition with a positive thought or emotion than either
the average or ineffective groups irregardless of the
type of the preceding thought or emotion. The average group
is more likely to end the sequence positively than the
ineffective group. The reverse pattern is found when
looking at negative consequences irregardless of type of
antecedent. Ineffective problem solvers are more likely to
end on a negative note than either the effective or average
groups, while average problem solvers are more likely to
have a negative consequence than effective problem solvers.

These results provide interesting information about
characteristics of problem solvers. First, problem solving
ability, as defined and measured in this study, is not

related to endorsement of problem attitudes and behaviors.
This finding complements the results obtained by Heppner and
Petersen (1982) who found no significant correlation between
PSI scores and scores on three MEPS stories (measuring
ability to develop means for a problem solution). Tests
assessing solutions to hypothetical problems and the PSI
appear to measure different aspects of problem solving.

Second, the finding that low scorers on the PSI
(effective problem solvers) had more confidence in their
efforts than high scorers is also consistent with other
research (Heppner & Petersen, 1982) which found positive
correlations between PSI scores and self-ratings of levels
of problem solving skills (when comparing to others) and
satisfaction with level of problem solving skills. Whereas
the Heppner and Petersen study involved a more general
self-assessment of level and satisfaction of skills, the
present study provided a more specific and immediate
assessment of confidence in skills. This finding adds
to the validity of the PSI as a measure of problem solving
self-confidence.

The third finding regarding differences in
thought/emotion sequences is the most interesting outcome
of the study. Heppner and his associates (Heppner, et al.,
1983) found that low PSI score are related to a more
positive self-concept and less criticalness of self. The
present study provided some information on the processes

that occur that may contribute to self-concept and
self-liking. Low scorers appear more likely to end a
two-stage sequence positively while high scorers are more
likely to end the sequence thinking or feeling negatively
about themselves or others.

The results of this study confirmed previous
research but also added more specific information on the
characteristics of problem solvers. It also included
information on the mid-range scorers on the PSI who appear
to have qualities of a good "middle" group with some
characteristics similar to both low and high scorers.

There are also theoretical questions raised by these
results. Heppner (1986) in acknowledging the relationship
between the PSI and the concept of self-efficacy stated
that, "The PSI is conceptualized as a global appraisal of
oneself, whereas Bandura's self-efficacy is a more
situation specific self-appraisal" (p. 21). Bandura (1977)
defined self-efficacy as the belief "that one can
successfully execute the behavior required to produce
outcomes" (p. 193). He also proposed that, "Not only can
perceived self-efficacy have directive influence on choice
of activities and settings, but through expectations of
eventual success, it can affect coping patterns once they
are initiated" (p. 194). These statements seem to parallel
the results of this study regarding confidence and
self-statements. Perhaps, self-efficacy is the underlying

construct with effectiveness of problem solving being only
one form of its expression.

Thus, the present study added some information to the
growing body of knowledge on problem solving and also raised
some theoretical questions. There were some limitations to
the study, however. Use of a test of problem solving
ability with more external validity would have added more
information. Also, since the thought listing was
retrospective in nature, it did not assess the
self-statements that would occur during a problem situation.
However, because of the often chronologically enduring
nature of interpersonal problems, methodological issues
would be difficult to overcome.

INFORMED CONSENT

I, _____, agree to participate in a
study of interpersonal problem solving which is a common aspect
of everyday life. The purpose of this study is to examine the
processes involved in solving these kinds of problems so that, in
the future, people may better resolve such situations. I consent
to participate in this research which consists of completing a
questionnaire on my problem solving behaviors and solving a
hypothetical problem situation.

I understand that my responses will be confidential. All
analyses of the data will be conducted on group data, with no
reference made to my personal responses. Under these conditions,
I agree that any information obtained from this research may be
used in any way thought best for publication.

I understand that there is minimal personal risk or
discomfort involved in this research and that I am free to
withdraw my consent and discontinue participation in this study
at any time. A decision to withdraw from the study will not
result in any adverse consequences for me.

If I have any questions or problems that arise in connection
with my participation in this study, I should contact
Pat McGregor, the project director, at 565-2741 (work).

_____   _____
Date   Signature of Subject

_____   _____
Date   Project Director

THIS PROJECT HAS BEEN REVIEWED BY THE UNIVERSITY OF NORTH TEXAS
COMMITTEE FOR THE PROTECTION OF HUMAN SUBJECTS (Phone: 565-3940)

PROBLEM SITUATIONS

Please read the following five interpersonal problem situations carefully. As you read, imagine that you are involved in each of the situations.

