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INDIVIDUAL LEARNING STYLES AND THE PROCESS OF CAREER CHOICE IN MEDICAL STUDENTS

by

Mark S. Plovnick

S.M. Alfred P. Sloan School of Management, M.I.T.
(1970)

B.S.M.E. Union College
(1968)

B.A. (Economics) Union College
(1968)

SUBMITTED IN PARTIAL FULFILLMENT

OF THE REQUIREMENTS FOR THE

DEGREE OF DOCTOR OF

PHILOSOPHY

at the

MASSACHUSETTS INSTITUTE OF

TECHNOLOGY

September, 1974
[illegible] February 1975

Signature of Author.....
Alfred P. Sloan School of Management, September. 1974

Certified by.....
Thesis Supervisor

Accepted by.....
Chairman, Departmental Committee on Graduate Students

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Submitted to the Alfred P. Sloan School of Management on September 10, 1974 in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

ABSTRACT

This study investigates the effects of individual learning styles or problem-solving styles on the kinds of careers people choose, and on the sources of information and influence they utilize in making those career decisions. The specific population studied were medical students at a well-known eastern medical school.

Generally speaking medical careers were categorized as a) people oriented versus science (or disease) oriented, and b) patient-practice oriented versus research activity oriented. Using an instrument called the Learning Styles Inventory, students' learning styles were identified and predictions made about their career choices, and how those choices are made.

The results of the study indicated that students with different learning styles use different sources of information and influence in making career decisions. "Concrete" students seem more likely to use work experiences and identification with attractive role models while "abstract" students are more likely to use courses at school and the intellectual aspects of their work as influence sources. When abstract students rely on people for influence it is usually in an impersonal "scanning" sense rather than the more affective "identification" mode.

In addition there seems to be a preference among students with different learning styles for the different types of medical careers identified. "Concrete" students prefer people oriented careers while "abstract" students prefer research oriented careers. Students with an "active" bias enter practitioner fields, usually characterized by frequent patient interactions. Students with a "reflective" bias choose research oriented careers.

Thus career decisions are affected by both personal characteristics (i.e. learning styles) and by environmental influences available (e.g. role models, work experiences, courses, etc.). One implication of these findings for medical education is that the medical school environment provides insufficient influence sources in certain career areas, notably primary care careers, for students who might otherwise be interested in these careers (concrete-active students).

Thesis Advisor: Edgar H. Schein
Title: Professor of Organizational Psychology and Management, Chairman of Organization Studies Group.

Acknowledgements

I would like to take this opportunity to thank Ed Schein in particular for his guidance and encouragement not only during this study but throughout my own career development. I would also like to express my appreciation for the support of and contribution to this thesis by Lotte Bailyn, Dave Kolb, Irv Rubin and Ron Fry, all of whom are from the Sloan School.

Special thanks is due Dr. Paul Gertman of the Boston University Medical Center whose support made this study possible, and whose advice and suggestions concerning medical systems have contributed greatly to the quality of the final product.

My gratitude is also extended to all those medical school faculty and students who cooperated in the data gathering stages of this project.

I would like to acknowledge the help of all those others at the Sloan School who took part in the conceptualization and execution of this thesis, particularly Karen Harvey and Lena Haarmeyer for their perseverance in the typing and editing of the various drafts of the manuscript.

Finally, I would like to thank the Robert Wood Johnson Foundation which in part supported this study through its grant to the M.I.T. Health Management Project.

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CHAPTER I

INTRODUCTION

Rationale

This thesis was undertaken to study the effects of an individual's learning style or problem-solving style on certain aspects of the process of career choice. Specifically, the study focused on the influence of learning style on the career choices of medical students.

Career choice is one part of the larger process of people working their way through the series of decisions, activities and changes that constitute their career development. Actually, as Hall (1971) points out, there is no one "career choice." Rather, people are continuously making choices about their work and their lives that have implications directly or indirectly for their career. Some of the career choice points are more obvious than others, as in the choice of a college major or a first job, and studies of career choice have tended to focus on these (e.g. Davis, 1967). Most of these studies of career choice have attempted to correlate some aspect of the person (attitudes, interests, values, cognitive skills, personality type, background, etc.) with the choice of a particular occupation, profession, or role (e.g. Rosenberg, 1957). In many cases these studies do not investigate or speculate as to how these choices are made, that is how people manage to get "matched" with the appropriate field.

In those cases where there is a theory about the process of career choice the theory is often non-specific around the critical factors included in the career decision-making process. For example, Super's (1963)

theory of career development is perhaps the best known and the most eclectic in that he acknowledges that all of the factors found to correlate with individuals' career choices (interests, aptitudes, attitudes, etc.) can in fact influence the career development process. The individual organizes these factors into a "self-concept." Through contact with the environment (feedback) this self-concept is continuously modified while the individual is continuously experimenting and making choices about his career. Super thus defines a general process of career development--implementation and modification of a self-concept through environmental feedback-- but is not very specific about how individuals get that feedback, what is its form, and exactly how they use it.

One possibility that comes to mind is that some of the same cognitive and emotional factors that are studied in correlating individual characteristics with career choices might be important in understanding how individuals go through the decision-making process. For example, openness to new ideas, flexibility, sensitivity to people, and ability to keep many diverse elements in mind when making a decision may be requirements for people to work in certain occupations and may also influence how an individual uses environmental and self-concept data when making career choices.

There have been several studies demonstrating the first point, that is, the correlation between cognitive styles and career choices (Hudson, 1966; Plovnick, 1971; Kolb, 1971; Osipow, 1969; Getzels and Jackson, 1962; etc.) Fewer studies have dealt with cognitive styles and the process of

career choice. Dill, Hilton, and Reitman (1962) have found that cognitive or information processing factors are important in making career decisions in a study of 30 managers.

The factors they found important were: sensitivity to environment, competence in handling a variety of difficult tasks, ability to learn and to adapt to change, ability to remain detached from the environment in order to maintain active control over their own career progress, and willingness to take risks. Their key factor was "sensitivity to the environment." By "sensitivity to the environment" they meant the "capacity to see, to hear, to feel what is going on around you; to record and store the things you perceive; and from these perceptions to guess the essential nature of your environment" (Dill et. al., 1962, p. 77). Dill et. al. present a "process-oriented" theory of career development focusing on understanding the influence of cognitive factors on short-run interactions between individuals and the environment rather than looking for long-run relationships between personal characteristics and career development. Their work suggests that career choices depend to a large extent on (1) how well and in what ways individuals perceive the environment (gather information) and (2) what style they use in problem solving, decision making and information processing.

Peer Soelberg's (1967) work on human decision making sought to discover how people made occupational choices. Using management graduate students' decisions about their first job, he developed a model describing the process

of problem definition, alternative generation, choice, and implementation. His 13 step model emphasizes the development of choice criteria and the subsequent evaluation of alternatives against these criteria prior to comparing alternatives to each other. Eventually decision rules are re-defined by the individual to reinforce his first choice, so as to relieve any dissonance between initial decision criteria and the first choice.

While Soelberg's research was done on subjects making career decisions, he proposed that the processes he discovered are typical of all "unprogrammed" human decisions. This suggests that the extensive research done on human decision making in general may be relevant to a study of career development. Soelberg notes that within his model of decision making there is a need to devleop more knowledge about how people evaluate the alternatives they generate as career choices. (Soelberg, 1967; p. 19). Again this would require insight into people's style of acquiring information and their preference for different sources -- that is, their perceptual styles and biases.

The Soelberg model suggests that all people go through the same sequence of steps in decision-making. Other researchers have noted that differences in cognitive style may lead individuals to differ in the sequence and emphasis of steps in the problem solving process (Guilford and Hoepfner, 1971; Gardner, Holzman, Klein, Linton, and Spence, 1959; Schroeder, Driver, and Streufert, 1967). For example, Einhorn (1971)

studied the decision-making process of 30 psychologists who were evaluating applicants to a Ph.D. program. Einhorn was trying to determine whether a linear or non-linear mathematic model best approximated the subjects' decision-making. In the linear model, the rank order of any one applicant changes in direct proportion to the variables being used to evaluate him (e.g. I.Q.). In the non-linear model the relationship between the rank order outcome and the evaluation variables is not directly proportional, but may be, for example, curvilinear. While Einhorn found a slight preference for the linear model, he notes a great deal of variety among his subjects in the model that best fit their decision-making. In the same experiment Einhorn studied a group of 39 engineering students engaged in another evaluation activity -- this time rating 15 job choices. The engineers displayed a marked consistency in approximating the non-linear decision-making model -- in contrast to the psychologists.

Gardner et. al. (1959, p. 13) note that cognitive style differences also are manifested in individuals' perceptions of environmental stimuli. For example, more rigid cognitive styles have more difficulty seeing "hidden figures" in a picture than more flexible styles. Einhorn similarly noted that among his subjects many ignored certain types of data given them. These experiments were performed with relatively simple tasks and limited data. When the amount of information and the complexity of the

task increases (as in a career choice decision) most researchers have found that the decision-maker even further simplifies the process by further censoring information and influence inputs (Simon, 1955; Miller, 1956).

What is being suggested is that the work on cognitive styles and problem solving can be applied to understanding career choice decisions. If career choice decisions are better understood in terms of sources of information, then it is possible to provide an environment which better facilitates career decision-making by people with different styles.

Learning Styles, Cognitive Styles, and Problem-Solving Styles

The terms cognitive style, problem-solving style and information processing style have been used interchangeably in the preceding discussion. This reflects the state of the field of cognitive psychology. All of the terms used refer to the general process of receiving, interpreting, evaluating and acting on information. There are many models of cognition proliferating the field, each attempting to simplify or clarify these elusive processes. For example, Guilford has developed a three dimensional "Structure of Intellect" model identifying some 120 different cognitive factors (Guilford, 1967).

In this study yet another term will be used which refers to these same general processes. The term, "learning style" (Kolb, 1971), as used in this study was developed and used to describe different preferences of students for types of learning situations (e.g. classroom lecture versus

laboratory experiment). The dimensions used to describe learning style (e.g. concrete-abstract) are very similar to the dimensions of cognitive structure and style developed by others (e.g. Schroeder, Driver, and Steufert, 1967). As Keen notes, "Cognitive style and learning are different facets of the same phenomenon, the development of the ability to handle problems in the very widest sense of the term" (Keen, 1974, p. 7). Thus, for purposes of this study, "learning style" will also be used to describe the processes involved in information processing.

One important definitional point concerns the use of the words style and structure. The terms cognitive structure and cognitive style have been used similarly in the literature to describe differences between individuals. Structure, however, has often been used when describing differences in capacity, or level of ability of individuals (Schroeder, et. al., 1967). Style, on the other hand, implies no capacity differences, but rather refers to differences in propensity (Keen and McKenney, 1974, p. 8).

Having discussed some of these terms, it is now necessary to briefly scan the literature on cognitive styles to determine which aspects of this work are most relevant to a study of the process of career choice. While this does not require a comprehensive review of the literature on cognitive and decision-making styles, there is a need to categorize the kinds of research done as it relates to this study.

There are a multitude of cognitive dimensions that have been identified by various researchers and theoreticians. These dimensions have been explored from a variety of perspectives including studies of their

origins in individuals (Frenkel-Brunswik, 1954), their development over time (Piaget and Inhelder, 1969) and their correlation with various behavioral manifestations, from solving word puzzles (Guillford, 1967) to choosing a particular career path (Hudson, 1966).

Many of the models of cognitive style and structure developed are similar in concept. What is often different is the manner in which the different cognitive dimensions are measured. Tests of cognitive style include those requiring a demonstration of the skills being studied (e.g. I.Q. tests) and those which seek a self-perception of the qualities in question (e.g. the Myers-Briggs Type Indicator which asks, for example, about preferences for "spontaneity" versus "planning"). As mentioned earlier, tests of "style" have focused on individual differences with respect to general tendencies (e.g. "spontaneous" versus "planned") while tests of "structure" have focused on the amount of ability in a give area (e.g., I.Q. tests). In general, self-perception tests are easier to administer, though less valid for ability measurements. They have been shown to be reasonably valid for measures of personal preference of "style" (Ross, 1963, Grant, 1965). In this sense they may be better predictors of occupational choice than are skill measuring tests, since career choices are presumably based upon preferences.

One such self-perception test of thinking style is the Myers-Briggs Type Indicator (MBTI).[1] The MBTI is based on Jung's theory of psychological types and differentiates people according to 1) whether they are introverts

[1] See the Myers-Briggs Type Indicator Manual, Princeton, N.J. Educational Testing Service, 1962.

or extroverts, 2) how they perceive things (sensate vs. intuitive), and 3) how they judge things (thinking vs. feeling). A "sensate" person relies directly on the five senses; the "intuitive" person relies more on the less obvious process of intuition, the indirect perceptions by way of ideas or associations which the unconscious tacks on to the perception of things outside. The "thinking" person is more concerned about discriminating between true or false, while the "feeling" person is more concerned about discriminating between the valued and the not-valued. People are also classified by the MBTI as primarily judging or perceiving depending upon their preferred way of dealing with the environment. Finally, the test classifies people as extroverts of introverts, reflecting whether the person focuses on the outer world of people and things or the inner world of concepts and ideas.

The MBTI has been used by researchers in many ways including studies of differences in thinking styles between different occupational groups. Of great significance to this study is the work by Myers and Davis (1964) on the thinking styles of medical specialists. They performed a 12-year follow-up study of over 4000 doctors who took the MBTI as medical students and discovered several important relationships, as predicted, between thinking type and specialty choice (see Table 1).

Table 1 shows the relative frequencies (percentages) of the different thinking types within the different specialties. For example, for General Practice (GP) 50% of the GP's were extroverts (E) and 50% Introverts (I);

56% of the GP's were Sensing (S) types while 44% were Intuitives; 53% of the GP's were Thinking (T) types while 47% were Feeling; Finally, 54% of the GP's were Perceiving (P) types while 46% were Judging types. The frequency of sensing types (56%) among GP's was significantly different (at the .001 level) from the frequency of sensing types in the other specialties.

Overall the results indicate that most of the specialties included here have physicians who are predominantly Thinking types as opposed to Feeling types, and who are Perceiving types as opposed to Judging types. In addition, Table 1 indicates that specialties that are more oriented towards diagnosis (e.g. internal medicine, psychiatry, pathology) are more Intuitive, while those oriented towards treatment (e.g. surgery, obstetrics and gynecology, anesthesiology) are more sensate. The surgical fields (surgery, urology, ob-gyn, anesthesiology) are more Extroverted, or "thing" oriented while the other specialties are generally more introverted, or idea oriented.

The wide use of this self-perception test in both research and counseling has generated considerable supporting evidence for the use of this type of instrument and for the hypothesis that style can be correlated with occupational choice (for other examples of MBTI research see Myers-Briggs Type Indicator: An Annotated Bibliography of the Literature, Educational Testing Service, Princeton, N.J.).

Table 1. Percentage Frequency of Preferences Predominating Within Each Specialty.

Number in Specialty	Specialty	Extrovert/ Introvert	Sensing/ Intuitive	Thinking/ Feeling	Judging/ Perceiving
794	General Practice	50% E	56% S***	53% T	54% P
730	Internal Medicine	52% I	61% N***	55% T	55% P
636	Surgery, Gen'l & Ortho.	55% E**	51% S*	54% T	58% P
373	Obstetrics & Gynecology	56% E*	58% S***	50% F	57% P
290	Pediatrics	58% E**	50% N	53% F*	55% P
289	Psychiatry	60% I***	82% N***	52% T	65% P
187	Radiology	53% E	51% N	55% T	63% P
149	Anesthesiology	58% I*	60% S***	54% T	56% P
146	Pathology	62% I**	68% N***	65% T	56% P
141	Opthalmology	50% I	50% S	54% F	61% P
95	Urology	53% E	57% S*	50% F	61% P
67	Otolaryngology	54% E	54% N	61% T	67% P
62	Dermatology	53% I	58% N	61% T	60% P
43	Neurological Surgery	54% E	72% N*	51% T	65% P
41	Neurology	61% I	76% N**	63% T	56% P
229	Others	52% I	58% N	53% F	58% P
83	Research	55% I	78% N***	58% T	58% P
185	Medical Faculty	53% I	69% N***	50% F	56% P

*Significant at .05 level; **significant at .01 level; ***significant at .001 level.

The Learning Style Inventory

Another self-perception test of cognitive style is the Kolb Learning Style Inventory (Kolb, 1971). This test requires a subject to describe his preferred style in learning situations, choosing on the one hand between abstract and concrete, and on the other between active and reflective. The Learning Style Inventory (LSI) is similar to the MBTI in many of its conceptual origins.

Studies of the two tests have revealed some correlations between subjects' scores on the LSI and on the MBTI (Taylor, 1973). Over the past few years there has been a significant amount of research relating learning styles to various indicators of behavior, including problem-solving styles and career choices (Kolb, 1973). Unlike the MBTI however the LSI has the advantage of being short and easy to administer. Originally it was the intention in this study to utilize both the MBTI and the LSI to investigate the hypotheses concerning the relationships between style and career choices. However, the small size and difficult nature of the test population (medical students are reluctant to respond to questionnaires, particularly "psychological" questionnaires) required a "pragmatic" decision to limit testing to the shorter LSI. The similarities between the instruments and the results of recent LSI research make this a comfortable decision. Thus the LSI was used as the principal indicator of cognitive style in this study. In the following chapter there follows a more detailed discussion of the development and use of Learning Style Inventory and its reliability and validity.

CHAPTER II

THE LEARNING STYLE INVENTORY

Development

The Learning Style Inventory was developed by David Kolb (Kolb, 1971) to measure relative strengths on what Kolb has theorized to be the four modes involved in the learning and/or problem solving cycle. (See Figure 1).