_____ 1. You want to have friends and be liked. However, over the past two weeks, you notice that several of your closest friends seem to be avoiding you.

_____ 2. Your parents still seem to treat you like a child and try to control your life too much. You love them, but would like for them to ease up on you.

_____ 3. Your boyfriend/girlfriend/spouse has lately pointed out that the two of you have differences of opinion about several important issues. You think he/she has been more distant because of this. You want the relationship to continue.

_____ 4. You would like very much to belong to a close-knit social group. However, you don't know any of the group members very well.

_____ 5. Your roommate/living partner seems to be picking on you lately about several of your admittedly bad habits. You like your roommate and want to get along with him/her.

In the space provided by each story, rank each one in order of which situation would be the most difficult for you personally to be in. For the situation that is the most difficult, write "1" in the space by it; the next most difficult situation would be ranked "2"; and so on, with the least difficult situation for you to be in having a "5".

PROBLEM RESOLUTION SHEET

You will now be given 5 minutes to write all the thoughts you
have regarding how you would go about resolving the problem
situation you rated as the most difficult ("1") for you. Please
write your response on this sheet as legibly as you can.

CONFIDENCE RATING

On the scale below, rate the level of confidence you have in the
effectiveness of the solution you developed for your most
difficult problem.

Very
Doubtful of
Effectiveness

Very
Confident of
Effectiveness

THOUGHT LISTING

During this section, you should still be thinking of the situation you ranked as the most difficult for you ("1").

Now, we want you to record the thoughts and feelings you think you would have as you went through the whole process of realizing a problem exists, deciding what you want to do about it, and developing some course of action to take. In other words, what would be going on <u>inside</u> <u>you</u> during this time. What emotions would you feel and what thoughts would you have. Think of this as a description or analysis of <u>yourself</u>.

As you consider these questions, we are interested in <u>everything</u> that goes through your mind. Please list your thoughts and feelings as they occur to you whether or not they seem important or relevant.

The next page is the form for you to record your thoughts and feelings. Ignore spelling, grammar, and punctuation; <u>just</u> <u>write</u> <u>down</u> <u>all</u> <u>thoughts</u> <u>and</u> <u>feelings</u> <u>immediately</u> <u>as</u> <u>they</u> <u>come</u> <u>to</u> <u>you</u>. Simply write down the first thought or feeling as it occurs to you in the first box, the second one in the second box, etc. Please put only one thought or feeling in a box. If you run out of room, use the back of the form. Try to write legibly.

You will have 4 minutes to complete this task.

THOUGHT RATING

We would now like for you to turn back to the preceding form on
which you wrote down your thoughts and feelings. We would like
you to go back and rate each thought and feeling you wrote.
In the left margin beside each box, we would like to know
if that idea or feeling was favorable to yourself (+),
unfavorable to yourself (-), or neither favorable nor unfavorable
toward yourself (0). If the idea or feeling seems to be
favorable, you should place a + (plus) in the left margin beside
it; if it seems unfavorable, you should place a - (minus) in the
left margin; and if it was neither favorable nor unfavorable, or
had nothing to do with yourself, you should put a 0 (zero) in the
left margin. Please go back now and rate each thought or feeling
by putting a +, -, or 0 in the left margin.

REFERENCES

Asendorpf, J.B. (1987). Videotape reconstruction of emotions and cognitions related to shyness. <u>Journal of Personality and Social Psychology</u>, <u>53</u>, 542-549.

Baird, B.F. (1978). <u>Introduction to decision analysis</u>. North Scituate, MA: Duxbury Press.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. <u>Psychological Review</u>, <u>84</u>, 191-215.

Baumgardner, A.H., Heppner, P.P., & Arkin, R.M. (1986). Role of causal attribution in personal problem solving. <u>Journal of Personality and Social Psychology</u>, <u>50</u>, 636-643.

Borgen, F.H. (1984). Counseling psychology. <u>Annual Review of Psychology</u>, <u>35</u>, 579-604.

Bransford, J., Sherwood, R., Vye, N., & Rieser, J. (1986). Teaching thinking and problem solving. <u>American Psychologist</u>, <u>41</u>, 1078-1089.

Brodbeck, C., & Michelson, L. (1987). Problem-solving skills and attributional styles of agoraphobics. <u>Cognitive Therapy and Research</u>, <u>11</u>, 593-610.

Bruning, J.L., & Kintz, B.L. (1977). <u>Computational handbook of statistics</u>. Glenview, IL: Scott, Foresman and Company.

Busemeyer, J.R. (1985). Decision making under uncertainty:
A comparison of simple scalability, fixed-sample, and
sequential-sampling methods. Journal of Experimental
Psychology: Learning, Memory, and Cognition, 11,
538-564.

Butler, L., & Meichenbaum, D. (1981). The assessment of
interpersonal problem-solving skills. In P.C. Kendall &
S.D. Hollon (Eds.), Assessment strategies for
cognitive-behavioral interventions (pp. 197-225).
New York: Academic Press.

Cacioppo, J.T., Glass, C.R., & Merluzzi, T.V. (1979).
Self-statements and self-evaluations: A
cognitive-response analysis of heterosocial anxiety.
Cognitive Therapy and Research, 3, 249-262.

Cacioppo, J.T., & Petty, R.E. (1981). Social psychological
procedures for cognitive response assessment: The
thought-listing technique. In T.V. Merluzzi, C.R. Glass,
& M. Genest (Eds.), Cognitive assessment (pp. 309-342).
New York: Guilford Press.

Castellan, N.J., Jr. (1979). The analysis of behavior
sequences. In R.B. Cairns (Ed.), The analysis of social
interactions: Methods, issues, and illustrations
(pp. 81-116). Hillsdale, NJ: Lawrence Erlbaum
Associates.

Crites, J.O. (1974). Career counseling: A review of major
approaches. The Counseling Psychologist, 4, 3-23.

Crites, J.O. (1976). Career counseling: A comprehensive approach. The Counseling Psychologist, 6, 2-12.

Dixon, D.N., Heppner, P.P., Petersen, C.H., & Ronning, R.R. (1979). Problem-solving workshop training. Journal of Counseling Psychology, 26, 133-139.

D'Zurilla, T.J., & Goldfried, M.R. (1971). Problem solving and behavior modification. Journal of Abnormal Psychology, 78, 107-126.

D'Zurilla, T.J., & Nezu, A. (1980). A study of the generation-of-alternatives process in social problem solving. Cognitive Therapy and Research, 4, 67-72.

D'Zurilla, T.J., & Nezu, A. (1982). Social problem solving in adults. In P.D. Kendall (Ed.), Advances in cognitive-behavioral research and therapy (Vol. 1) (pp. 201-274). New York: Academic Press.

D'Zurilla, T.J., & Nezu, A.M. (1987). The Heppner and Krauskopf approach: A model of personal problem solving or social skills? The Counseling Psychologist, 15, 463-470.

Ford, M.E. (1986). For all practical purposes: Criteria for defining and evaluating practical intelligence. In R.J. Sternberg & R.K. Wagner (Eds.), Practical intelligence (pp. 183-200). New York: Cambridge University Press.

Frederiksen, N. (1986). Toward a broader conception of human intelligence. In R.J. Sternberg & R.K. Wagner

(Eds.), Practical intelligence (pp. 84-116).

New York: Cambridge University Press.

Fretz, B.R. (1982). Perspective and definitions. The

Counseling Psychologist, 10, 15-19.

Gelatt, H.B. (1962). Decision-making: A conceptual frame

of reference for counseling. Journal of Counseling

Psychology, 9, 240-245.

Genest, M., & Turk, D.C. (1981). Think-aloud approaches to

cognitive assessment. In T.V. Merluzzi, C.R. Glass, &

M. Genest (Eds.), Cognitive assessment (pp. 231-269).

New York: Guilford Press.

Glucksberg, S., & McCloskey, M. (1981). Decisions about

ignorance: Knowing that you don't know. Journal of

Experimental Psychology: Human Learning and Memory,

7, 311-325.

Goldner, R.H. (1957). Individual differences in whole-part

approach and flexibility-rigidity in problem solving.

Psychological Monographs, 71, 1-18.

Goor, A., & Sommerfeld, R.E. (1975). A comparison of

problem solving processes of creative students and

noncreative students. Journal of Educational

Psychology, 67, 495-505.