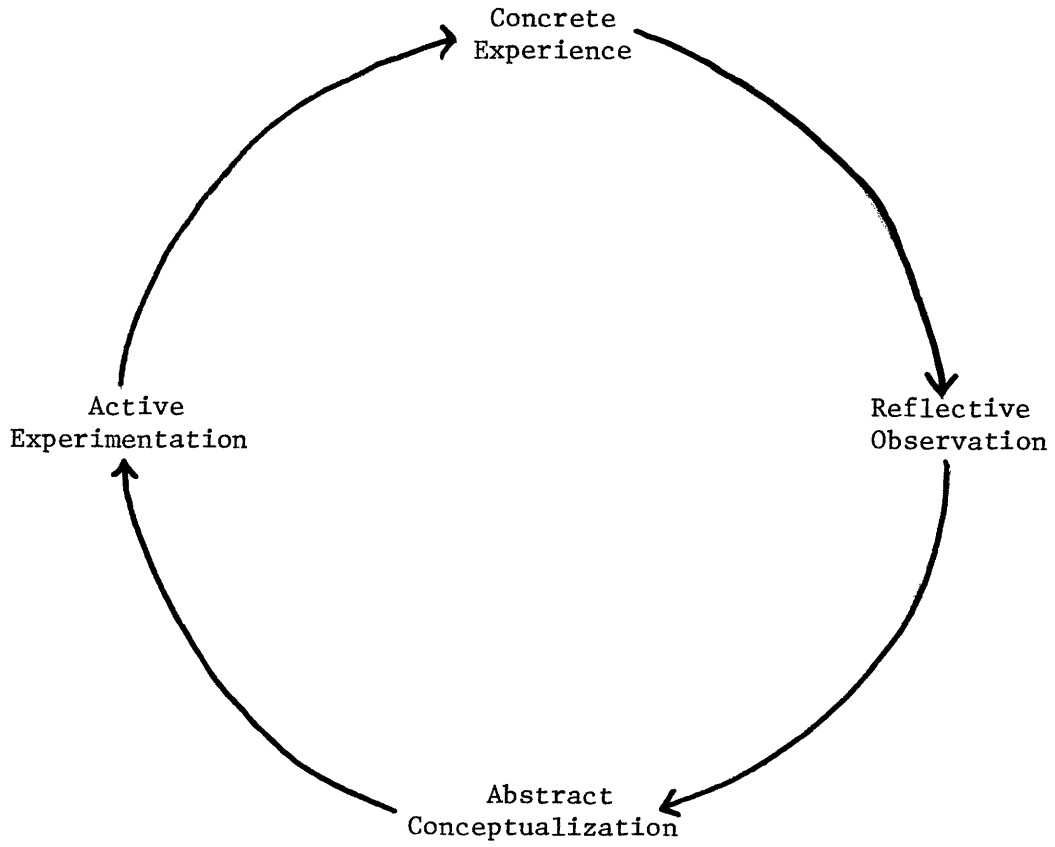

Figure 1. The Four Stages of The Learning Cycle.

Kolb has drawn on the work of Bruner, Piaget and others in defining his four modes or behaviors. Each mode represents one learning/problem solving style that is in contrast and conflict with its opposite pole on the two dimensions of style (abstract-concrete and active-reflective). Through heredity, experience and environmental demands people develop strengths, or styles that emphasize some of these learning modes over others. Thus four types of learners are defined based on their predominant styles: the Assimilator, the Accommodator, the Converger, and the Diverger (see Figure 2). Using scores on the two dimensions of style, people can generally be defined as approximately one of these four types.

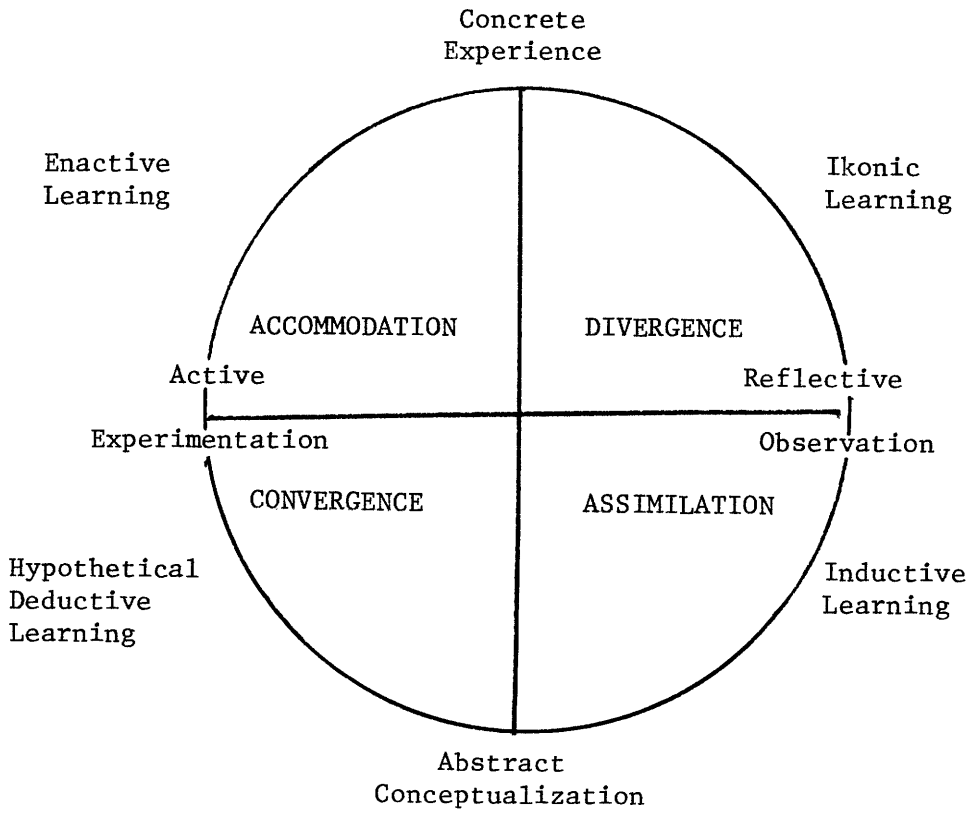

Figure 2. Learning Styles and the Learning Process.

The Converger is defined as having dominant learning modes of Abstract Conceptualization (AC) and Active Experimentation (AE). His tendency is towards the practical application of ideas. Kolb called this learning style the "converger" because a person with this style seems to do best in those situations like conventional intelligence tests where there is a single correct answer or solution to a question or problem (see Torrealba, 1972). His knowledge is organized in such a way that, through hypothetical-deductive reasoning, he can focus it on specific problems. Liam Hudson (1966) used different measurement instruments in research with a similarly defined group. His research shows that what he calls convergers are relatively unemotional, preferring to deal with things rather than people. They tend to have narrow technical interests, and choose to specialize in the physical sciences. In a sample of graduate business students, convergers as measured by the LSI correlated closely with convergers measured by Hudson's techniques. Kolb's research also shows that this learning style is characteristic of many engineers (Kolb, 1973).

The Diverger is defined as having the opposite learning style from the converger. He prefers Concrete Experience (CE) adn Reflective Observation (RO). He likes to view concrete situations from many perspectives. Kolb has labeled this style "diverger" because a person with this style prefers situations that call for generation of ideas such as a "brainstorming" idea session. As Kolb defines them, they have broad cultural

interests and tend to specialize in the arts. Kolb's research shows that this style is characteristic of managers from humanities and liberal arts backgrounds. Kolb also found that personnel managers tend to be characterized by this learning style (Kolb, 1973).

The Assimilators' dominant learning modes are Abstract Conceptualization (AC) and Reflective Observation (RO). His greatest strength lies in his ability to create theoretical models. He prefers inductive reasoning in assimilating disparate observations into an integrated explanation. He, like the Converger, is less interested in people and more concerned for abstract concepts, but he is less concerned with the practicial use of theories. For him it is more important that the theory be logically sound and precise. As a result , this learning style is more characteristic of the basic sciences rather than the applied sciences. In organizations this learning style was found most often in the research and planning departments (Kolb, 1973).

The Accommodator has the opposite learning styles of or from the assimilator. His preference is for Concrete Experience (CE) and Active Experimentation (AE). He likes doing things, carrying out plans and experiments and involving himself in new experiences. He tends to be more of a risk-taker than people with the other three learning styles. Kolb has labeled this style "accommodator" because he tends to prefer those situations where he must adapt himself to specific immediate circumstances. In situations where the theory or plan do not fit the "facts", he will most

likely discard the plan or theory. (His opposite style type, the assimilator, would be more likely to disregard or to re-examine the facts). The accommodator is at ease with people but is sometimes seen as impatient and "pushy". His educational background is often in technical or practical fields such as business. In organizations, Kolb notes, people with this learning style are found in "active-oriented" jobs, often in marketing or sales (Kolb, 1973).

Construction of the LSI

The form of the LSI is a nine-item self description questionnaire (see Appendix A). Each item asks the respondent to rank order four words in the way that best describes his learning style. One word in each item corresponds to one of the four learning modes -- Concrete Experience (sample word, feeling), Reflective Observation (watching), Abstract Conceptualization (thinking) and Active Experimentation (doing). The words were selected by a panel of four behavioral scientists acquainted with the theory. An attempt was made to balance the four words in each item on their social desirability, i.e., they tried to use words that represented equally desirable qualities for one to possess. In the first version of the test the sum of the nine words associated with each learning mode equalled the total score on that mode. The test has now been refined through item analysis to include only the six words that individually correlated best with the total nine-item score on each mode. No word was included in the final six if it correlated less than .40 with the total score. The chart

contains the six words scored for each learning mode. The other 3 words in each column of the LSI itself are "dummy" words and are not scored.

Actual Words Scored for Each Learning Mode in the LSI

Concrete Experience	Reflective Observation	Abstract Conceptualization	Active Experimentation
Receptive	Tentative	Analytical	Practical
Feeling	Watching	Thinking	Doing
Accepting	Observing	Evaluative	Active
Intuitive	Reflecting	Logical	Pragmatic
Present-Oriented	Observation	Conceptualization	Experimentation
Experience	Reserved	Rational	Responsible

Intercorrelation of LSI Scales

From the theory we would predict that Concrete Experience (CE) would be negatively correlated with Abstract Conceptualization (AC) and that Active Experimentation (AE) would be negatively correlated with Reflective Observation (RO). Other correlations should be near zero. Intercorrelations of the scale scores for 807 people in a sample population of graduate students and managers shows this to be the case. The subgroups of this sample are described in Kolb (1971). CE and AC were negatively correlated (-.57, $p < .001$). RO and AE were negatively correlated (-.50

p <.001). Other correlations were low but significant because of the large sample size (CE with RO .13, RO with AC -.19, AC with AE -.12, and AE with CE -.02. All but the last are significant at P<.001). As a result of the intercorrelations two combination scores were created to measure the concrete/abstract dimension (CE-AC) and the reflective/active dimension (RO-AE). With the concrete/abstract dimension CE correlated .85 and AC correlated -.90. With the reflective/active dimension AE correlated -.85 and RO correlated .84.

Test-Retest Reliability

To test the stability of LSI scores the inventory was given to 42 M.I.T. Sloan Fellows on two occasions. These are middle managers who come to M.I.T. for one year on leave from their companies to get a M.S. degree in management. The test was given to them at the start of their program in June and at the middle of their stay in December. These results are reported in Table 2. The means and standard deviations of the scale scores show little change between June and December (the only statistically significant difference is the increase in the RO variance from 2.9 in June to 3.8 in December, p <.05). However, the correlations between June and December scores, while significant, were lower than expected. The relatively low stability of individual scores on the LSI over time is puzzling. It could be a function of the fact that Sloan Fellows are in a period of flux during their year at M.I.T. Or it could be a result of the test itself. It could be that the procedure of ranking four words of similar social desirability creates instability.

Table 2. Test-Retest Scores on the Learning Style Inventory for 42 M.I.T. Sloan Fellows

	JUNE $\bar{X}$	JUNE SD	DECEMBER $\bar{X}$	DECEMBER SD	CORRELATION June-Dec.
CONCRETE EXPERIENCE	14.1	3.3	14.2	3.3	.49 ($p < .001$)
REFLECTIVE OBSERVATION	11.7	2.8	11.8	3.8	.40 ($p < .004$)
ABSTRACT CONCEPTUALIZATION	17.5	3.3	16.2	3.9	.40 ($p < .005$)
ACTIVE EXPERIMENTATION	17.8	3.4	17.5	3.5	.33 ($p < .02$)
CONCRETE/ABSTRACT (CE-AC)	3.4	5.7	2.0	6.2	.30 ($p < .03$)
REFLECTIVE/ACTIVE (RO-AE)	6.1	5.3	5.8	6.6	.43 ($p < .002$)

The reliability of the LSI was also tested by Ron Fry of M.I.T. in the M.I.T. Advanced Graduate Program in Management. Kendall Tau rank order correlation coefficients for each of the four LSI scales were calculated based on two administrations of the test separated by ten weeks. The results of that analysis are shown in Table 3.

Table 3. Correlations Between Test Scores on Successive Administrations of LSI

		Kendall Tau Correlation	Significance	N
Scales	AC	.73	.001	23
	CE	.48	.01	23
	AE	.43	.02	23
	RO	.51	.006	23

The results of this analysis were also not impressive. However, the low correlations can be attributed to (a) a small sample, with many ties in their scores and (b) the fact that the students tested were being subjected to an intensive summer education program which may have had differential effects in terms of altering learning styles.

Given these reliability scores this author decided to attempt a different type of analysis of reliability for the 23 AGP students. Since the primary use of the LSI is to differentiate groups of people into "types" rather than focusing on the specific scores of any one or two subjects, an appropriate test of LSI reliability would be to note whether there were

changes from test to re-test in the "type" designation of the people in the sample. Thus, the sample is divided at the median on the two composite dimensions (CE-AC and RO-AE) and the focus becomes whether an individual's score crosses the median on either the CE-AC, RO-AE dimension from test to re-test, thus causing his "type" (accommodator, etc.) to change.

Using this analysis led to the results in Table 4. Medians were taken from the total population norms for managers and graduate students (800 subjects).

Table 4. Frequency of "Type" Changes for AGP Students on Successive LSI Tests

	Abstract/Concrete Score Changed	Abstract/Concrete Score No Change	
Active/Reflective Score Changed	2	5	7
Active/Reflective Score No Change	2	14	16
	4	19	23

In Table 4 of the 23 students involved, 9 (39%) crossed the median on one or both LSI dimensions resulting in a change in his LSI category. Thus this type of analysis still suggests somewhat limited reliability for the LSI. However, again the test population was undergoing significant forces which could have led to changes in their learning style and thus to changes in their LSI scores.

Based on the research to date, LSI reliability is questionable. Further analysis of LSI reliability is needed, particularly with populations experiencing more stable learning environments. For this reason, another reliability test of the LSI was included in this study of the career choice process, and will be described in detail in subsequent sections.

Research on Validity

Other research using the LSI has been substantially more impressive than reliability tests of the instrument to date. Based on the traditional career development notion that individuals tend to match their career with their interests or abilities, and based on the Learning Styles Inventory's ability to measure differentiable interests and abilities (with respect to cognitive styles), Kolb predicted and demonstrated correlations between people's learning style and choice of academic major as well as position in an industrial organization (marketing, sales, etc.) (Kolb, 1971).

Five functional groups are described below, followed by Kolb's hypotheses about the learning style that should characterize each group given the environments to which they relate.

1. Marketing (n=20). This group is made up primarily of former salesmen. They have a non-quantitative "intuitive" approach to their work. Because of their practical sales orientation in meeting customer demand they should have accommodative learning styles, i.e. concrete and active.

2. Research (n=22). The work of this group is split about 50/50 between pioneer research and applied research projects. The emphasis is on basic research. Researchers should be the most assimilative group, i.e., abstract and reflective a style fitted to the world of knowledge and ideas.
3. Personnel/Labor Relations (n=20). In this company men from this department serve two primary functions, interpreting personnel policy and promoting interaction among groups to reduce conflict and disagreement. Because of their "people orientation" these men should be predominantly divergers, concrete and reflective.
4. Engineering (n=18). This group is made up primarily of design engineers who are quite production-oriented. They should be the most convergent subgroup, i.e., abstract and active, although they should be less abstract than the research group. They represent a bridge between thought and action.
5. Finance (n=20). This group has a strong computer, information systems bias. Finance men, given their orientation toward the mathematical task of information system design, should be highly abstract. Their crucial role in organizational survival should produce an active orientation. Thus finance group members should have convergent learning styles.

Figure 3 shows the average scores on the reflective/active (RO-AE) and concrete/abstract (CE-AE) learning dimensions for the five functional groups. LSI quadrants are defined by dividing the two scales at the sample means.

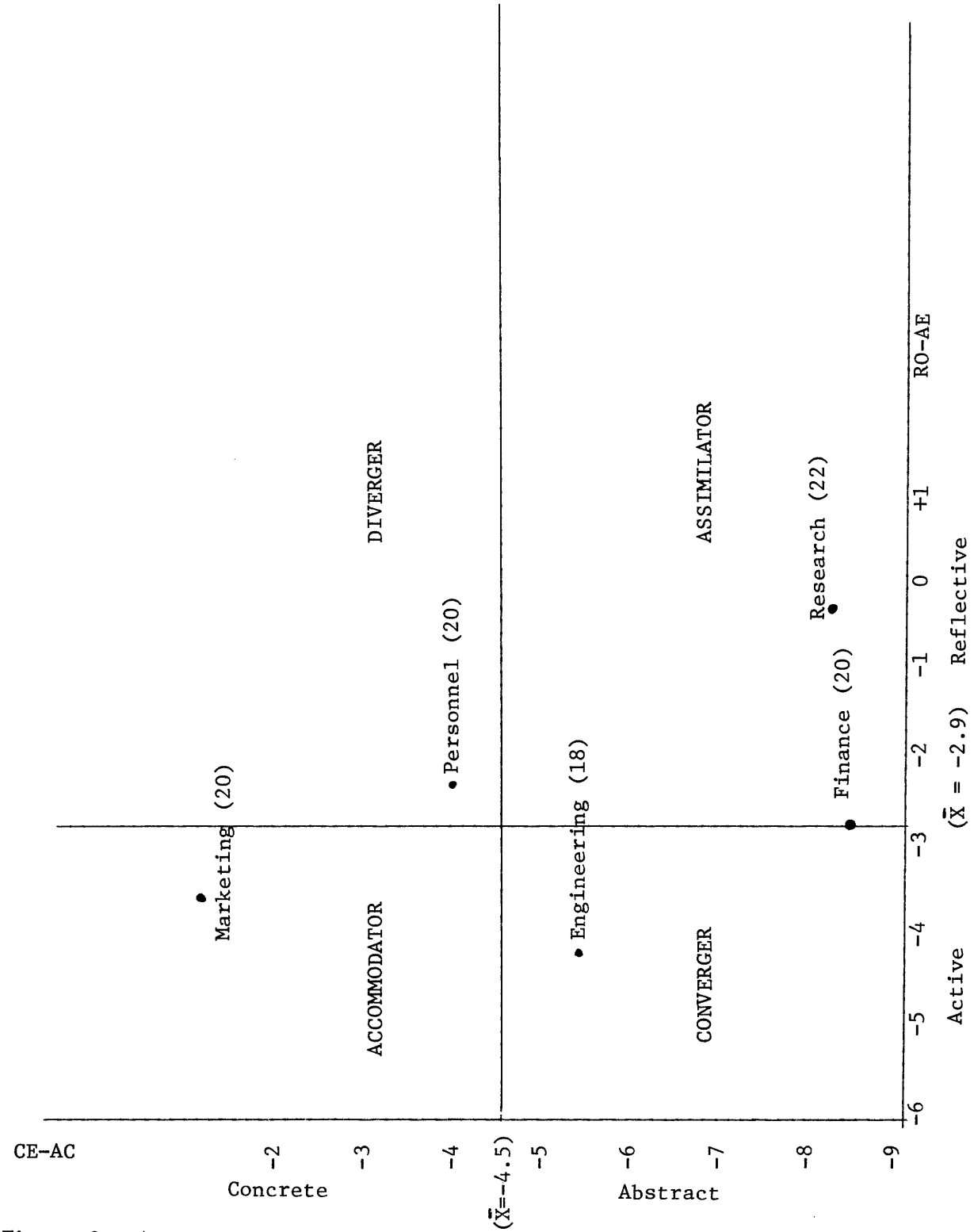

Figure 3. Average LSI Scores on Active-Reflective (AE-RO) and Abstract-Concrete (AC-CE) by Organizational Function

These results are consistent with the predictions with the exception of the finance group whose scores are less active than predicted. The "t" tests for significance of difference between groups on the abstract/concrete dimension yield the following 1-tail probabilities that are less than .10. Marketing is more concrete than personnel ($p < .10$), engineering ($p < .05$), research ($p < .005$). On the active/reflective dimension research is more reflective than marketing ($p < .05$), engineering ($p < .05$) and to a lesser extent finance ($p < .10$).