Gotlib, I.H., & Asarnow, R.F. (1979). Interpersonal and

impersonal problem-solving skills in mildly and

clinically depressed university students. Journal of

Consulting _and_ _Clinical_ _Psychology,_ _47,_ 86-95.

Gottman, J.M., & Bakeman, R. (1979). The sequential analysis of observational data. In M.E. Lamb, S.J. Suomi, & G.R. Stephenson (Eds.), _Social_ _interaction_ _analysis_ (pp. 185-206). Madison: The University of Wisconsin Press.

Hansen, D.J., St. Lawrence, J.S., & Christoff, K.A. (1985). Effects of interpersonal problem-solving training with chronic aftercare patients on problem-solving component skills and effectiveness of solutions. _Journal_ _of_ _Consulting_ _and_ _Clinical_ _Psychology,_ _53,_ 167-174.

Harren, V.A. (1966). The vocational decision-making process among college males. _Journal_ _of_ _Counseling_ _Psychology,_ _13,_ 271-277.

Harren, V.A. (1979). A model of career decision making for college students. _Journal_ _of_ _Vocational_ _Behavior,_ _14,_ 119-133.

Harren, V.A., Kass, R.A., Tinsley, H.E.A., & Moreland, J.R. (1978). Influence of sex role attitudes and cognitive styles on career decision making. _Journal_ _of_ _Counseling_ _Psychology,_ _25,_ 390-398.

Hayes, J.R. (1981). _The_ _complete_ _problem_ _solver._ Philadelphia: The Franklin Institute Press.

Hazler, R.J., & Roberts, G. (1984). Decision making in vocational theory: Evolution and implications.

Personnel and Guidance Journal, 62, 408-410.

Heppner, P.P. (1978). A review of the problem-solving literature and its relationship to the counseling process. Journal of Counseling Psychology, 25, 366-375.

Heppner, P.P. (1986). Manual for the Problem Solving Inventory (PSI). Unpublished manuscript, University of Missouri-Columbia.

Heppner, P.P., Hibel, J., Neal, G.W., Weinstein, C.L., & Rabinowitz, F.E. (1982). Personal problem solving: A descriptive study of individual differences. Journal of Counseling Psychology, 29, 580-590.

Heppner, P.P., & Krauskopf, C.J. (1987). An information-processing approach to personal problem solving. The Counseling Psychologist, 15, 371-447.

Heppner, P.P., & Petersen, C.H. (1982). The development and implications of a personal problem-solving inventory. Journal of Counseling Psychology, 29, 66-75.

Heppner, P.P., Reeder, B.L., & Larson, L.M. (1983). Cognitive variables associated with personal problem-solving appraisal: Implications for counseling. Journal of Counseling Psychology, 30, 537-545.

Highlen, P.S. (1986). Analyzing patterns and sequence in counseling: Reactions of a counseling process researcher. Journal of Counseling Psychology, 33, 186-189.

Horan, J.J. (1987). On the union of problem solving and information processing: Will they live happily ever after? The Counseling Psychologist, 15, 448-452.

Houtz, J.D., Ringenbach, S., & Feldhusen, J.F. (1973). Relationship of problem solving to other cognitive variables. Psychological Reports, 33, 389-390.

Ickes, W., Robertson, E., Tooke, W., & Teng, G. (1986). Naturalistic social cognition: Methodology, assessment, and validation. Journal of Personality and Social Psychology, 51, 66-82.

Ivey, A.E. (1980). Counseling 2000: Time to take charge! The Counseling Psychologist, 8, 12-16.

Janis, I.L., & Mann, L. (1977). Decision making: A psychological analysis of conflict, choice, and commitment. New York: The Free Press.

Janis, I.L., & Mann, L. (1982). A theoretical framework for decision counseling. In I.L. Janis (Ed.), Counseling on personal decisions: Theory and research on short-term relationships (pp. 47-72). New Haven: Yale University Press.

Kahneman, D., & Tversky, A. (1973). On the psychology of prediction. Psychological Review, 80, 237-251.

Kaplan, M.F., & Miller, C.E. (1987). Group decision making and normative versus informational influence effects of type of issue and assigned decision rule. Journal of

Personality *and* *Social* *Psychology*, **53**, 306-313.

Kerer, G., & Wagenaar, W.A. (1985). On the psychology of playing blackjack: Normative and descriptive considerations with implications for decision theory. *Journal* *of* *Experimental* *Psychology*: *General*, **114**, 133-158.