Colleagues of Kolb's working with the LSI have found correlations between individual's learning style and the process by which they engage in problem-solving and decision-making. Stabell (Stabell, 1973) studied the Trust Department of a large U.S. midwestern bank. One aim of his study was to discover how the learning styles of investment portfolio managers affected their portfolios. While this study involved only 31 managers, he found that nearly all of the managers in the Investment Advisory section of the department, a high risk, high pressure job (as indicated by a large percentage of holdings in common stock, a large percentage of discretionary accounts and a high performance and risk orientation on thepart of clients) had accommodative learning styles (scoring very high on the AE and CE LSI scales). On the other hand the men in the Personal Trust section, where risk and performance orientation were low, and where there were few discretionary accounts and fewer holdings in common stock, scored highest on Reflective Observation. This finding supported the hypothesis that high pressure management jobs develop and/or attract people

with active experimentation learning skills and inhibit Reflective Observation learning skills.

Stabell was interested in whether he could identify behavioral differences, on the basis of their LSI scores, in the way managers went about making investment decisions. He focused his research on differences within one department between managers with Concrete Experience (CE) learning style scores and Abstract Conceptualization (AC) learning style scores. He asked these managers to evaluate the importance of the information sources that they used in making decisions and found several interesting differences. First CE managers cited more people as important sources (e.g., colleagues, brokers and traders) while the AC managers listed more analytically oriented printed material as sources (e.g., economic analyses, industry and company reviews). In addition, it seemed that CE managers sought services that would give them a specific recommendation that they could accept or reject (e.g., a potential list) while the AC managers sought information that they could analyze themselves in order to choose an investment. This analytic orientation of the AC managers is further illustrated by the fact that they tended to use more information sources in their decisions than the CE managers. The concrete managers prefer go/no go implementation decisions based on personal recommendations while the abstract managers prefer to consider and evaluate alternative solutions themselves.

A second study of the relationship between learning styles and managerial problem-solving was a laboratory computer simulation of a production

"trouble-shooting" problem where the problem solver had to determine which specific type of "widget" among several types available was failure-prone. This experiment which is a modification of an earlier problem-solving experiment by Bruner et. al. (1956) was conducted by Jerry Grochow as part of his doctoral dissertation (1973). His subjects for the experiment were 22 middle level managers at M.I.T.'s Sloan Fellows program. Grochow was particularly interested in the different types of problem-solving strategies that assimilators and accommodators would use to solve this problem. He predicted that the accommodators would use a strategy that called for little complexity in data use and interpretation, little inference fron the data, and little cognitive strain in assimilating information; while assimilators would prefer a strategy that had the opposite characteristics, i.e., more complex use and interpretation and more assimilation strain and required inference. The former strategy, called successive scanning , was simply a process whereby the problem-solver scans the data base of widgets for a direct trial-and-error test of his current hypothesis about which widget was failure prone. It requires little conceptual analysis since the current hypothesis is either validated or not in each trial. The latter strategy, called simultaneous scanning, is in a sense an "optimal" strategy in that data on each widget are used to eliminate from consideration the maximum number of other widgets still representing solutions to the problem. This strategy requires considerable conceptual analysis since the problem-solver must keep several hypotheses in his head at the same time and deduce the optimal widget to examine in order to test these

hypotheses. The results of Grochow's experiment confirmed his hypothesis that accommodators would use successive scanning while assimilators would use the more analytical simultaneous scanning strategy. He further found that managers with accommodative learning styles tended to show more inconsistency in their use of strategies while the assimilative managers were quite consistent in their use of the simultaneous scanning strategy. The accommodative managers seemed to be taking a more intuitive approach, switching strategies as they gathered more data during the experiment. Interestingly enough Grochow found no differences between accommodative and assimilative managers in the amount of time it took them to solve the problem. Though the two groups used very different styles, in this problem they performed equally well. The results of both of these studies are consistent with the Kolb learning/problem solving model. Managers' learning styles are measurably related to the way in which they solve problems and make decisions on the job and in the laboratory.

Thus LSI scores have been shown to relate both to people's career choice and to the way in which people acquire and use information in making general (non-career) decisions. In this sense the LSI fits the requirements of an instrument to study both career choice itself and the process of choice in career development. In addition it seems to relate both to perceptual qualities (e.g., types of information and situations people respond to) and to cognitive processing qualities (e.g., how the information is sought and used). Finally, it is relatively simple to administer and score. These advantages of the LSI suggest its usefulness as a principal

means of identifying individual differences in learning or problem-solving style in order (1) to discover if there are systematic differences in the way people with different styles gather and use data in making career decision, and (2) to further explore the relationship between people's style and the type of career they pursue.

Thesis Overview

Previous sections have outlined a general rationale for investigating how career choices are made and what career choices are made by people with different learning styles. The remainder of this thesis will discuss the study that was undertaken to carry out this investigation. A brief overview of the plan for the rest of the thesis follows.

Chapter III discusses more specifically the rationale, hypotheses, and methodology associated with the thesis. One set of hypotheses predicts that people with different learning styles (i.e. accommodators, divergers, convergers, and assimilators) will utilize different sources of information and influence in arriving at a career decision. This hypothesis was tested primarily through interviews with 27 senior medical students. In these interviews subjects were asked to describe their career decision-making process and the interview was coded as to sources of information and influence used by the subjects. These coded results were then measured against scores on an LSI that was administered after the interview. LSI types were defined by arbitrarily dividing the sample into the four learning

style quadrants by dividing each LSI dimension (CE-AC, and RO-AE) at its median thereby creating four nearly equally sized groups. Thus learning types were not "pure" but were defined relative to each other.

The second set of hypotheses dealt with the actual choices of specialties within a career (medicine) by senior medical students with different learning styles. To predict specialty choices it was necessary to characterize the various career choices available in terms of the learning styles they are most suited for. This was done, as a "first-cut", by investigating the existing literature on medical careers, and through use of the author's "layman" perceptions of the specialties involved. Subsequent experiences necessitated some revision to these initial perceptions.

The predictions concerning career choice were tested by administering questionnaires to 72 freshman and 64 senior medical students. The questionnaires contained an LSI and a series of questions concerning career choice. Many of these survey question results are not examined in the main body of the thesis but are available in Appendix B.

Chapter IV contains a brief summary of responses to the quesionnaire LSI and a review of LSI scoring procedures.

Chapter V analyzes results for the hypotheses concerning the process of choice. Prior to examining the interview data this chapter explores the responses to three items in the questionnaire which were relevant to the process of choice. Following this discussion the interview data and the

specific hypotheses were analyzed. LSI types (e.g. accommodators) were arbitrarily identified by dividing the sample at the median rather than at the zero points of the LSI scales because the sample distribution was somewhat biased. Because of this, results were expected to show trends in the predicted directions rather than perfect correlations.

Chapter VI analyzes results for the hypotheses concerning career choices of different learning style types. Again the sample was arbitrarily divided into LSI types because of population biases on the LSI. Results not conforming to the hypotheses are closely examined and often lead to redefinitions of the nature of some of the types of careers (specialties) involved. This chapter also seeks to show how learning styles are associated with career choices by comparing freshmen choices with senior choices, and the choices of students more certain of their career choices with the choices of students less certain of their career choices.

Chapter VII explores the validity and reliability of the LSI as demonstrated in this study. Several interesting dynamics concerning the use of the instrument are uncovered. These dynamics help to explain some of the changes that were necessary in the predictions of what learning styles would choose which types of careers.

Chapter VIII summarizes key findings in this study and applies these findings to a discussion of the career development process in medical school.

CHAPTER III

HYPOTHESES AND METHODOLOGY

The General Research Question

The previous sections discussed some of the literature and issues relevant to the questions of (1) can differences in cognitive styles be related to career choice, and (2) can differences in cognitive styles be related to differences in the processes people use to gather information and make career decisions.

With respect to career choices it was shown that cognitive styles have been used to predict general career choice areas (e.g. arts vs. sciences) as well as specialties within a field (e.g., Kolb's management studies and the Myers and Davis study of medical specialists). With respect to the decision-making process, cognitive styles have been shown to yield differences between people doing general (not necessarily career) problem-solving. There have been no studies uncovered that have shown specific differences (as a result of cognitive styles) in the way people approach career decisions although the literature does suggest the importance of cognition in the career development process (e.g., see Dill et. al., Soelberg and Einhorn studies).

The hypothesis is that cognitive style differences will yield differences not only in people's career choice, but in the way they go about making decisions about their career. Specifically, we suggest: People with different cognitive styles will opt for different fields, and for different

specialties within fields. People with different cognitive styles will (a) use different information sources, and (b) be influenced differently by different types of information sources in making those choices.

General Methodology

To study the process of career choice it was necessary to find a population where there was both homogenity and heterogeneity. That is, a group who are all experiencing similar environmental conditions, are reasonably similar in terms of ability, motivation, and experience (income, status, etc.) for methodological control, yet have sufficient variety of career choices to allow differentiation according to style.

The well-established professions, such as medicine and law seemed to provide these conditions. All aspiring professionals are required to enter professional schools where a rigorous training regimen subjects them to similar conditions. Entry to these professional schools is generally competitive such that any one school will have a reasonably narrow distribution of ability and motivation. Student expectations of income and status are fairly well-defined by the existing professional patterns. Yet, within each profession there is a considerable variety of specialties and types of career.

The population selected for this study consists of the students at the ——— University Medical School. The population was selected because it was accessible, and also because medical students typify the category of career decision-makers who (1) are highly and homogenously educated; (2) have

a myriad of specialties to choose from and a variety of "roles" open to them (e.g., researcher, practitioner, teacher, administrator) whose attractiveness could vary with cognitive style; (3) have been the subjects of many career choice studies and thus are a relatively "known" and controllable sample (e.g., Myer-David study); and (4) represent a group under the stress of a changing profession where there are many important questions to be answered with respect to facilitating the process, and perhaps altering the traditional patterns, of career choice.

The general research questions focusing on the relationship of learning styles to (1) the process of career choice, and (2) the actual choice made, led to the use of both questionnaires and interviews. The questionnaires could be used to gather data from a large number of students about their career intentions. In addition, the LSI can be administered by questionnaire. The interviews, with a smaller sub-sample of students could be used to gather more detailed information about career choices, focusing on the process of choice in a way that a questionnaire study could not. Further, the interview format could be used to gather more data on the reliability and validity of the LSI. More specific details of the questionnaire and interview will be discussed as they relate to the specific hypotheses of this study in the following sections.

Hypothesis Development - Process of Choice

In investigating the process of career choice, the study focused on differences between medical students in the sources of information and in-

fluence used in their career decisions. Literature in this area is scanty. Several accounts of medical student life and culture discuss the many influences on medical students (see Merton, et. al., 1957, and Becker et. al., 1961 for descriptions of faculty, peer groups, curriculum, parents, work experiences, etc.). However, few other examples of empirical research are available; and there are no examples of research on individual differences in the process.

Hall (1971) has differentiated the career development literature into five major areas: (1) Occupational Choice, focusing on the "match" between some aspects of individuals and their job choice and typified by the Hudson, Kolb, and Myers work on cognitive style and career choice. (2) Career Development, viewing the "match" process as a continuous one rather than just the initial choice. Research in this area is typified by Super's studies testing his self-concept theory. (3) Career Transitions, focusing on regularized common changes in career status and the impact of these transitions upon the incumbent's identity such as the med student-to-intern-to-resident-to-specialist transitions. Becker, Geer, Hughes, and Strauss's (1961) Boys in White study is typical of research here. (4) Intracareer Role Analysis contains studies pertaining to one specific role, such as a particular occupation or a profession, in which a wide range of issues related to that role are explored (e.g., career norms, role conflicts, etc.). Studies of dance musicians (Becker, 1963) and school superintendents (Gross, Mason, and McEachern, 1958) are typical of this type of research; and (5) Intercareer Comparisions, similar to the previous cate-

gory, but comparing two or more roles with respect to a set of variables such as Roe's (1953) comparison of personality differences between social and physical scientists.

A study of individual differences in the process of career choices based on cognitive styles could fall into several of Hall's categories, particularly occupational choice, career development and career transitions. Hall notes, however, that in studies of career transition, such as Boys in White, typically "There has been little research on individual differences in response to role transitions." (Hall, 1971; p. 53) It was noted earlier that the studies typical of the occupational choice category do not focus on the process of choice. It is primarily in the career development category that one finds research similar to the study described in this paper.

The prime example is the Dill, Hilton and Reitman study of career decision making in managers. However, their case studies of three aspiring managers seem more to "set the stage" for focusing on cognitive processes in career decision making. Further research using more rigorous empirical studies of individual differences are needed.

In general, the other studies focusing on influences in the career choice process do not relate individual cognitive differences to differences in the process of career decision making.

In the general career development literature, Tennyson notes: "...the attention given to studying personal variables involved in vocational de-

cision making has not been matched by an equal concern for understanding the influence of significant reference groups or the effect of providing information about job requirements and employment opportunities... Few studies were found which dealt with the influence of school subjects, work experience, or peer pressure upon the development and expression of vocational motives". (Tennyson, 1968; p. 355) Exceptions to this statement include studies by Krumboltz and Varenhorst (1965) comparing the career development influence of guidance counselors, parents, and peers on ninth grade students in which they found that counselors demonstrated more attitude-shaping power. DeFleur's (1963) study found that personal contact has more influence on 6-13 year olds than television or general culture. Osipow (1962) found that written information could influence school children in their vocational perceptions. These studies however do not differentiate the effects of the various sources of information and influence on different individuals, nor do they deal with adults.

Similar studies with medical students include Paiva & Haley's (1971) findings that work experience and physician influence are important in making career choices. Funkenstein (1972) in a limited sample of interviews found that the absence of role models in primary care fields and the absence of federal funds for academic physicians influenced career decisions. Having work experience under a preceptor was important to 78 percent of students in shaping career plans according to Sivertson and Meyer (1971). Perlstadt (1972) found that medical faculty exerted a career influence indirectly through use of research opportunities by involving students in

projects. Coker, et. al., (1960) was one of many studies showing medical school faculty influence of varying kinds on students career choices. Again, none of these studies account for individual differences between students in the effect of the various influences.

Methodology - Process of Choice

The hypothesis in this thesis is that people with different learning styles will utilize, and be influenced by different sources of information in career choice. Specifically, several factors have been determined that could be involved as sources of information of influence. These include:

Faculty

Non-Faculty Physicians

Work Experience in Health Care Delivery

Research Experience

Family

Peers

Medical School Courses/Experiences

(a) By Subject Matter (Intellectual Content)

(b) By Mode

1. Lecture
2. Seminars
3. Labs
4. Patient Interaction
5. Etc.

The impact on student career decisions of these factors was measured through a structured interview format. The format consisted of a series of questions, starting very generally and increasing in specificity with respect to factors important in students' career decisions. The interview questions were as follows:

Interview Questions - Process of Choice

1. Have you made a final decision on your internship plans for next year? What are your ultimate career plans?
2. How did you come to these decisions?
3. What factors influenced you in these decisions?
4. Can you describe the process, events, thinking, etc. by which this decision was made?
5. Where or how did you get information about this career?
6. Where, how, or who influenced you most?
7. Were any of the following important to your decision:
   a. Faculty? Any in particular?
   b. Other people (physicians, family, etc.)?
   c. Courses? Which ones?
   d. Work experience? Please describe.
   e. Work factors? What?

The responses to these questions were coded according to the following sources of information of influence:

1. Work Experiences
   a. Intellectual Aspects.
   b. Personal Involvement Aspects.
2. Identification with another person. (Emphasizing a positive emotional attachment)
3. Scanning of several other people. (Emphasizing desireable qualities of people but no emotional attachment)
4. Work factors (pay, hours, etc.).
5. Intellectual Nature of the Work.
6. Courses.
7. Perceived impact of future role.

Interview data were collected from senior medical students. Seniors were interviewed since they are furthest along in their career decision-making and had been exposed to more potential career influences than students in the first three years. The interview population was selected at random from the seniors who had responded to a questionnaire which was sent to both freshmen and seniors (more details on the questionnaire follow later). The interview subjects' responses to the LSI or the questionnaire were unknown to the interviewer. The same interviewer interviewed every one of the interviewees.

Immediately following each interview the interviewer wrote out his analysis of the interview with respect to the priorities associated with the categories of influence sources indicated earlier. The interviews themselves were all tape recorded. Roughly one-third of the 27 tape recorded interviews were re-coded according to the same categories by colleagues of the principal interviewer as a test of interviewer coding validity. These re-coders of course had no knowledge of the earlier scoring results.

Specific Hypotheses About Information and Influence Sources

The general expectation was that, concrete types would refer more to satisfying experiences, identification with valued others -- particularly physician role models, and interpersonal relationships in general as sources of information and influence. Abstract types being more logical and systematic, would be influenced more by ideas, concepts, and a variety of work variables. When abstract types discuss people as sources of information and influence it would be more as information sources and more in the sense of a "scanning" (or abstract) mode as opposed to more of an "identification" (or affective) mode (see Schein, 1968). This is a result of the difference between concrete and abstract styles. Concrete types are more likely to "feel" more for people as total humans while abstract types will tend to "analyze" different aspects of people.

More specifically, referring to the Learning Styles Inventory typologies, it was hypothesized that:

Accommodators, with their concrete and active orientation will have concrete work experiences as their information and influence source. Specifically:

H-1: Accommodators, more than other LSI types, should indicate satisfying or dissatisfying work experiences as primary sources of influence in their career decisions.

Divergers being less active, but being "feeling" oriented and "receptive" will be more likely to "identify" with physician role models. This identification will have a strong affective component, rather than strictly a cognitive appreciation of desireable qualities in the role model. Specifically:

H-2: Divergers, more than other LSI types, should indicate the influence of role models, in the identification sense, as primary sources of influence in their career decisions.

Convergers being active and pragmatic and abstract non-feeling oriented will tend to describe the impact of their future "role" (an abstraction) on themselves and on others and the world in general. They will develop their own theories about their environment, developed from many information sources (but not always experientially validated) and their active orientation towards dealing with their environment. Being abstract, they will utilize scanning as a method of gathering information about role models. They will also incorporate other work factors, such as pay, into their career decision analysis. Specifically:

H-3: Convergers, more than other LSI types, should indicate (1) scanning, (2) their perceived impact of their role, (3) other work factors (pay, hours, etc.) as primary sources of influence in their career decisions.

Assimilators being abstract and logical, and not active but more tentative, will list courses at school more often as sources of influence. In speaking of work experience, they will specify the intellectual nature of the work. Specifically:

H-4: Assimilators, more than other LSI types, should indicate (1) courses, (2) the intellectual nature of their work as primary sources of influence in their career decisions.

Hypothesis Development - Career Choice

The second set of hypotheses concerns the correlation between choice of occupation or specialty, and learning style. Many studies of medical specialty choice have shown that in general few differences seem to exist between students choosing the different specialties (e.g., medicine, surgery, psychiatry) while in medical school (Reinhardt and Gray, 1972; Rezler, 1969). The Myers-Davis (1964) study on the other hand was able to demonstrate differences in thinking style that correlated with specialty choice. However, more significant differences in personality variables, attitudes, values, etc. seem to exist between students choosing between different types of medical career (e.g., academic, practioner, administration) (Rexler, 1969; Funkenstein, 1972). Funkenstein (1972) and Haney (1971) both suggest schemes for

combining the specialty and type choices. These combinations result in more relevant categories of choice which are based on the kind of work done, rather than on title.

Funkenstein has found three differentiable categories of medical career: Bioscientific, Biosocial, and Biomedical Engineering.

Bioscientific types include students planning to become specialists in surgery or medicine and their subspecialties. This category also includes careers in the basic medical sciences such as physiology. The chief criterion for inclusion in this group is whether the career is primarily based on biology.

Biosocial careers are those that include a large social component in addition to the biological one. Psychiatrists, public health physicians (concerned with health care delivery) and primary care physicians are included here. These physicians are concerned with the socio-emotional state of their patients as well as their medical problems.

Biomedical Engineering careers include those students electing (a) to work in the basic medical sciences, or (b) clinical specialists; and who are primarily concerned with applying engineering, computer science, physics, etc. to those specialties.

Haney has defined three dimensions of medical career: Scientism-Humanism, Degree of Patient Interaction, and Degree of Medical Intervention with a patient.

The Scientism-Humanism dimension roughly approximates Funkenstein's categorization between biosocial careers concerned with socio-emotional

issues of the patient and bioscientific/biomedical engineering careers concerned with the more "scientific" aspects of medicine.

The Degree of Patient Interaction as Haney describes it concerns the extent to which there is an active interchange between doctor and patient as in the extreme in the case of a psychiatrist, versus a physician-dominant relationship as in the case of a surgeon. Even more extreme, although not considered by Haney, is the case of a basic science research type physician who never sees a patient (e.g., a physiologist).

The Degree of Medical Intervention deals with the extent to which the physician physically alters the patient. Again a psychiatrist who does little physical intervention characterizes one extreme, while a surgeon typifies the other.

It was found useful to modify Funkenstein's and Haney's categories in thinking about dimensions for use with the LSI. One dimension is the degree of patient contact (an active stance)versus the degree of research orientation (a reflective stance). The other dimension is the degree of scientific orientation (abstract) versus a more total involvement in the patient interaction including a strong empathy, or socio-emotional concern for the patient (concrete).

These dimensions were created since they seemed to fit the dimensions measured by the LSI. The words used in the active scale of the LSI (practical, doing, active, pragmatic, experimentation, responsible) seem to fit

the model of the "busy" practitioner, treating patients. The words used to define the reflective scale of the LSI (tentative matching, observing, reflecting, observation, reserved) seem to fit the research orientation of the academic physician, or the listener orientation of the psychiatrist.

The words used in the abstract scale of the LSI (analytical, thinking, evaluative, logical, conceptualization, rational) seem to characterize the detached, intellectually oriented sub-specialist and/or researcher. In contrast, the words used in the concrete scale (receptive, feeling, accepting, intuitive, present-oriented, experience) seem to describe more of an involved, empathic physician concerned with the socio-emotional well-being of his patients in addition to the medical diagnosis. This concrete orientation should be found more among the primary care physicians, like the traditional family doctor, who are generally not in the complex sub-specialties but rather refer more medically complex cases to the specialists and sub-specialists. The primary care physician must treat his patients more as "total" people - a concrete orientation - focusing on the "here and now" interaction between doctor and patient rather than seeing patients as "clinical subjects" or "interesting cases" as is often the orientation in the more specialized fields.

The empathy, receptivity, and concern for the total person attributed to concrete physicians would seem to apply to psychiatrists as well as primary care doctors. In addition, the word "intuitive" used in the concrete scale would seem particularly appropriate to psychiatrists. This is

borne out by the Myers and Davis results discussed earlier in which psychiatrists scored more intuitive than any other specialty on the MBTI (see Table 1). Therefore psychiatrists were included among the concrete types.

A modified version of Funkenstein's career choice vignettes was developed to ascertain career intentions of medical students. These categories use "typical" career type descriptions to determine where students fall on the continua of "active practitioner" vs. "reflective researcher" and "abstract sub-specialist/basic scientist " vs. "concrete socio-emotionally oriented healer". Thus the intention was to replicate and perhaps improve upon some of the results of the Myers and Davis study (Myers-Briggs Type Indicator and medical specialties) using the LSI to measure individual problem-solving style, and using a categorization scheme for career choice based on the work of Funkenstein and Haney. The specific career choice options used are listed below.[1]

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[1] Other questions concerning career choice can be found in the questionnaire in Appendix A. These other questions were asked in order to help further understand the dynamics of career choice. A discussion of the results of this general survey can be found in Appendix B.

Career Type Vignettes Given to Students for Ratings of Preference

The following vignettes are descriptions of various careers of physicians.

CAREER NUMBER 1

This physician is in one of the clinical specialities such as medicine, surgery, pediatrics, neurology, etc. He (or she) is highly specialized in one of the sub-specialties of a major specialty. For example, if an internist, he is a gastro-enterologist, a kidney specialist, a pulmonary specialist, an endocrinologist, etc. If a surgeon, he is an orthopedic surgeon, a plastic surgeon, an abdominal surgeon, a thoracic surgeon, etc.

This physician is an excellent scientist and his or her education is basically biological. This doctor is affiliated with a medical school on a part-time basis doing some teaching, but his major activity is interacting with patients in the practice of medicine. This doctor is so busy with his patient load that although he would like to, he can spend little time on the emotional, social, and family aspects of the patients' illnesses. Clinical professor describes this physican.

CAREER NUMBER 2

This physician is in one of the clinical specialties or subspecialties that are characterized by limited patient interaction (e.g. pathology). He may or may not be affiliated with a medical school, however, he is primarily involved in his practice, often based in a hospital.

CAREER NUMBER 3

This doctor is in one of the other clinical specialties (e.g., pediatrics, internal medicine) and may or may not be in a sub-specialty. He is not affiliated with a medical school, but with an excellent community hospital. This doctor has a full-time private practice.

CAREER NUMBER 4

This doctor is in one of the subspecialties of a major specialty, similar to the physician in Career 1 or 2. However, this physician is full-time with a medical school in which he devotes about 70 percent of his time to research, often in a basic science. He has minor teaching duties and spends approximately 30 percent of his time in patient care, hospital based, which is largely carried out by supervising residents. Academic medicine is applied to this type of career.

CAREER NUMBER 5

This physician is full-time with a medical school. After graduation from medical school he was a post-doctoral fellow for two years in one of the basic medical sciences and now teaches and does research full-time in a medical school in a basic medical science. He has no clinical practice.

CAREER NUMBER 6

This physician majored in college in a physical science such as mathematics, computers, engineering, or physics, and has a career involving various mixtures of research, teaching and patient care. This doctor is mainly concerned with medical problems which involve his knowledge of these

sciences. These would include applying computers to medicine, systems analysis, biomedical engineering, artificial organs, cardiac monitoring, etc.

CAREER NUMBER 7

This doctor is a psychiatrist. He is either full-time with a medical school or affiliated with one, works in a community clinic or in a full-time private practice. This physician is primarily concerned with research and/or treatment of patients with psychiatric problems.

CAREER NUMBER 8

This physician is a Public Health Physician. He works in a governmental agency and is primarily concerned with the administration of health programs.

CAREER NUMBER 9

This physician is also a Public Health Physician. However, he is primarily concerned with research in bacteriology, environmental health, etc.

CAREER NUMBER 10

This doctor is engaged in the family practice of medicine. His or her training is in internal medicine or pediatrics. In addition to training in his basic specialty, this physician may have some training in psychiatry, public health, and minor surgery. This doctor treats all members of the family, not only paying attention to their physical problems, but also to the emotional, social, and family aspects of their 11nesses. Extremely complicated or unusual problems are referred to physicians in subspecialties.

CAREER NUMBER 11

This physician is a Primary Physician with training in internal medicine, pediatrics, and psychiatry. In delivering patient care, his services also include assessment of patients' total needs before these are categorized by specialty; determination of who shall meet the defined needs - physicians, general or specialist, non-physician members of the health team, or social agencies; attention at each step to the personal, social and family dimensions of the patient's problem; health maintenance and disease prevention are as important as cure and rehabilitation.

Based on our discussions of the LSI scales, the Haney (1971) dimensions, the Myers and Davis (1964) results with the MBTI, and some preliminary stereotypes of the types of physicians described in the vignettes, predictions were made concerning the type of learning style that should be associated with each of these career descriptions. Figure 4 shows these predictions.

"Predicted" Accommodator Careers

As discussed earlier, family physicians and primary care physicians were characterized as concrete (total patient orientation) and active (busy practitioners). Public health administrators were seen as similar to the general management people Kolb (1973) has studied. Therefore, it was expected that they would be concrete and active, as in the Kolb study.

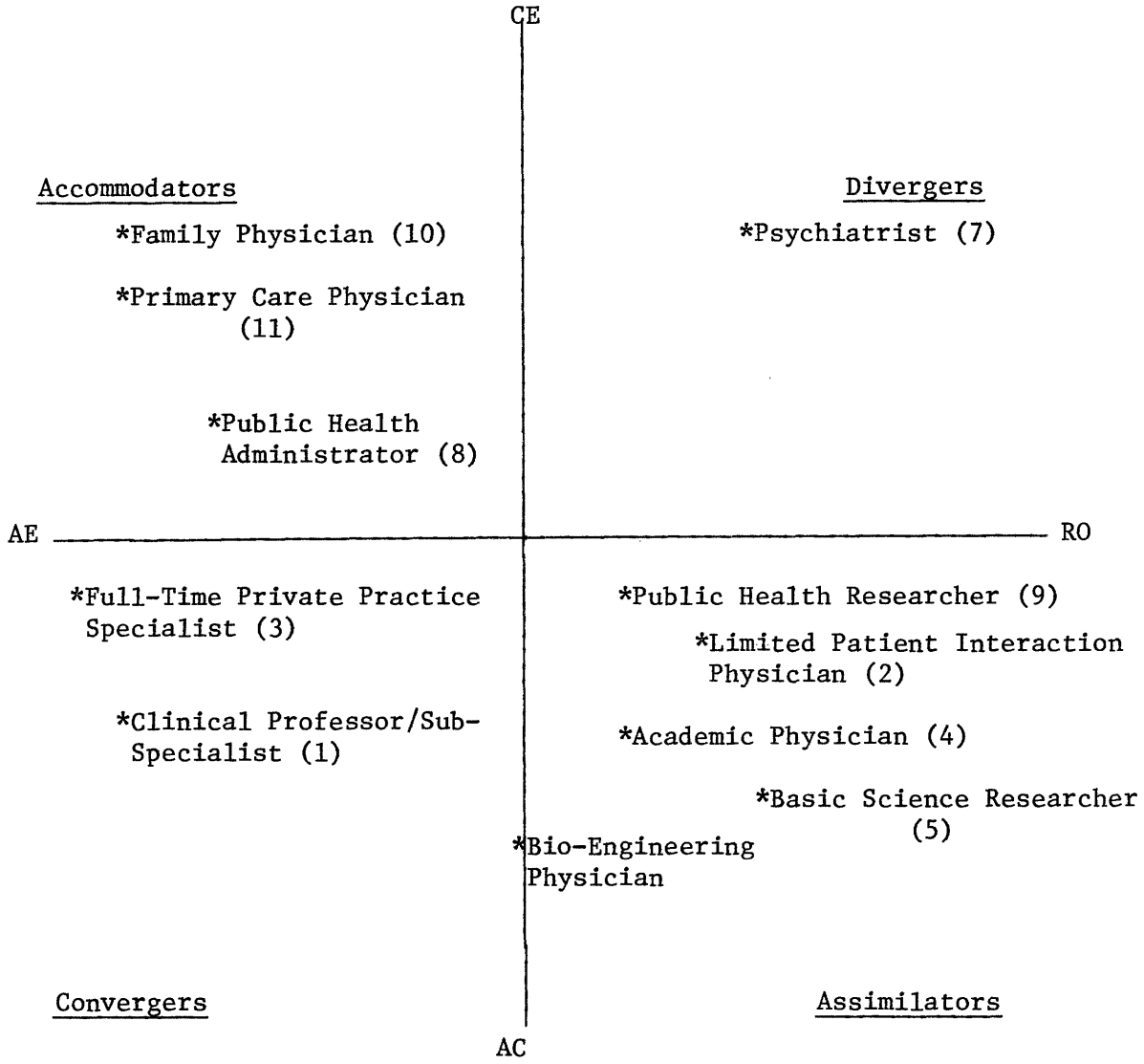


Figure 4. Predicted Distribution of Career Types on Learning Style Grid

"Predicted" Diverger Careers

As discussed earlier psychiatrists were included among the concrete careers. However, because of the low profile "listener" orientation associated with psychiatrists they were expected to be more reflective than the other concrete physicians.

"Predicted" Converger Careers

Specialists and sub-specialists often focusing on diseases and their diagnosis rather than on patients as people were expected to be abstract as discussed earlier. When they are in private practice they can be expected to be active in patient interactions.

Bio-engineering physicians were seen as similar to Kolb's (1971) engineers. Thus they too should score as abstract, and active even though they may not have a patient practice. However, they were expected to be less active than the patient practicioners.

"Predicted" Assimilator Careers

Academic physicians, basic research scientists, and public health researchers were all expected to fit the reflective, abstract research model as described earlier. Medical research is a non-people oriented, intellectually complex activity. In many ways, the same characteristics are true of the limited patient interaction physicians. The pathologist for example, like the medical researcher works in a laboratory setting. His work often includes analysis of diseased tissue to determine the nature and source of the disease. This activity is both abstract and reflective according to the definitions of the LSI scales. Thus limited patient interaction physician was considered an assimilator career type.

Overall, frequent patient interaction careers were considered active, while research oriented (or "listener") careers were considered reflective. Conceptually complex careers relying heavily on knowledge expertise with a

disease orientation were considered abstract while less specialized more people oriented careers often depending more on intuition and "bedside manner" were considered concrete.

Specific Hypotheses About Medical Student Career Choices

The general hypothesis is that there is a process of selection and/or socialization in progress that results in people with particular learning styles being found in particular types of careers. Further, if there is a selection and/or socialization process occurring, the seniors should be choosing the careers associated with their learning styles more often than the freshmen. For example, seniors with assimilator learning styles (reflective, abstract) should be found in basic science research careers relatively more frequently than freshmen with assimilator learning styles.

The specific hypotheses for this section are stated below:

H-5: Among seniors, accommodators (active, concrete), more than the other LSI types will choose Family Medicine, Primary Medicine and Public Health Administration.

H-6: Among seniors, divergers (reflective, concrete) more than the other LSI types will choose Psychiatry.

H-7: Among seniors, convergers (active, abstract) more than the other LSI types will choose Private Practice Specialties and Sub-specialties, and Bio-Engineering Medicine.

H-8: Among seniors, assimilators (reflective, abstract) more than the other LSI types will choose Basic Science Research, Academic Medicine, Public Health Research, and Limited Patient Interaction Practice (e.g. pathology).

H-9: The results hypothesized in H5, H6, H7, and H8 above will be more significant among seniors than among freshmen.

LSI Validity and Reliability Check

Previous investigations of the reliability of the LSI have revealed a need for further testing. In addition, while the LSI's validity has been demonstrated in a variety of studies there have been many questions concerning "how" or "why" it works.

To further pursue the issues of reliability and validity of the instrument the LSI was readministered to the interview population at the time of their interview. This re-test, some 6-10 weeks after the initial test provided a reasonable test of reliability. Unlike previous checks, in this case the population was not undergoing any new, intensive experiences during the period between tests that might lead to changes in learning style.

To better understand the way in which the LSI works, interview subjects re-taking the LSI were subsequently questioned as to "how" they responded to the inventory. They were also asked to demonstrate their response "technique" by "walking through" several of the LSI items they had just filled in. This particular strategy was designed to enhance our under-

standing of the LSI so as to provide a more complete knowledge of the impact of style on both choice, and the process of choice in career development.

Additional Areas of Inquiry

In addition to the specific hypotheses about (a) the choice process, and (b) the relationship of style to choice, and in addition to the investigation of the reliability and validity of the LSI, the questionnaire and interview were designed to solicit a variety of information concerning the career intentions of medical students, and the medical school influences on the medical students. It was hoped that all of these data would be helpful in understanding the process of medical student career development. Any of these data which shed light on the specific hypotheses of this thesis will be presented in the discussion of results of predictions. Further, any data highlighting new questions or issues concerning the process of career development, and/or medical education in general will be discussed in the results chapter. Finally, a brief discussion of the responses to all questions in the questionnaire is presented in Appendix B.

CHAPTER IV

LSI RESPONSES AND SCORING

Because the LSI is so central to the hypotheses of this study, a brief description of the overall distribution of responses to the instrument will precede the discussion of results of the various hypotheses.

Eventually, 72 freshmen and 64 seniors responded to the questionnaire. This represents a response rate of 68% and 64% respectively. To achieve these response rates both classes received one follow-up letter subsequent to the mailing of the questionnaire, and an attempt was made by telephone to contact all seniors who had not responded to the initial mailings.

As discussed earlier, the LSI consists of four scales, Concrete Experience (CE), Abstract Conceptualization (AC), Reflective Observation (RO). and Active Experimentation (AE). Each of these scales is represented by a column of adjectives on the LSI. There are nine rows of the four columns and a subject is asked to read across the columns, row by row, and indicate the adjective that most describes his style with a "1", next most with a "2", and so on. By totalling the sum of responses in each column (CE, AC, etc.) a score for each scale is obtained. In the revised LSI used in this study, certain items in each column are "dummy" items and are not totaled when scoring the column. In the example LSI below, the items to be scored in each column are starred, and the score for each column indicated.