Klass, E.T. (1981). A cognitive analysis of guilt over assertion. *Cognitive* *Therapy* *and* *Research*, **5**, 283-297.

Klemp, G.O., Jr., & McClelland, D.C. (1986). What characterizes intelligent functioning among senior managers. In R.J. Sternberg & R.K. Wagner (Eds.) *Practical* *intelligence* (pp. 31-50). New York: Cambridge University Press.

Koriat, A., Lichtenstein, S., & Fischhoff, B. (1980). Reasons for confidence. *Journal* *of* *Experimental* *Psychology*: *Human* *Learning* *and* *Memory*, **6**, 107-118.

Lanning, K. (1986). Some reasons for distinguishing between "non-normative response" and "irrational decision". *The* *Journal* *of* *Psychology*, **121**, 109-117.

Levin, I.P., Louviere, J.J., & Schepanski, A.A. (1983). External validity tests of laboratory studies of information integration. *Organizational* *Behavior* *and* *Human* *Performanc*, **31**, 173-193.

Lichtenberg, J.W., & Heck, E.J. (1986). Analysis of

sequence and pattern in process research. Journal of
Counseling Psychology, 33, 170-181.

Margolin, G., & Wampold, B.E. (1981). Sequential analysis
of conflict and accord in distressed and nondistressed
marital partners. Journal of Consulting and Clinical
Psychology, 49, 554-567.

Martin, J. (1984). The cognitive mediational paradigm for
research on counseling. Journal of Counseling
Psychology, 31, 558-571.

Mayer, R.E. (1983). Thinking, problem solving, and
cognition. New York: W.H. Freeman and Company.

Mendonca, J.D., & Siess, T.F. (1976). Counseling for
indecisiveness: Problem-solving and anxiety-management
training. Journal of Counseling Psychology, 23,
339-347.

Neisser, U. (1976). General, academic, and artificial
intelligence. In L. Resnick (Ed.), The nature of
intelligence (pp. 135-144). Hillsdale, NJ:
Lawrence Erlbaum Associates.

Nezu, A.M. (1985). Differences in psychological distress
between effective and ineffective problem solvers.
Journal of Counseling Psychology, 32, 135-138.

Nezu, A.M. (1987). A problem-solving formulation of
depression: A literature review and proposal of a
pluralistic model. Clinical Psychology Review, 7,
121-144.

Nezu, A.M., & D'Zurilla, T.J. (1979). An experimental evaluation of the decision-making process in social problem solving. <u>Cognitive Therapy and Research</u>, <u>3</u>, 269-277.

Nezu, A., & D'Zurilla, T.J. (1981a). Effects of problem definition and formulation on decision making in the social problem-solving process. <u>Behavior Therapy</u>, <u>12</u>, 100-106.

Nezu, A., & D'Zurilla, T.J. (1981b). Effects of problem definition and formulation on the generation of alternatives in the social problem-solving process. <u>Cognitive Therapy and Research</u>, <u>5</u>, 265-271.

Nezu, A.M., & Ronan, G.R. (1988). Social problem solving as a moderator of stress-related depressive symptoms: A prospective analysis. <u>Journal of Counseling Psychology</u>, <u>35</u>, 134-138.

Notarius, C.J. (1981). Assessing sequential dependency in cognitive performance data. In T.V. Merluzzi, C.R. Glass, & M. Genest (Eds.), <u>Cognitive assessment</u> (pp. 343-357). New York: Guilford Press.

Osipow, S.H. (1982). Research in career counseling: An analysis of issues and problems. <u>The Counseling Psychologist</u>, <u>10</u>, 27-34.

Peterson, D.K., & Pitz, G.F. (1988). Confidence, uncertainty, and the use of information. <u>Journal of</u>

Experimental Psychology: Learning, Memory, and

Cognition, 14, 85-92.

Peterson, P.L., Swing, S.R., Braverman, M.T., & Bass, R.

(1982). Students' aptitudes and their reports of

cognitive processes during direct instruction.

Journal of Educational Psychology, 74, 535-547.

Phillips, S.D., Pazienza, N.J., & Ferrin, H.H. (1984).

Decision-making styles and problem-solving appraisal.

Journal of Counseling Psychology, 31, 497-502.

Phillips, S.D., & Strohmer, D.C. (1983). Vocationally

mature coping strategies and progress in the

decision-making process: A canonical analysis. Journal

of Counseling Psychology, 30, 395-402.