Learning Style Inventory Example

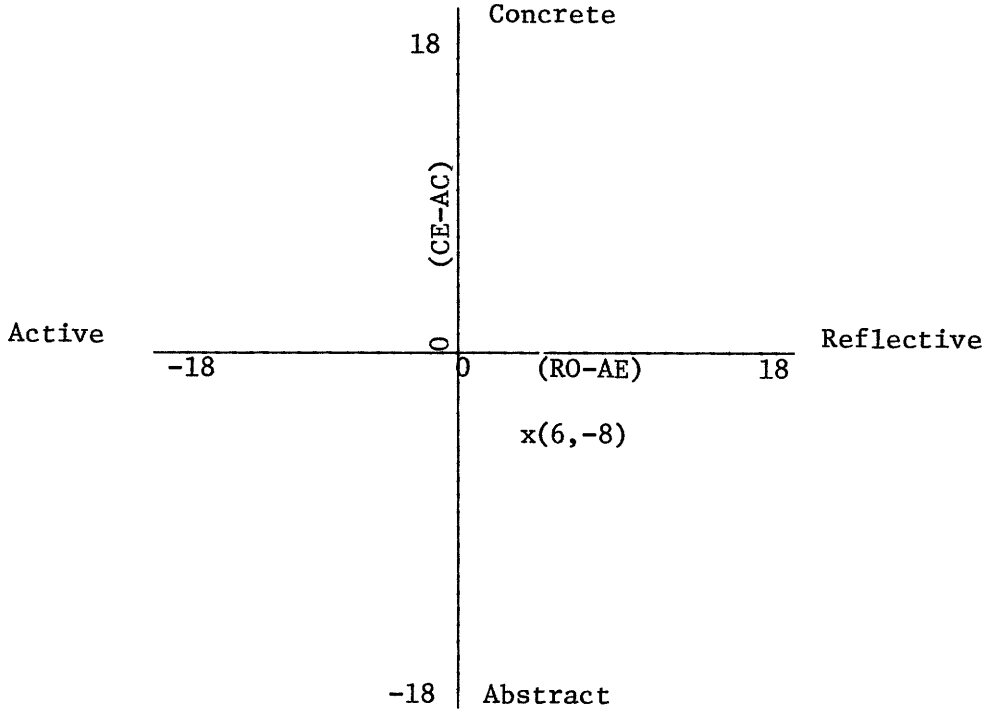
1.	1 discriminating	2 tentative*	3 involved	4 practical*
2.	4 receptive*	3 relevant	2 analytical*	1 impartial
3.	2 feeling*	3 watching*	1 thinking*	4 doing*
4.	2 accepting*	4 risk-taker	1 evaluative*	3 aware
5.	4 intuitive*	1 productive	2 logical*	3 questioning
6.	3 abstract	1 observing*	4 concrete	2 active*
7.	2 present-oriented*	3 reflecting*	1 future-oriented	4 pragmatic*
8.	4 experience*	2 observation*	3 conceptualization*	1 experimentation*
9.	3 intense	2 reserved*	1 rational*	4 responsible*

CE=18 RO=13 AC=10 AE=19

CE-AC = 8 RO-AE = -6

To determine the two major dimensions of learning style, the abstract score is subtracted from the concrete score (CE-AC), and the active scoore is subtracted from the reflective score (RO-AE). This yields the subject's preferred orientation on each of the two learning style dimensions, concrete-abstract, and reflective-active. As is evident in the sample LSI above, the scores on the individual scales (CE, AC, RO, AE) can range between 6 and 24 since there are six scored items in each column, each receving a 1, 2, 3, or 4. A score of 6 indicates a highly preferred scale for the subject while a 24 indicates low preference. Thus, in subtracting one scale from another, a negative total would indicate a preference for either CE or RO. For example, in the sample LSI above, the RO-AE score of -6 indicates a Reflective Observation preference.

In this study, in order to keep the graphical representations of the LSI scores consistent with previous research, that is, to have the concrete side of the CE-AC dimension appear on the top of the graph and the reflective side of the RO-AE dimension appear on the right side of the graph, the CE-AC and RO-RE scores were multiplied by (-1). Thus values for CE-AC can vary from -18 (abstract) to +18 (concrete) while values for RO-AE can vary from -18 (active) to +18 (reflective). The neutral point (no preference between scales) then is 0 for each dimension (CE-AC and RO-AE).



In the example of an LSI given earlier, the CE-AC score would be computed as -8 while the RO-AE score would become 6. This score of (6, -8) would then be plotted on the graph above as shown.

In this study only the CE-AC and RO-AE scores are used in testing hypotheses since these scores reflect a subject's preferred style. However, in Tables 5 and 6, the summary statistics for the four individual scales (CE, RO, AC, AE) are presented in addition to the statistics for the CE-AC and RO-AE dimensions.

The distribution of senior and freshmen scores on the CE-AC and RO-AE dimensions revealed a bias among both seniors and freshmen towards the abstract and active scales of the LSI which causes a concentration of scores in the Converger quadrant (abstract, active).

This medical student bias was expected, based upon previous research with medical samples (e.g. Myers and Davis, 1964). The abstract and active bias is evident in samples of other college and graduate students as well. In a sample of 342 M.I.T. undergraduates in various academic departments, Kolb found a mean CE-AC score of -2.65 and a mean RO-AE score of -1.39 (Kolb and Goldman, 1973). In a sample of graduate students in management at M.I.T. Kolb found CE-AC scores averaging -4.36 and RO-AE scores averaging -3.27 (N=70) (Kolb, 1971).

Because of the bias in these samples towards the active and abstract scales, it has been necessary to divide samples at their median points rather than at the score of zero (which represents the instrument's "neutral"

Table 5. Freshmen Summary Statistics for Learning Style Inventory

	Mean	Median	STD. DEV.	Minimum	Maximum	Sample Size
Concrete Experience*	15.71	16	2.93	8	23	69
Abstract Conceptualization*	10.92	10	3.21	6	20	69
Reflective Observation*	17.08	17	3.36	8	24	69
Active Experimentation*	14.85	14	3.21	9	22	69
CE-AC	-4.80	-6	5.51	-14	12	69
RO-AE	-3.71	-5	4.81	-12	12	69

Table 6. Seniors Summary Statistics for Learning Style Inventory

	Mean	Median	STD. DEV.	Minimum	Maximum	Sample Size
Concrete Experience*	15.20	15	2.65	7	20	63
Abstract Conceptualization*	12.47	12	3.10	7	19	63
Reflective Observation*	17.60	18	3.91	6	23	63
Active Experimentation*	13.28	12	3.38	7	22	63
CE-AC	-2.75	-4	4.98	-11	12	63
RO-AE	-4.62	-6	6.29	-14	15	63

*It should be remembered that these scores are summed rank-orders. Therefore low numbers indicate high preference while high numbers indicate low preference.

LSI Scores Used to Define Learning Style Quadrants

		CE-AC Score	RO-AE Score	N
Seniors	Accommodators	> -4	> -6	17
	Divergers	> -4	≤ -6	13
	Convergers	≤ -4	> -6	15
	Assimilators	≤ -4	≤ -6	16
Freshmen	Accommodators	> -6	> -5	17
	Divergers	> -6	≤ -5	14
	Convergers	≤ -6	> -5	16
	Assimilators	≤ -6	≤ -5	16

point) for analysis purposes. In our senior medical student population the median on the CE-AC scale is -4 and the median on the RO-AE scale is -6. For freshman these medians are -6 and -5. These medians will be used in the subsequent analyses to the study to divide subjects in the Accommodator, Diverger, Converger, and Assimilator quadrants as in the chart above.

In the next chapter we will analyze the choice process of the different LSI types based on these groupings. In dividing the sample in this manner it was expected that some students might be "miscategorized" (e.g. some students who actually scored less than zero on the RO-AE dimension might be

categorized as divergers or assimilators). However, as a group, each learning style category should be showing a tendency to behave in its predicted manner more than any other group.

CHAPTER V

THE PROCESS OF CAREER CHOICE: RESULTS

The hypotheses concerning the process of career choice among the medical students predicted that there would be differences in the sources of information and influence used in making career decisions in students with different learning styles. Specifically, accommodators would emphasize "work experiences," divergers would emphasize "identification," assimilators would emphasize "courses" and the "intellectual nature of work," and convergers would emphasize "role impact," "work factors," and "scanning."

To investigate these hypotheses it was necessary to interview students as a means of obtaining the level of detail needed to properly determine what factors were influencing a given student. For example, it would be difficult to determine through a questionnaire whether a student meant "identification" or "scanning", or just advice when he indicated he had been influenced by medical school faculty.

Questionnaire Analysis

However, one question in the questionnaire which was intended to gather general information concerning student career decisions was in part relevant to the hypotheses of this study about the process of career choice. This question (question 12) asked students to rank order twelve potential sources of career influence in order of their importance. Of the twelve items listed, 3 were potentially analyzable from the perspective of the

hypotheses of this study. These items, 1) "Work Experience in Health Care Delivery," 2) "Research Experience," and 3) "Medical School Courses" all link directly to H_1, H_2, H_3, or H_4 (p. 54). The other nine items were either irrelevant or too ambiguous to relate directly to any of the hypotheses. The items concerning the influence of various kinds of people were relevant to the hypotheses, but ambiguous hence not used.

In Table 7, the results for seniors on all 12 items are presented. The average rank-ordering of each influence source is indicated for each learning style type . A lower score indicates a high or important rank ordering for the particular LSI group, while a higher score indicates a lower importance for the particular LSI category. Only items 1, 2, and 3, as discussed, will be analyzed for now, as a "first cut" at investigating the hypotheses concerning the process of career choice, and as a way of reinforcing the discussion of interview results in the next sections. The other items will be discussed in a later section.

In Table 7, only the results for seniors are reported. Results for freshmen on this question are discussed in Appendix B. This analysis is limited to seniors since they have had more exposure to the various factors hypothesized to influence career decisions and thus are more relevant to the hypotheses of this study.

Table 7. Average Rank Order Importance of Various Career Choice Influence Factors for Senior Medical Students with Different Learning Styles

Influence Factors	Accommodators	Divergers	Convergers	Assimilators
1. Work Experience in Health Care	2.7*	3.9	5.1	5.5
2. Research Experience	7.5	7.4	7.9	6.2*
3. Med. School Courses	7.7	6.5	5.0	6.3*
4. Example of Physician	3.1	3.8	4.5	3.0
5. Other Experience	7.4	8.6	7.2	7.8
6. Funding Available	8.8	8.9	8.7	8.8
7. Med. School Faculty	6.5	6.3	5.7	5.4
8. Family Influence	7.4	6.8	6.9	7.6
9. Med. Student Influence	7.8	6.9	7.3	6.5
10. Friend Influence	8.5	7.5	7.3	7.1
11. Other Physician Influence	6.8	5.9	6.9	5.5
12. Other	7.7	6.9	7.9	8.8
	N = 17	N = 13	N = 15	N = 16

*Hypothesized as important (i.e. low numbers)

Work Experiences - The prediction was that Accommodators would find work experiences more significant than the other LSI types. The results bear this out as accommodators rate work experience importance as an average rank-order of 2.7. While this is a considerably higher ranking than either convergers or assimilators (5.0[1] and 5.5[2] respectively) it is not that much higher than the ranking given by divergers (3.9[3]). Perhaps this is because the active bias of the sample has caused the median line to be drawn in such a way as to include many accommodators in the diverger category. Another explanation is that the abstract-concrete dimension is more relevant than the active-reflective dimension with respect to predilections for certain different influence sources.

To test the first alternative the rank ordering scores of the accommodators described in Table 7 were compared to a newly defined group of divergers with scores on the active-reflective dimension of zero or higher. The average rank order score for this group on work experience was 3.8, not different from the first diverger group which scored 3.9. Therefore the first explanation seems incorrect. This may indicate that the alternative explanation, that the abstract-concrete scale may be more relevant as a determinant of differences in influence sources, or specifically for "work experiences" as an influence source, may be more correct.

Research Experience - The prediction here was that research experience would be more important to assimilators than to other LSI types as research is an

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[1] $t=2.010$; $p < .025$

[2] $t=2.758$; $p < .005$

[3] $t=1.061$; $p > .10$

abstract-reflective activity. The results indicate that in fact assimilators rate research experience as more important than the other types do. Assimilators' score of 6.19 is higher than accommodators' 7.6,[1] divergers' 7.4[2] or convergers' 7.9[3]. It is interesting to note here that the active-reflective dimension does seem to make a difference, as convergers find research experience least important compared to the other LSI types.

Medical School Courses - The expected result here was that assimilators would again rank this source of information and influence as more important than the other groups. Assimilators score 6.25 on courses, while accommodators score 7.7[4], divergers 6.5[5], convergers 5.0 . The actual results indicate that convergers rate courses more important than assimilators do, but that convergers and assimilators together -- the abstract types -- rate courses much more important than the concrete types do. However, divergers (who are reflective) also rate courses higher than active accommodators and only slightly less high than assimilators. The results may be indicating that courses will be important to people if the people are either abstract or reflective. Clearly concrete active accommodators have not been influenced greatly by course work, while the other groups have been more influenced by their courses.

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[1] $t=1.339$; $p<.10$

[2] $t=1.060$; $p>.10$

[3] $t=1.625$; $p<.10$

[4] $t=1.169$; $p>.10$

[5] $t=.223$; $p>.10$

These initial results on the questionnaire provided some insights which were useful in analyzing the interview data concerning the process of choice. The basic hypotheses about sources of influence seemed to stand up with the exception that the importance of certain sources seemed less dependent on the active-reflective dimension than others did, or that there might be some more complex relationship between the two dimensions.

Interview Analysis

The hypotheses in this section stated that students in the different learning style categories (accommodators, divergers, convergers, assimilators) would discuss different sources of information and influence in describing how they made their career decisions.

27 senior medical students were interviewed concerning the sources of information and influence in their career decisions. The interviewees were selected randomly. All were interviewed by the same person according to the format on page 51. The interviews were coded according to the scheme discussed on page 52 .[1]

[1]These analyses were compared with analyses performed by Sloan School colleagues of the interviewer from tapes of the interviews. Interview reliability was 100% when the ratings of "important sources of influence" were compared for 10 of the interviews, randomly selected. Although the rank order assigned by the various scorers varied slightly, the three most important sources identified in each interview did not vary at all from scorer to scorer.

Thus, for each interview, the most important sources of information and influence were identified. The subjects were then categorized by learning style type, (accommodators, etc.) using a second administration of the LSI which was performed immediately following the interview.

To measure the validity of the hypotheses the coded interviews were compared along each predicted dimension of influence (i.e., work experiences, identification, scanning, etc.) according to whether or not the subject indicated that dimension as one of the three most important sources of his career influence (importance coded by interviewer). Then subjects in the four LSI categories were compared on each dimension of influence to see whether significant differences were apparent in the relative sources of influence between LSI types. Following are actual examples of the types of statements made by interview subjects which were coded as one of the seven potential sources of information and/or influence.

Work Experience: "In the third and fourth year, you know, we go through a series of clinical experiences in the various departments on our rotations. I really enjoyed all of them. Almost every time I got into a new rotation I decided that that was what I wanted to be. But the one that really appealed to me was a pediatrics elective. I was really interacting with patients on my own -- with some supervision, of course, but I felt responsible. It's funny because I always thought I would go into surgery but the surgical rotation was one of the few I didn't enjoy -- you were treated like the surgeon's slave -- no responsibility -- nothing interesting to do."

Identification: "There is one faculty person who really has had an effect on me. Dr. X at Children's Hospital was just such an exciting person to work with - and a really good teacher too. He seems to know just what's going on inside a patient - I'd really like to be able to do that. Unfortunately, there aren't more people like him teaching but he sure kept me involved with psychiatry."

Scanning: "There was no one in particular who I'd say influenced me in my decisions. Oh, there are several guys that I considered excellent physicians and from whom I learned quite a bit. Dr. Y for example is a superb diagnostician - but he's too wrapped up with the hospital - I doubt that he ever goes home. And Dr. Z seems to combine an acute sensitivity for the patient with some good medical skills. I think you need to learn what you can from each of these people - but basically, your career decision has to be your own."

Role Impact: "I think there is a real need for more women in Ob-Gyn. A woman has a much greater understanding of the emotional side of what an Ob-G patient is going through - and that has to be an advantage in diagnosis and treatment."

Work Factors: "To be honest, I didn't want to be the kind of physician that was being called at all hours of the night. I want some time to myself to pursue other interests besides my job. That's why I stayed away from the generalist/family practice stuff."

Intellectual Nature of Work: "You have to understand the kinds of work these people do. Surgeons for example aren't concerned with really understanding what is wrong with a patient. To them it is just, 'take it out and sew 'em up.' It's the internist who needs to consider all the variables involved and come up with an accurate diagnosis. That's the interesting part -- understanding the interactions of all the complex systems and arriving at a solution. Surgeons -- well, they're just not interested -- they're not intellectually inclined."

Courses: "Most of the courses here aren't taught very well. The material can be really fascinating. For example, Biology of Disease was really great. It was the first time you got to sit down and try to figure out what was happening disease-wise. I guess that started me off on my interst in internal medicine."

Using this type of coding, the following hypotheses were investigated:

H_1: Accommodators more than other LSI types should indicate satisfying or dissatisfying work experiences as primary sources of influence in their career choices.

H_2: Divergers more than other LSI types should indicate the influence of role models, in the identification sense, as primary sources of influence in their career choices.

H_3: Convergers more than other LSI types should indicate (1) their perceived impact of their role; (2) scanning; (3) other work factors (pay, hours, etc.) as primary sources of influence in their career choices.

H_4: Assimilators more than other LSI types should indicate (1) the intellectual nature of work; (2) courses at school, as primary sources of influence in their career choices.

The overall results for these hypotheses are presented in Table 8.

Table 8. Percentage of Cases in Which Factors were Identified as a First, Second, or Third Most Important Career Choice Influence by Seniors of Different Learning Styles.

	Accommodators	Divergers	Convergers	Assimilators
1. Work Experience	100%*	100%	50%	20%
2. Identification	67%	55%*	50%	20%
3. Scanning	11%	44%	75%*	0%
4. Role Impact	33%	11%	25%*	20%
5. Work Factors	44%	22%	25%*	20%
6. Intellectual Work	0%	33%	25%	80%*
7. Courses	22%	0%	25%	100%*
	N = 9	N = 9	N = 4	N = 5

*Hypothesized as high scores.

Although the size of the sample is small, there are some confirming trends apparent. With the exception of identification, work factors, and role impact the predicted preferences seem to be verified in so far as the groups for which the preferences were expected did display at least as frequent mention of the predicted influence sources as any other group. In some cases, the relative frequency of mention was much higher in the predicted group.

H_1: Accommodators were expected to indicate "work experiences" as a source of career influence more frequently than the other learning style types did. In Table 8 the results indicate that 100% of the accommodators did indicate the importance of "work experiences" for them. This compares with only 67% of the rest of the population (Fisher's Exact p=.06). However, within the rest of the population, 100% of the divergers also indicated they were influenced by work experience compared with only 50% of the convergers and only 20% of the assimilators. The major difference then appears to be between the "concrete" students (accommodators and divergers) and the "abstract" students (convergers and assimilators). The reflective-active dimension does not seem to be very important here, just as it was not very important in the previously discussed questionnaire analysis concerning "work experience" as an influence source.

Overall the data indicate that concrete students (accommodators and divergers) are influenced more by work experience in making career decisions than are abstract students (convergers and assimilators).

H_2: Divergers were expected to indicate "identification" as an important source of career influence more often than the other learning style types. Overall the results in Table 8 show only minor support for this hypothesis as 55% of the divergers indicate "identification" as a source of influence compared to 50% of all other types. (Fisher's Exact $p > .10$). While only 20% of assimilators mention identification, 50 percent of the convergers and 67 percent of the accommodators, even more than the divergers found identification important. Here again, the concrete types together (accommodators and divergers) display an overall preference for the predicted influence source that is greater than the abstract types together (convergers and assimilators). Yet when the active-reflective scale is introduced some of the predicted differences disappear. Perhaps this is as was suggested earlier an indication that for certain sources of influence, one dimension is more relevant than the other in determining the impact that the influence source will have on an individual.

The results actually fit the hypothesized explanation concerning why a diverger would be influenced by identification. In that explanation it was suggested that the "concrete" orientation would lead to identifying with "whole" people rather than with specific qualities of people that an abstract thinker might relate to. This may be true for active (accommodator) as well as reflective (diverger) concrete students as the data seem to indicate. In fact it may be more true for active concrete students.

H_3: Convergers were expected to indicate "scanning", "role impact", and "work factors" more frequently than the other learning style types as a source of career influence. Each of these sources was analyzed separately.

Scanning

Convergers do indicate "scanning" more frequently than the others do (see Table 8). 75% of the convergers mentioned scanning as compared to 22% of everyone else (Fisher's Exact $p < .01$). Apart from the convergers, only divergers show any appreciable use of scanning (44%). This diverger score is interesting. The distinction between "scanning" and "identification" as defined in this study is often difficult to make since both imply the influence of role models. The divergers were expected to be influenced by identification, yet they indicate almost as much influence through "scanning" (55% versus 44%). Similarly, 50% of the convergers were scored as indicating they were influenced by identification. Perhaps the hypotheses for these two learning styles were more accurate than the interview coders' scoring. If more accurate distinctions between scanning and identification were possible the results may have been more supportive of the hypotheses. Overall, however, convergers do indicate scanning as an important source of career influence more often than the other learning style types.

Role Impact

Convergers did not mention "role impact" more frequently than the other learning style types did. Convergers mentioned role impact as impor-

tant only 25 percent of the time in Table 8 compared to 33 percent for accommodators, 20 percent for assimilators and 11 percent for divergers. Actually the active types (convergers and accommodators together) found "role impact" to be important when compared to the reflective types. Perhaps in this case abstract-concrete qualities are not as important as the active orientation in determining who will be concerned about "role impact."

In the interviews, both convergers and accommodators talked about role impact in terms of having an effect on their environment - a pragmatic responsible orientation which the LSI would include under the "active experimentation" scale. However, there was a difference between the two groups that is not evident from the coding scheme used to verify the hypotheses here. Accommodators, with their concrete orientation were concerned about such things as "helping the disadvantaged," or "providing needed services in rural areas." These statements reflect more of a total personal involvement, typical of the definition of "concrete".

Convergers on the other hand stressed "the need to be competent in my work, to be able to accurately diagnose and treat disease" as a way of having impact. They generally spole of these two skills, diagnosis and treatment, as their "role impact." This is a much more differentiated and limited view of role impact - one more in line with the definition of "abstract."

Although the coded interviews did not support the hypothesis that convergers are influenced in their career decisions more by their perceptions of "role impact" than other types, role impact does seem to concern students with an active orientation more than those who are reflective. In addition, there appear to be some differences in how "role impact" is perceived by different learning style types. (concrete versus abstract)

Work Factors

Convergers did not mention "work factors" more often than the other learning style types did. Convergers (see Table 8) indicated "work factors" as important sources of influence in 25 percent of the cases compared to 44 percent for accommodators, 22 percent for divergers, and 20 percent for assimilators. Apparently "work factors" like "role impact" were not terribly important for any of the four groups. If anything, work factors appear most important for accommodators. However there is a confounding effect with this source of influence. Five out of the six women in the interview sample attributed significance to work factors in their career choices (e.g., "I want to remain flexible so I can move with my husband if I have to," or "I want to work reasonably stable 9-5 hours so I can look after a family as well as my job.") Four out of these five are accommodators or divergers, that is, concrete. (The sixth woman is also a diverger).

The women in the total sample of 136 were generally more concrete than the male population. This is consistent with findings in the general

population of the United States and if often attributed to differences in sex role identification in children (Lynn, 1971). In any event, five out of six of the women in this sample fell into the accommodator and diverger groups. As a result, of the six accommodators and divergers indicating "work factors" as important sources of influence, four were women. This suggests that the responses in this category were more affected by sex role differences than by learning style differences. Because of this phenomenon it is difficult to reach any conclusion about the relative influence of work factors on career decision for people with different learning styles in this population. However, the data do indicate that "work factors" may not be nearly as important for men as for women.

H_4: Assimilators were expected to indicate they were influence by "courses" and "the intellectual nature of work" in making their career decisions more frequently than the other learning style types did.

Courses

In Table 8, 100% of the assimilators indicated that courses were important to them compared to only 14% of the rest of the sample (Fisher's Exact $p < .01$). These results are somewhat different than the questionnaire results concerning the influence of medical school courses. In the questionnaire, divergers indicated they were influenced by courses more than they indicated course influence in the interviews.

Perhaps, this is a result of the particular people being interviewed not being representative of the total sample of divergers. However, it is

more likely that the differences result from the interviewer's distinction between "pure" course work and clinical rotations. The third and fourth year clinical rotations are part of the curriculum and may have been considered courses by some divergers. Yet they are actually much more "work experience" than "courses." Perhaps, the more abstract assimilators were better able to make this distinction in the questionnaire than the concrete divergers were.

Intellectual Work

Assimilators also attributed much more frequent career influence to "the intellectual nature of work" than did the other learning style types. In Table 8, 80% of the assimilators found the "intellectual nature of work" an important influence source compared to 18% of the other learning style types (Fisher's Exact $p < .01$). The data then seem to provide strong support for the hypothesis that assimilators will be influenced by "courses" and the "intellectual nature of work" more than other learning style types will.

Conclusions

Although the sample size was small and thus tests of statistical significance inconclusive for the most part in these analyses, the trends in the data suggest that certain of the hypotheses concerning the relative importance of different sources of influence to people with different learning styles seem to apply. These conclusions are supported by similar results

in the larger questionnaire sample on the items relating to sources of career influence. To summarize, in making career choices, "identification" and "work experience" appear to be important to concrete types, "courses" and the "intellectual nature of the work" are more important to assimilators, and "scanning" appears more as an influence mode for convergers.

There are several important implications of these results. If people with different learning styles are influenced by different sources of information, then the process of career choice can be seen as an interaction between the individual and his environment. Certain environmental conditions will have impact on some types of people but not others. For example, concrete types will need more "work experiences" to enable them to make satisfactory career decisions. Many educational programs, particularly in colleges and graduate schools provide little practical work experience for students (Schein, 1972). This may present a problem for many concrete students.

Concrete students also seem to be affected more by identification in their career decisions. The implication here is that they will pursue careers similar to those of the available role models. If the variety of models the concrete students are exposed to is limited, then in effect their career choice options are limited. In medical schools this has some interesting effects which will be discussed in subsequent chapters.

One key implication of the findings in this section is that selection or admissions criteria are not sufficient to control or influence the kinds of career aspirants being turned out. A frequent question in the medical world is whether applicants can be screened to produce more or less of one kind of physician or another (Schumacher, 1963; Gough, 1971). Clearly selection criteria are only part of the solution. The medical school environment, as has been pointed out before (e.g., Kendall, 1971), is also involved. What this study suggests is that neither can be viewed independently. Rather, career choices emerge from the interaction between different types of students and different aspects of environments.

CHAPTER VI

CAREER CHOICE:RESULTS

The previous chapter discussed differences in how people sought and used information in making their career decisions. The data suggested that differences in learning styles may cause medical students to be influenced by different types and sources of information in career decision-making. This chapter will investigate the hypothesis that learning styles also influence the actual specialty, or type of career that people choose. That is, there are characteristics of the different types of specialties and careers that make different learning styles more suited for one type of career than another.

In many ways the hypotheses about different sources of information and influence are similar to those about different career choices. Just as accommodators (active, concrete) preferred information sources that were active and concrete, such as personal experiences, it is expected that the accommodators will prefer careers that are active (e.g. many patient interactions) and concrete (e.g. concerned with patients, as "whole" people). A primary care physician, as defined in this study, would meet these requirements.

Similarly, assimilators (reflective, abstract) who were influenced by research, courses, and the intellectual nature of their work in making their choices, should prefer reflective (e.g. research) and abstract (e.g. complex, sophisticated medicine) careers. Academic medicine meets these requirements.

In general, the hypotheses in this section suggest that students with concrete learning styles will choose careers which deal with patients' socio-emotional problems, while students with abstract learning styles will choose careers more concerned with complex and sophisticated medical concepts. Students with reflective styles will opt for careers in research, or with less active patient interaction, while students with active styles will prefer careers where the physician is actively engaged with patients.

The specific hypotheses were as follows :

H_5: Among seniors, accommodators (active, concrete) more than the other LSI types will choose Family Medicine, Primary Medicine, and Public Health Administration.

H_6: Among seniors, divergers (reflective, concrete) more than the other LSI types will choose Psychiatry.

H_7: Among seniors, convergers (active, abstract) more than the other LSI types will choose Private Practice Specialties, Sub-Specialties, and Bio-Engineering Medicine.

H_8: Among seniors, assimilators (reflective, abstract) more than the other LSI types will choose Basic Science Research, Academic Medicine, Public Health Research, and LImited Patient Interaction Practice (e.g. pathology).

H_9: The results hypothesized in H_5, H_6, H_7, and H_8 will be more significant among seniors than among freshman.

This last hypothesis suggests that there is a process of selection and/or socialization occurring in medical school wherein students try to "match" their learning style with their career choice. Thus seniors will have had more time and data than freshmen to establish the match between their learning style and their career choice.

Analysis

In analyzing the career choices of medical students only the responses of subjects who indicated they were "certain" of their career choice were used. "Certainty" was determined by selecting those students who responded 1, or 2 on the 5 point scale on the questionnaire item (question 2) which asked "How certain are you of your career choice?" Those who indicated career uncertainty by responding 3, 4, or 5 to this question were not included in the analysis since one reason for their uncertainty may be related to a "mismatch" of learning style with career characteristics.

An important necessary modification to these hypotheses became apparent during the course of the senior interviews. In the above hypotheses, specialist and sub-specialist surgery and medicine (e.g., internists, pediatricians, etc.) careers were not differentiated from each other in formulating the career categories of specialist and sub-specialist physicians. It became obvious from talking to representatives of both groups that there were important differences between students choosing surgery versus medicine

that could be a result of differences in their respective learning styles. It had been expected that surgeons would be abstract. Because of the nature of their work they would need to avoid heavy emotional involvements characteristic of concrete types. This socio-emotional concern for patients had been used as a criterion for defining "concrete" physicians in Chapter 3. These assumptions made about surgeons were only half true. While surgeons do characteristically avoid involvement with their patients, their cognitive preferences, particularly around work, are concrete. Surgeons lean towards the experiential, tangible and non-intellectual in their work. The total medical student sample in this study as discussed earlier is somewhat biased towards the abstract dimension. Therefore, surgeons' concreteness, manifested by scoring "present-oriented," and "experience" oriented on the LSI, resulted in their being far more concrete than students interested in medicine, even though surgeons did not see themselves as being "feeling" oriented on the LSI.

Because of this we separated students choosing surgery from those choosing medicine within the career categories of Private Practice Specialist and Private Practice Sub-Specialist. In addition, it was necessary to revise H_5 and H_7 concerning the career choices of accommodators and convergers. The surgical specialties and surgical sub-specialties were now expected to be a choice of the more concrete accommodator group along with primary care and family practice. The accommodators choosing surgery will do so not because of a desire to deal with socio-emotional issues with their patients, but rather because of the "mechanical", non-ambiguous,

Table 9 . Percentage Distribution of Career Choices of Different Learning Style Types.

		Accommodators	Divergers	Convergers	Assimilators	Total Sample
"Predicted Accommodator" Careers	Family Medicine	14%	0	27%	17%	15%
	Primary Medicine	14%	10%	0	0	6%
	Surgical Specialty	0	10%	9%	0	4%
"Predicted "Predicted "Predicted Diverger Career	Surgical Sub-Spec.	36%	20%	18%	8%	21%
	Psychiatry	7%	10%	0	8%	6%
"Predicted Converger" Careers	Medicine Specialty	21%	20%	9%	0	13%
	Medicine Sub-Spec.	7%	20%	27%	25%	19%
"Predicted Assimilator" Careers	Academic Medicine	0	0	0	25%	6%
	Limited Patient Interaction	0	10%	9%	17%	9%
		100% N=14	100% N=10	100% N=11	100% N=12	100% N=47

concrete nature of surgery which appeals to them. The medicine specialists and sub-specialists were still expected to be found among convergers.[1]

Table 9 contains the overall distribution of career choices by learning style types.

As is evident from Table 9 some career choices are more popular than others regardless of learning style type. This is due to several factors which are discussed in this chapter and in the final chapter of this study. The career choice preferences of the learning styles types will be analyzed by comparing each learning style type with all the other types according to the hypotheses.

H_5: Accommodators were expected to choose family medicine, primary medicine, surgical specialties and surgical sub-specialties more frequently than the other learning style types. Table 10 shows the results for this hypothesis.

Table 10 Percentage Distribution of Career Choices of Accommodators and Other Learning Style Types

	"Predicted Accommodator" Careers	Other Careers	
Accommodators	65%	35%	100% N=14
Others	39%	61%	100% N=33

Fisher's Exact $p < .10$

[1] The multiple interpretations of the concrete scale as described here will be examined more fully in Chapter VII.

The results support the hypothesis. 65% of accommodators compared to 39% of all other career types choose to be either family physicians, primary physicians, or surgeons. Interestingly, of the five accommodators choosing non-accommodator careers, 2 choose medicine specialties (pediatrics and ob-gyn) that are probably more appropriately categorized as accommodator careers. Within the medicine specialists there are represented internists, pediatricians, and obstetricians-gynecologists. Of the 3 specialties, only internists fully epitomize the "type" originally considered in formulating this hypothesis. Pediatricians who are involved with children and their families are inclined to be more sensitive to the socio-emotional aspects of the doctor-patient relationship.[1] In the hypothesis of this study, this socio-emotional concern was associated with a concrete (accommodator) learning style, not the abstract (converger) style associated with medicine specialists here.

Ob-gyn'ers are also somewhat misplaced on the abstract-concrete dimension when categorized with internists as convergers. Ob-gyn is generally described as being at the crossroads between medicine and surgery, combining aspects of each. In this sense, it might be expected that ob-gyn'ers would show some of the characteristic concreteness of surgeons, making them accommodators. If these two student choices were re-categorized

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[1] In fact, pediatricians were found to be very feeling oriented in the Myers and Davis (1964) research (see Table 1).

as accommodator careers the results become even more supportive of the hypothesis. Either way it does appear that accommodators do tend to choose careers that match their learning style as defined in this study.

H_6: Divergers were expected to choose psychiatry more frequently than the other learning style types do. Table 11 has the results for this hypothesis.

Table 11. Percentage Distribution of Career Choices for Divergers and Other Learning Style Types

	"Predicted Diverger" Careers	Other Careers	
Divergers	10%	90%	100% N=10
Others	5%	95%	100% N=37

Fisher's Exact $p > .10$

The results in Table 11 are in the predicted direction, but the numbers are so small that the results are difficult to draw any conclusions from. Psychiatry is one of the career types that was not chosen by many students. Students reported experiencing much pressure from faculty and peers against the choice of a career in psychiatry. This is particularly important in the case of divergers since divergers have been identified as a group more likely to be influenced by identification with faculty or even peer role models. Thus they may have been discouraged by factors other than the "match" between learning style and career type in rejecting psychiatry.

Unfortunately there are no other career types identified as diverger careers which they could choose as alternatives. Table 9 does suggest that 60% of the divergers do go into "concrete" careers (accommodator or diverger careers). This is similar to the results in Chapter 5 which indicated that the distinction between accommodators and divergers is not very clear. In fact, of the five divergers choosing non-accommodator (or non-diverger) careers, three are choosing careers which again are probably miscategorized. One of the three chose pediatrics and another chose ob-gyn. As suggested earlier, both of these specialties may be considered accommodator careers. The third student chose radiology, one of the limited patient interaction careers. Originally this group was intended to include pathologists and was so defined. The group now incorporates anesthesiologists and radiologists. The pathologists are in fact assimilators, as predicted.

It may be however that radiology is more of a diverger career. Many types of radiology can be seen as diverger work. For example, the basic radiological task, examining X-rays, is reflective. It is also an "ikonic" task in the sense that one is dealing with objects as opposed to ideas, and therefore is by definition concrete. Radiology is also reflective, or non-active, in the sense that there is not the same kind of frequent doctor-patient interaction as in the medicine specialties, family medicine, or primary care.

If the pediatrician, ob-gyn'er and radiologist are now considered as either accommodator or diverger career choices, only 20%, (or 2) of the divergers are left having chosen abstract (converger or assimilator) careers.

It is still difficult to understand exactly what is happening with divergers, but based on the results here and in Chapter 5, it seems difficult to separate their behavior from that of accommodators. Perhaps this is true as suggested earlier because of the active bias of this sample which has resulted in a diverger group which is actually relatively active, or accommodator-like. The data do suggest that divergers and accommodators together (concrete learning styles) behave very differently from convergers and assimilators. Combining the divergers and accommodators and their career choices in Table 12 (compensating for the pediatricians ob-gyn'ers, and radiologists) and comparing them to the other two learning style types demonstrates this point.

Table 12. Percentage Distribution of Career Choices for Accommodator and Divergers as Compared to Convergers and Assimilators

	Accommodator and Diverger Careers	Converger and Assimilator Careers	
Accommodators and Divergers (Concrete)	83%	17%	100% N=24
Convergers and Assimilators (Abstract)	43%	57%	100% N=23

Together, the accommodators and divergers do seem to support the overall hypothesis that learning style influences choice of a career type, at least on the concrete-abstract dimension of the learning style inventory.

H_7: Convergers were expected to choose careers in the medicine specialties and sub-specialties more often than the other learning style types do. The results for this hypothesis are described in Table 13.

Table 13. Percentage Distribution of Career Choices for Converger and Other Learning Style Types

	"Predicted Converger" Careers	Other Careers	
Convergers	36%	64%	100% N=11
Others	31%	69%	100% N=36

Fisher's Exact $p > .10$

The results do not provide support for the hypothesis. There is little evidence of more frequent choice of converger careers by convergers (36%) as compared to other learning style types (31%). However, it has already been shown in previous discussions that four of the other learning style types (2 accommodators and 2 divergers) chose "predicted converger" careers in pediatrics and ob-gyn. These particular medicine specialties could (or should) be categorized as accommodator careers. This adjustment

would change the percentage of "others" choosing converger careers to 19%, as compared to the 36% for convergers choosing converger careers.

In addition, the one converger choosing a limited patient interaction career chose anesthesiology. Anesthesiology is actually a surgical specialty, and, could be argued, requires a much more active orientation than the category "limited patient interaction" intended (as was discussed, the limited patient interaction category was based on pathologists). Anesthesiology then might properly be considered a converger career, raising the percentage of convergers in converger careers to 45%.