Pitt, R.B. (1983). Development of a general

problem-solving schema in adolescence and early

adulthood. Journal of Experimental Psychology:

General, 112, 547-584.

Pitz, G.R., Sachs, N.J., & Heerboth, J. (1980).

Procedures for eliciting choices in the analysis of

individual decisions. Organizational Behavior and

Human Performance, 26, 396-408.

Platt, J.J., & Spivack, G. (1972). Problem-solving

thinking of psychiatric patients. Journal of Consulting

and Clinical Psychology, 39, 148-151.

Platt, J.J., Spivack, G., Altman, N., Altman, D., &

Peizur, S.B. (1974). Adolescent problem-solving
thinking. <u>Journal of Consulting and Clinical
Psychology</u>, <u>42</u>, 787-793.

Richards, B.A., & Dodge, K.A. (1982). Social maladjustment
and problem solving in school-aged children. <u>Journal of
Consulting and Clinical Psychology</u>, <u>50</u>, 226-233.

Rubinstein, M.F. (1986). <u>Tools for thinking and problem
solving</u>. Englewood Cliffs, NJ: Prentice-Hall.

Scandura, J.M. (1977). <u>Problem solving</u>.
New York: Some publisher.

Schwartz, R.M., & Gottman, J.M. (1976). Toward a task
analysis of assertive behavior. <u>Journal of Consulting
and Clincal Psychology</u>, <u>44</u>, 910-920.

Schweiger, D.M., Anderson, C.R., & Locke, E.A. (1985).
Complex decision making: A longitudinal study of process
and performance. <u>Organizational Behavior and Human
Decision Processes</u>, <u>36</u>, 245-272.

Scribner, S. (1986). Thinking in action: Some
characteristics of practical thought. In R.J. Sternberg
& R.K. Wagner (Eds.), <u>Practical intelligence</u> (pp.
13-30). New York: Cambridge University Press.

Simon, H.A. (1955). A behavioral model of rational choice.
<u>Quarterly Journal of Economics</u>, <u>69</u>, 99-118.

Simon, H.A. (1956). Rational choice and the structure of
the environment. <u>Psychological Review</u>, <u>63</u>, 129-138.

Simon, H.A. (1978). Rationality as process and as product of thought. American Economic Review, 68, 1-16.

Simon, H.A. (1979). Rational decision making in business organizations. American Economic Review, 69, 493-513.

Slife, B.D., Weiss, J., & Bell, T. (1985). Separability of metacognition and cognition: Problem solving in learning disabled and regular students. Journal of Educational Psychology, 77, 437-445.

Sternberg, R.J. (1984). A contextualist view of the nature of intelligence. International Journal of Psychology, 19, 307-334.

Sternberg, R.J., Conway, B.E., Ketron, J.L., & Bernstein, M. (1981). People's conceptions of intelligence. Journal of Personality and Social Psychology, 41, 37-55.

Sternberg, R.J. (1985). Beyond IQ: A triarchic theory of intelligence. Cambridge: Cambridge University Press.

Sternberg, R.J. (1986). Practical intelligence. New York: Cambridge University Press.

Tetlock, P.E. (1986). A value pluralism model of ideological reasoning. Journal of Personality and Social Psychology, 50, 819-827.

Tiedeman, D.V., & O'Hara, R.P. (1963). Career development: Choice and adjustment. New York: College Entrance Examination Board.

Tisdelle, D.A., & St. Lawrence, J.S. (1986). Interpersonal problem-solving competency: Review and critique of the literature. Clinical Psychology Review, 6, 337-356.

Tversky, A. (1972). Elimination by aspects: A theory of choice. Psychological Review, 79, 281-299.

Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. Science, 185, 1124-1131.

Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. Science, 211, 453-458.

Wagner, R.K., & Sternberg, R.J. (1986). Tacit knowledge and intelligence in the everyday world. In R.J. Sternberg & R.K. Wagner (Eds.), Practical intelligence (pp. 51-83). New York: Cambridge University Press.

Wallsten, T.S., & Barton, C. (1982). Processing probabilistic multidimensional information for decisions. Journal of Experimental Psychology: Learning, Memory, and Cognition, 8, 361-384.

Wampold, B.E. (1986). State of the art in sequential analysis: Comment on Lichtenberg and Heck. Journal of Counseling Psychology, 33, 182-185.