However, one might also argue that anesthesiology is an accommodator career since anesthesiology is a surgical specialty and surgery has been defined as in the accommodator career category. This leads to an important problem in this analysis. In fact, the student choosing anesthesiology, has a score on the concrete scale of -4, exactly on the median between accommodators and convergers. A one point difference in his score would have put him in a different learning style category where his career choice would have had very different implications for the hypotheses of this study. The LSI is not sensitive enough as an instrument to make 1 point distinctions (see discussion on LSI validity/reliability). There are several cases in this study where a difference of 1 or 2 points on one of the LSI scales would have caused a student to be placed in a different LSI category. Ordinarily, to resolve this problem the analysis could exclude subjects whose scores were not clear-cut indicators of a type, and focus on

subjects with more extreme scores. However, in a small sample, as this one is, it is not possible to exclude many subjects. This problem of marginal learning style types then remains a weakness in this analysis. To provide an alternative method of analysis that is less subject to this particular problem, a comparison of mean scores on the LSI for the various career types will be made later on in this chapter.

As for the data on convergers, the initial results do not support the hypothesis. However, further analysis of the career choices of individual students revealed that several adjustments to the hypothesis and results could be made which improve the conceptual consistency of the hypothesis and increase the empirical support. The overall intent of this study is to demonstrate the influence of learning styles on career choices. In view of this objective the modificiations to the definitions of various career types seem reasonable and valid, and help to increase our understanding of the dynamics involved in matching learning styles and career choices.

H_8: Assimilators were expected to choose careers in academic medicine and limited patient interaction careers (pathology) more frequently than the other learning style types do (see Table 14).

The results in Table 14 strongly support the hypothesis. Assimilators choose assimilator careers 42% of the time as compared to 6% for other learning style types. No "others" choose academic medicine. The two "other" students choosing limited patient interaction careers chose radiology

Table 14. Percentage Distribution of Career Choices for Assimilators and Other Learning Style Types

	"Predicted Assimilator" Careers	Other Careers	
Assimilators	42%	58%	100% N=12
Others	6%	94%	100% N=35

Fisher's Exact $p < .01$

and anesthesiology, both of which, as has already been discussed, probably should not be called assimilator careers. In addition, of the seven assimilators choosing non-assimilator careers, three are going into sub-specialty medicine, and are interested in becoming clinical professors. Clinical professors can be very similar to academic physicians, particularly if they stress research in their work. Because of the current scarcity of jobs in academic medicine, sub-specialty medicine may be the closest possible alternative for these students. If the medicine sub-specialties can be seen as an appropriate second choice for assimilators it improves the results for this hypothesis. It also improves our understanding of the results for the hypothesis concerning the career choices of convergers (Table 13), as the three non-convergers choosing medicine sub-specialties (converger careers) might now be recategorized.

The data seem to indicate that assimilators' career choices do seem to be influenced by their learning style when compared to other learning style types. In the four analyses of this chapter the data supported the

hypotheses for assimilators' and accommodators' career choices most strongly without any necessary modifications. All results improved, particularly those for convergers and divergers, when certain adjustments were made in the definitions of "predicted" career categories. These modifications were necessitated primarily by oversights in the operational formulation of the initial hypotheses by including disparate specialties within the same categories (e.g. including pediatricians with internists). Although the origianl hypotheses did not all work out perfectly, the overall analysis, with modifications included, does seem to support the notion that an individual's learning style influences, or is influenced by career choice. That is, there is a process of selection and/or socialization that causes people with different learning styles to be found in different careers.

To further support this hypothesis, the mean LSI scores of students who chose the originally defined career categories were compared on both the concrete-abstract dimension and the reflective-active dimension (see Table 15). As discussed earlier this method of analysis eliminates the problem of having to categorize students as learning style types when their LSI scores may not clearly place them in one category or another. These mean LSI scores are for students who chose one of the careers originally defined in the hypothesis as a career that one of the learning style types should choose. In other words, the modifications to career categories (e.g. separating pediatrics from internal medicine) have not been implemented

Table 15. Mean LSI Scores of Different Career Types for Seniors

	CE-AC	RO-AE	
"Predicted Accommodator" Careers (Family Medicine, Primary Care, Surgery)	-2.2	-6.3	N=22
"Predicted Diverger" Careers (Psychiatry)	-1.7	-4.6	N=3
"Predicted Converger" Careers (Medicine Specialties and Sub-Specialties)	-2.9	-5.6	N=15
"Predicted Assimilator" Careers (Academic Medicine Limited Patient Interaction)	-4.7	-1.6	N=7

here. Essentially then this is a test of the original hypotheses using a different form of analysis (means instead of frequencies).

The results in Table 15 support the hypothesis. Students in the accommodator and diverger career categories each score more concrete than students in either the converger or assimilator career categories. Students in the accommodator and converger career categories each score more active than students in either the diverger or assimilator career categories. Relative to each other, students in all four career categories have mean LSI scores exactly as predicted (see Figure 5).

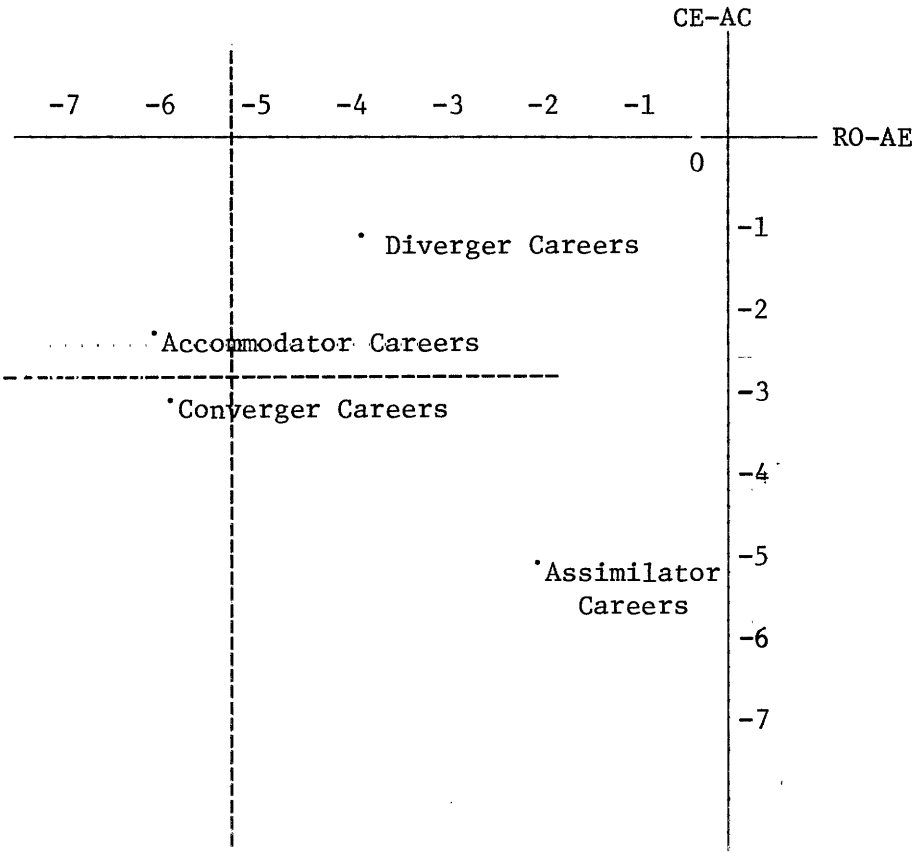

Figure 5. Mean LSI Scores of Students Choosing Different Careers

These results further support the theory that learning style is a factor in career choice. If the previously discussed modifications were made in the definition of career categories (i.e. changing pediatricians, ob-gyn'ers and radiologists) the differences between mean LSI scores for the four career categories would increase.

One further analysis of the matching phenomenon was performed in addition to those already described. Assuming that there is a process of selection and/or socialization occurring which leads to a match between a student's learning style and his career choice, then one might expect a

student with a "mismatch" to be less comfortable with, and therefore less certain of, his choice. To test this, students who indicated they were "uncertain" about their choice of a career were compared with students who were "certain" of their career choices.[1]

Using the hypothesized "predicted" career choices for the different learning styles resulted in a finding that 36% (13) of those students who were "mismatched" were "uncertain" of their career choice, while only 12% (3) of those students who were "matched" with their career choice were "uncertain."

Of the 3 "uncertain" students who were in a "predicted" career, 1 was merely ambivalent between family medicine and primary care, either representing a match with his accommodator style. In addition another of the "uncertain" students in a "matched" career was a converger in pediatrics which, as has been discussed, is really a mismatch. Finally, by modifying the "predicted" career choice categories as discussed earlier, 4 of the "certain" students would move from being "mismatched" to being "matched." The final distribution would show that 40% (14) of those students who were "mismatched" were "uncertain" while only 3% (1) of those students who were "matched" were "uncertain."

These results seem to indicate that a mismatch between a student's learning style and his choice of career is associated with some uncertainty about the career choice. This conclusion again supports the theory that learning style is a factor in career choice.

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[1] "Uncertainty" was defined as scoring 3,4, or 5 on question 2 in the questionnaire asking students to rate how certain they were of their career choice, on a five-point scale.

H_9: The final hypothesis in this study suggested that there was a process of selection and/or socialization occurring in medical school that would cause seniors' learning styles to match the hypothesized career choices more closely than freshmen learning styles would. For each learning style type, freshmen career choices were compared with senior career choices to see if there were any significant differences, again using the originally defined career categories.

Table 16. Percentage Distribution of Freshman and Senior Accommodator Career Choices

	"Predicted Accommodator" Careers	Other Careers	
Freshmen	40%	60%	100% N=10
Seniors	65%	35%	100% N=14

Fisher's Exact $p > .10$

The results for accommodators (Table 16) support the hypothesis. 65% of the senior accommodators choose accommodator careers compared to 40% of the freshmen accommodators.

In Table 17 a similar analysis is done for Divergers.

Table 17. Percentage Distribution of Freshmen and Senior Diverger Career Choices

	"Predicted Diverger" Careers	Other Careers	
Freshmen	11%	89%	100% N=9
Seniors	10%	90%	100% N=10

Fisher's Exact $p > .10$

The results in Table 17 do not support the hypothesis. Unfortunately, as in previous analyses with divergers there are too few people choosing psychiatry, the lone diverger career, to obtain reliable results. An interesting sidelight is that freshmen divergers might actually be expected to indicate psychiatry as a career choice more often than seniors since they have not yet been as exposed to the pressures against psychiatry as seniors have. In this one case, the socialization process may be working against the hypothesis, especially since there are no alternative diverger careers to choose from once a student is discouraged from psychiatry.

Combining the accommodator and diverger careers as in previous sections again reveals results more consistent with the hypothesis (see Table 18). The combined senior accommodators and divergers chose concrete (accommodator and diverger) careers 63% of the time as compared to the freshmen 52%. This is particularly interesting since the freshmen sample overall chose concrete careers slightly more often than the seniors did overall (60% versus 55%).

Table 18. Percentage Distribution of Freshmen and Senior Accommodator and Diverger Career Choices

	"Predicted Accommodator and Diverger" Careers	Other Careers	
Freshmen	52%	48%	100% N=19
Seniors	63%	37%	100% N=24

Thus, combining the learning style types into "concrete" and "abstract" students leads to results more supportive of the hypothesis that there is a process of selection and/or socialization occurring in medical school.

The results for this hypothesis as tested with the convergers are shown in Table 19.

Table 19. Percentage Distribution of Freshmen and Senior Converger Career Choices

	"Predicted Assimilator" Careers	Other Careers	
Freshmen	25%	75%	100% N=8
Seniors	36%	64%	100% N=11

Fisher's Exact $p > .10$

The results in Table 19 support the hypothesis. Although the sample sizes are small, more senior convergers choose converger careers than do freshmen convergers.

The results for freshmen and senior assimilators are presented in Table 20.

Table 20. Percentage Distribution of Freshmen and Senior Assimilator Career Choices

	"Predicted Assimilator" Careers	Other Careers	
Freshmen	0%	100%	100% N=16
Seniors	42%	58%	100% N=12

Fisher's Exact $p < .01$

The results in Table 20 strongly support the hypothesis that seniors will choose careers matching their learning style more frequently than freshmen. Senior assimilators choose assimilator careers 42% of the time compared with 0% for freshmen assimilators.

The results in three out of the four learning style types supported the hypothesis that seniors career choices will be better matched to their learning style then will freshmen career choices. In the fourth case, divergers, the analysis is plagued by a) the existence of only one diverger career option, psychiatry, which was chosen by very few students; and b) the fact that the socialization pressure in medical school is against a career in

psychiatry, perhaps causing seniors to be less inclined than freshmen to choose it even if it does match their learning style. In fact, in the entire sample, freshmen choose psychiatry slightly more frequently than seniors even though there are fewer "true" divergers in the freshmen sample. By "true" divergers we mean someone whose actual LSI scores are positive on both the concrete and the reflective dimension.

The conclusion, based on results in Table 16 through 19 is that there is a process of selection and/or socialization occurring which causes seniors to match their learning style with their career choice more often than freshmen do.

Conclusions

The overall results in this chapter suggest that learning styles are correlated with students' choice of a medical career type and may in fact influence students' choice of a career. This possibility has implications for counseling, admissions and selection decisions. However, any influence of learning styles on ultimate career choice is subject to the possible offsetting influence of learning style on the process of career decision-making as discussed in Chapter 5. While there are certain careers that may be more appropriate for certain learning styles, there is no guarantee that the match will be consumated unless the appropriate influence sources are available. For example, divergers who may be "matched" with psychiatry may not become psychiatrists unless the influence factors divergers respond

to (e.g. identification with role models and work experiences) are available in psychiatry. In the final chapter of this thesis the consequences of these dynamics in the medical school setting will be discussed as a case in point. Before that however it is necessary to return to the Learning Style Inventory itself.

The results of this study so far would indicate that the LSI is a useful instrument for measuring personality qualities that can effect important decisons people make. Therefore the LSI can be a useful tool in counseling, admissions tests, etc. Of course all of these applications of learning style are contingent upon the ability to measure accurately the learning styles of individuals. The results discussed so far would indicate that overall LSI scores for groups are potentially highly useful, but there has been less validation and no reliability check on an individual by individual basis. Group means often hide individual deviance. While this is less critical in a research study of this nature it is clearly <u>not</u> appropriate when making decisions about a given individual's career fate.

For this reason, the next chapter focuses on a discussion of LSI validity and an analysis of the test-re-test reliability of the LSI performed in this study.

CHAPTER VII

LEARNING STYLE INVENTORY VALIDITY AND RELIABILITY

The analyses of this study have used the Learning Style Inventory to measure characteristics of individuals that were hypothesized to relate to such things as people's career choices and their decision-making processes. The use of the LSI in these analyses is of course predicated on the assumption it does in fact measure learning styles with reasonable validity and reliability. The results of the various analyses themselves provide some data concerning the validity of the instrument. That is why an explicit discussion of LSI validity and reliability was deferred until after the overall results of the study had been reviewed. At this point however it is necessary to address the issues of LSI validity and reliability prior to drawing any final conclusions and making any recommendations based on the results of this study.

LSI Validity

Overall, the results concerning the various hypotheses of this study were positive, thus supporting the validity of the instrument. In addition in several of the analyses in this study it was necessary to examine the LSI scores of individuals who deviated from the hypothesized career choices. In each analysis an explanation could be found for the seemingly deviant behavior. For example, some students who scored "concrete" on the LSI and who chose medicine specialties were actually found to be interested in pediatrics, a "concrete" specialty. Thus, in

addition to the group data validating the LSI, individual situations like these have demonstrated validity for the LSI.

Another significant source of validation were the individual interviews with senior medical students. These interviews concerning students' career decision-making processes also focused on the validity of the LSI. Students were asked to fill out the LSI after their interviews. Following this, the interviewer asked the subject to describe first generally, then in detail, how he actually went about rank-ordering the items in the LSI. Based on these descriptions a much clearer understanding of how and why the LSI works was possible.

In general, there are two distinctive styles in which students responded to the items in the LSI in attempting to rank-order the four words in each row:

Method 1 - students tried to discern the meaning of each word in the row, and systematically applied those definitions to a generalized self-image.

Method 2 - students thought of specific situations they had been in and tried to determine which of the words was most descriptive of them in those situations.

In Method 1 students spent a great deal of time mulling over the meaning of the words and often complained about the ambiguity of several of them. It was difficult in Method 1 to determine whether the generalized self-image being employed by students was an idealized (desired) image or

an actual one. However, students employing Method 1 almost unanimously scored high on the abstract dimension, (6 out of 7 students using Method 1 were abstract). Since an abstract score seems consistent with the Method 1 style, it may be appropriate to assume that the self-image employed by these students was in fact an "actual" self-image.

In Method 2 students focused primarily on their clinical rotations in looking for specific experiences which they tried to relate to the words on the LSI. Often this method led to some inconsistencies in the rank orders they assigned to the various items in LSI. For example, a student might rank order the word "doing" as 1 in one row, and word "active" as a 3 or 4 in another row. This was possible since these students did not seem to concentrate on accurately defining the words for themselves and then systematically applying them to a generalized self-image as did the Method 1 students. Instead, their situation-by-situation evaluation without a constant definition for the words led to the inconsistencies described. Students employing Method 2, as one might have guessed, tended to be "concrete experience" oriented in their LSI scores (15 out of 20 Method 2 students were concrete).

One other aspect of the workings of the LSI requires some discussion. In an earlier section it was necessary to modify the hypotheses of this study because of a phenomenon in the CE scale of the LSI. It was discovered that students choosing surgical careers were scoring as concrete rather than the predicted abstract (see Chapter 6). The expectation of abstract scores for surgeons was based on the assumption that the concrete scale

represented a "feeling-oriented" scale that would be characteristic of empathic physicians concerned with socio-emotional aspects of their patients. Surgeons do not fit this physician model. However, the concrete scale seems to measure more than just this feelings orientation. Several of the items in the CE column represent a more cognitive (as opposed to emotional, if the two are separable) concreteness. The items "experience" and "present oriented" have a different appeal on the LSI than the words "feeling," "accepting," and "receptive." Thus the CE column actually picks up subjects' preferences for what might be differentiated as affective concreteness and cognitive concreteness (again recognizing the conceptual danger of trying to separate cognitive and affective components of cognitive style). In an abstract sample such as the medical students, an inclination towards either the affective or the cognitive concreteness will result in an LSI score on the concrete side of the median.

The situation is somewhat further confused by the word "intuitive" which is scored in the CE column. "Intuitive" is concrete only in the sense that it is opposite from "logical" which is listed in the AC (abstract) column. Intuitive is qualitatively different from the two categories of concreteness already described. This serves to confuse the concrete scale a little more. This confustion might help to explain the smaller differences in LSI means between career categories in Chapter VI for the CE-AC dimension as compared to RO-AE dimension. It might also lead to less reliability with respect to the CE scale.

Apparently the multiple interpretations of the concrete scale are not limited to this sample of medical students. An examination of the inter-item correlation within the concrete scale from an early sample of 129 management graduate students reinforced the findings in this study. Table 21 contains the correlations between the six items that are scored for CE for the 129 management students.

Table 21 Inter-Item Correlation for Concrete Scale (CE) of LSI.

N = 129

Graduate Management Students	Receptive	Feeling	Accepting	Intuitive	Present-Oriented	Experience
Receptive	1.000	.153	.223	.197	.134	.122
Feeling	.153	1.000	.150	.422	.062	.069
Accepting	.223	.150	1.000	.231	.220	.108
Intuitive	.197	.422	.231	1.000	.125	.197
Present Oriented	.134	.063	.220	.125	1.000	.294
Experience	.122	.069	.108	.096	.294	1.000

Table 21 indicates that "present-oriented" and "experience" do correlate at .294, higher than the correlation between either item and any other item. Most correlations between items are in the.1 to .2 range. However, there is a .422 correlation between "intuitive" and "feeling". In retrospect, this finding makes sense. Anyone rejecting "thinking" in favor of "feeling" is likely to reject "logical" in favor of "intuitive" in taking the LSI. In reviewing the medical student sample interview data however, this was not the case. Medical students generally did not indicate "feeling" but often did indicate "intuitive" as a preferred mode in learning. An "intuitive" approach to "thinking" through a problem is a frequently described method of problem-solving with limited data among these students. Yet, "feeling" is only infrequently acknowledged as a source of information in problem-solving (i.e. in diagnosis/treatment).

Looking again at Table 21, "feeling" does correlate higher with "receptive and "accepting" (.153 and .150) than with "present-oriented" and "experience" (.063 and .069). "Accepting" and "receptive" correlate relatively highly with each other (.223) and also correlate pretty consistently with all the other CE items.

The most significant result in Table 21 supporting the findings in this study is the apparent distinction between "feeling" and the combination of "present-oriented" and "experience" as different qualities within the CE scale.

Overall, the LSI does seem to measure qualities similar to those it purports to measure. Evidence for this comes from the descriptions the different LSI types give of how they responded to the instrument, and from case by case analyses of students' career decisions. However, there is some confusion in the instrument, particularly in the CE scale. The interesting results obtained when students described their item by item use of the LSI suggest that an alternative method of measuring learning styles might be one focusing more on behavioral indices. However, these kinds of tests require more time and are more difficult to administer. The LSI remains a useful tool when logistical considerations are important. It appears that the LSI could be even more useful with some modification of the CE scale. All of these conclusions however are based on an analysis of LSI validity only. In the following section the reliability of the LSI will be examined.

LSI Reliability

Previous reliability tests of the LSI have been unimpressive. A variety of factors may have accounted for this. Foremost among these factors is the suggestion that in previous test-retest situations the subjects were involved in situations that may well have been causing their learning styles to change, such as the M.I.T. Sloan Fellows Program or the Sloan School Accelerated Graduate Program. In addition, it has been suggested that small sample sizes with many tie scores may be contributing to lower scores on reliability tests.

In this study, subjects were administered the LSI by mail, in December - January of their freshmen or senior year. In addition, the 27 seniors interviewed took the LSI again after their interview in April of the same year. Unfortunately this results in differences in the test setting for each test (mailed questionnaire versus interview). Unlike previous reliability checks though, this test-retest does not seem to suffer from major changes in the subjects learning environment over the 3-4 month interim period. However, the sample size is still small (N=27) and there are still many ties in their scores. Pearson Product-Moment Correlations and Kendall Tau Rank Order correlations were both calculated for the test-retest sample . Table 22 contains the results of these analyses.

Table 22. Reliability Coefficients for LSI Scales.

N = 27	Pearson Product Moment Correlation	Kendall Tau Rank Order Correlation
CE	.483	.379
RO	.729	.528
AC	.643	.510
AE	.642	.493
CE-AC	.612	.500
RO-AE	.710	.545

The two different tests of reliability were used in order to be able to compare results in this study with previous LSI reliability checks using both Pearson and Kendall. While the Pearson coefficients are not as high as one would like, they do suggest improved reliability over previous reliability checks with other populations (see Table 2). Only the CE scale does not show dramatic improvement when compared to Kolb's Sloan Fellows. Previous discussions have indicated that inconsistencies in the construction of the CE scale may be responsible for these reliability problems. However, in combination with the AC scale (CE-AC) the reliability of the concrete-abstract dimension improves considerably.

The Kendall Tau reliability coefficients are somewhat lower than those found by Fry in his sample of Accelerated Graduate Program students (see Table 3). However, Kendall Tau may be a less appropriate test of reliability for the LSI than Pearson. Since LSI scores tend to group closely together, slight variations in scores from test to test may change rank orders drastically. These slight score changes often have no significance for purposes of analysis. Therefore, the Pearson test which focuses more on the actual score and its changes than on relative positions of subjects may be a more important indicator of reliability for the LSI, assuming LSI scores meet the assumptions necessary for Pearson correlations.

Another form of reliability check used on Fry's sample earlier was to construct a table of "changers" and "non-changers". That is, for the concrete-abstract dimension, and for the reflective-active dimension, determine whether or not subjects scores on the retest showed enough change to

cross the median line to become a different learning style type. In other words, if a subject is an accommodator on the first test, does he stay an accommodator, or does he become some other type of the retest. Since the LSI is being used primarily to divide subjects into these learning style types this is an alternative way of measuring reliability. In Table 23 this type of analysis is performed for the 27 students in this sample. The CE-AC median is -4 and the RO-AE median is -6.

Table 23. Frequency of "Type" Changes for Senior Medical Students on Successive LSI Tests.

	Abstract/Concrete Changed	Abstract/Concrete No Change
Active/Reflective Changed	1	4
Active/Reflective No Change	6	16

Eleven students (41%) had LSI score changes on one or both LSI dimensions that would have resulted in a change of learning style type. These results are not very impressive. However, several of the "changes" involved actually only resulted from 1 or 2 point changes in a subject's LSI score. That is the weakness of this analysis, and of the LSI in general. The LSI is not sensitive enough to make 1 or 2 point distinctions. One way to avoid this difficulty is to consider the scores of "extreme" LSI types only in analyzing data. Unfortunately in small samples, as this is, it is

difficult to exclude cases from the analysis. The implication may be that larger samples must be used in research studies with the LSI to insure reliability by utilizing only subjects with less ambiguous scores.

Conclusions

The improved reliability results using Pearson Product Moment Correlation coefficients are encouraging. Perhaps under perfect control conditions (i.e., no pressures to change) between successive tests, results would improve again, particularly with some modification to the CE scale.

Using the LSI for research studies, particularly with larger samples, seems relatively safe from the standpoint of validity and reliability. As an individual counseling or selection instrument however, the LSI should be used with caution. Like many other psychological tests, the LSI can be very useful as a means of heightening awareness and understanding of certain aspects of self. However, the results of the test should be considered in the perspective of other data about the individual. If the LSI scores seem to confirm or clarify other indications of style (tests or behavior) then the test may be useful as a way of helping to evaluate alternative choices (career, personal growth, etc.) for the individual.

CHAPTER VIII

DISCUSSION OF RESULTS

Previous sections have examined the results of the hypotheses concerning the relationship between learning style and several aspects of career choice in medical school. At various points in these discussions issues have come up which did not relate directly to the hypotheses of this study, and which were deferrred to further consideration in "a later section." This is the "later section." In this chapter we hope to summarize many of the points brought out previously and explore more thoroughly some other questions that have not received much attention. These discussions will be based on data from the questionnaire, the interviews and some general observations of medical systems, particularly the medical center inwhich this study was conducted.

The Process of Choice

In Chapter V the results indicated that students with different learning styles seemed to be influenced by different aspects of their environment in making career choices. Specifically, concrete types (accommodators and divergers) seemed to be effected more than the other LSI types by work experiences and by identification with attractive role models. Assimilators, on the other hand, were influenced more than the other LSI types by their course work and by the intellectual content of the work

they were going into. Finally, convergers seemed more inclined towards scanning across various role models as a means of collecting data relevant to their career decisions.

These results suggested that attention has to be directed at the process of medical education as well as at the type of students being admitted to medical school to fully understand the career choices being made.

Career Choices

In Chapter VIthe results indicated that different types of medical careers become associated with certain predictable learning styles, through a process of selection and/or socialization. Family medicine and primary care careers were chosen more by accommodators, and by divergers, as were surgical careers. Internal medicine specialties and subspecialties were chosen more often by convergers. Academic medicine and pathology attracts (or trains) more assimilative students. Furthermore, the differences in preferences between different learning style types for these fields tend to increase between the freshmen and senior years.

Taken together, the results from Chapters V and VI indicate that learning styles correlated with or were related to the career choices medical students made. Certain types of medical careers seem to be more appropriate for certain learning styles. However, a student's selection of a specific career from among several appropriate alternatives, or even the selection of an "inappropriate" career type is affected by the student's

learning style and the range of environmental influences to which he is subject. To understand the implications of all these findings, it will be useful to integrate them into a general discussion of medical student career choice.

General Discussion of Medical Career Choice

Overall, career decisions in medical school do not seem to occur in a very planned, deliberate fashion. Few mechanisms are provided to facilitate the process of career choice, rarely are career decisions discussed in the open, and medical students frequently find it difficult to determine exactly how they made the decisions that they have made. Yet, there seem to be some generalizations that can be discerned about what does happen as well as what does not happen.

One phenomenon documented in many studies of medical school and soon evident to anyone observing these systems is the transition that occurs in the students themselves over four years. At one level, student attitudes seem to change from idealism to cynicism in medical school (Eron, 1955; Becker and Geer, 1958). This is reflected in the question concerning values in the questionnaire in this study. As Tables 41 and 42 demonstrate, freshmen seem much more concerned about people, helping, changing society, etc., while seniors are more concerned with intellectual work, pay, hours, etc.

In terms of career plans this change is manifested in a turning away from family care and primary care careers to the more lucrative and status-

filled sub-specialties and academic medicine (see Table 24). While 52% of the freshmen sample indicate a first choice for family medicine or primary care careers, only 30% of the seniors do so. Seniors indicate a first choice for academic medicine or sub-specialty practice in 42% of the cases compared to only 17% for freshmen. Many medical educators have been concerned about how (and whether) to alter this pattern. Several of the findings in this study relate to that question.

Medical students' career choices are strongly influenced by work experiences and by physician role models (see Table 7 and 35). Approximately 75% of the seniors indicated that both of these factors were important sources of career influence - more than any other factor. Yet, within the medical school studied, there were very few, if any opportunities for students to work in a family practice or primary care setting. All required rotations are in hospital settings as are most electives. As for role models, non-specialists generally do not have admitting privileges in the wards of a university affilliated hospital.

Most students find the medical faculty model too extreme for them, given the students' practitioner orientation. As one student said: "How can the faculty here have influenced me in my career choice - most of them have never <u>really</u> practiced medicine." Only 26% of the seniors found the faculty as one of the three most important influences in their career decisions (see Table 35).

Yet the faculty do have influence in subtle ways. The word "competence" is often used in medical school. The faculty use it to describe what medical school faculty are, and what students and non-specialists are not. Competence in this sense is not usually very well defined, but it seems to mean the ability to either diagnose rare diseases or perform miraculous surgery -- depending upon whether you are talking to an internist or a surgeon.

This attitude toward competence is pervasive. It appears in case studies in their courses (e.g. "... the admitting physician, a local G.P., incorrectly diagnosed..."); in class discussions, lectures, clinical rounds, rotations, informal conversations, etc. There is no representative of the non-specialties to make a case for other kinds of competence, and there are no primary care experiences to demonstrate other types of physician skills. The community medicine physicians who are found in the medical school are often experts on population dynamics, or epidemic control -- not attractive role models for would-be healers. In the absence of countervailing forces, the pressure towards "competence" (and money, status, etc.) lead medical students to the only practicing physician role models they are exposed to -- the specialists and sub-specialists they encounter in their hospital rotations.

What is particularly important about this situation is that it is just those types of students who seem to prefer the family physician or primary physician roles (accommodators and divergers) who also appear to need work

experience and identification with role models to influence them in their career decisions. Yet most of their experiences and role models lead them away from these careers. Of the aspiring family physicians or primary care physicians interviewed in this study, almost all either had parents who were family doctors, or had experienced family or primary medicine outside of medicial school -- in several cases after having dropped out of medical school for awhile.

Changes in initially positive student attitudes towards careers in family and primary care often begin to show up in the second year of medical school. In their first year medical students are too overwhelmed with mountains of memorization and courses they find "irrelevant" to be thinking much about career choices (see Tables 28 and 36). 70% of the seniors and 54% of the freshmen indicated they did not like or were ambivalent towards their courses in medical school (mostly in the first year), and only 7% of the seniors and 12% of the freshmen indicated they were able to make any career decisions based on the first year's experience. Of those who did make career decisions in the first year of medical school, many merely decided that they did not want to go into basic medical science (the substance of their first year).

In the second year of medical school, students begin to interact with some clinical faculty more, and encounter courses in diagnosis and treatment (case studies). Second year students who are still considering family or primary care careers begin to speak of "new career options I hadn't thought

much about before (i.e., the sub-specialties)" as a result of these medical school influences. By the third year's clinical rotations this dissonance often results in a career change (see Table 28) towards one of the specialties. 11% of the seniors indicated that they changed their career plans in the second year of medical school while 37% indicated a change in the third year.

The third year is critical for several other reasons. For one, it is for most students the first intensive experience at being like a physician. Perhaps more importantly, it immediately precedes the point at which they must make a career choice. The fourth year is almost exclusively an electives year and would seemingly enable students to experience other modes of health care delivery if they still so desired. However, several constraining forces are at work. First, student applications for internships for the following year are due in the Fall of their fourth year. The third year provides the most immediate data for this choice. Second, in order to secure the internship or residency of their choice, students feel it is necessary to spend as much time as possible interacting with the "right" faculty whose recommendations are seen as essential to securing the desired internships and/or residencies. Thus, all the pressures are towards making an early career choice. Therefore, it is the third year's clinical rotations, in hospital settings, that become the primary experience influence for medical students; and the hospital based specialists they encounter in the third year represent their most likely role models in making a career decision.

Implications for Different Learning Styles

The medical school experience seems to be different for each LSI type. For assimilators, the medical school experience is not too bad. One might expect that their experience in medical school would be more satisfying than for other learning styles since the medical school experience is designed by medical school faculty who are themselves probably assimilators. Assimilators, unlike their peers with other learning styles, seem to get more out of their first two years of courses (see Table 8). 100% of the assimilators interviewed indicated that courses were a primary source of career influence. Since an assimilator's ultimate career choice is more likely to be academic medicine, or something close to it, exposure primarily to medical school faculty and research in hospitals is not limiting to him.

Convergers similarly do not seem to fare badly in medical school. They were in this study somewhat less influenced by the more basic science courses probably because of their active nature. They were more influenced by courses in the second year which stress diagnosis (case studies). Their ultimate career choices in this study were generally in the specialties or sub-specialties in medicine. This is consistent with their learning style and with the nature of the clinical rotations in the third year and the diagnostic courses mentioned above. Their apparent preference for scanning as a mode of gathering career data is useful in the clinical rotations as it enables them to learn from the variety of sub-specialist role models they come in contact with in the hospital wards.

Many of the accommodators and divergers in the medical student population however may be a source of concern. Generally, the abstractions of course work in the first two years of medical school seem to frustrate and discourage them. 40% of the accommodators and 54% of the divergers indicate they were dissatisfied with their course work at medical school. Any initial inclination they may have towards family care, primary care, and psychiatry are strongly questioned by the medical school faculty and most of their peers[1]. The experience they appear to need to help them make career decisions are delayed two years and are limited to hospital practice when they happen. During their entire medical school stay, the role models they seek to identify with are almost exclusively in specialty or sub-specialty fields.

If the initial inclination of an accommodator or diverger is towards surgery, then the medical school experience is less of an impediment. The first two years of course work are still difficult, but the clinical rotations provide them the appropriate experiences and role models. If psychiatry were their original intention, there are many pressures towards a change, but there is some psychiatric presence in medical school to sustain a choice in that area with experiences and role models.

If, however, the initial choice is family care of primary care, there is little in the medical school to sustain the choice. Many of the accommodators in this study were channeled into a specialty practice (ob-g, pediatrics, or surgery). This is not to say that these types of careers are less desireable than any other. If, however, there is a need for more

[1]This was frequently mentioned in the student interviews. Other researchers similarly note this phenomenon (e.g., Kendall, 1971).

family and primary physicians, as many people are saying, or if there is just an ideological need to provide legitimate "freedom" of choice to these students, then the results of this study should be cause for concern.

Recommendations

Assuming the dynamics discussed above are accurate, several alternatives come to mind to help provide a more balanced learning environment for medical students. One is to provide students with more experiences in primary care settings, preferably sometime before and certainly during the third year. Another is to provide more contact with practicing physicians from non-hospital settings, preferably in courses (as a show of status) as well as in work settings during the first two years. Third is to bring some experiential relevance to the coursework in the basic medical sciences. Whether this can be done through the use of more cases in the first year or through some form of limited patient contact is a question for consideration. However, accommodators, divergers, and even the more abstract types in most cases consistently found it difficult to learn the course material without a clinical frame of reference. In other words, it is easier for them to study biochemistry if they see its relevance to actual patient problems.

Finally, students in all of the learning style categories were similar with respect to their reported lack of a systematic approach to career planning in medical school. Most students interviewed admitted

that the interview was the first time they had systematically evaluated how they had made their career decisions. Almost all reported they had never approached anyone at the medical school for advice or counselling prior to making their career choice, although they had solicited faculty advice on which hospitals to apply to for internships.

This is consistent with the students' relationship to the faculty. Faculty are sources of factual information. However, most students reported difficulty in establishing rapport with faculty and generally felt most faculty were not concerned with student needs or development but rather with their own research. Therefore, it was difficult for students to approach faculty with as important a personal decision as a career choice. There are a few norms in the medical school to support seeking this kind of guidance. Although some faculty advisor/advisee programs have been attempted, they have been generally unsuccessful. From the student point of view, this lack of success is due to faculty time constraints and indifference. It may be that non-faculty counselors are needed who can provide both the time and perspective necessary for effective career planning.

Many of these conclusions and implications are not new to medical educators. What is unique about them is that the conclusions are drawn from data on the interaction between learning styles and the medical school environment. In this sense, the results may be more "scientific", and

science is certainly valued in the medical school environment. Perhaps having made a diagnosis based on more "scientific" evidence will make it easier to accept the prescription (Rubin, Plovnick, and Fry, 1974).

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APPENDIX A

Questionnaire (Cover Page Deleted)

FORM B-1

LEARNING STYLE INVENTORY

Name _____ Years of Medical School _____

Date _____ Medical School _____

Age _____ Sex _____

This inventory is designed to assess your method of learning. As you take the inventory, give a high rank to those words which best characterize the way you learn and a low rank to the words which are least characteristic of your learning style.

You may find it hard to choose the words that best describe your learning style because there are no right or wrong answers. Different characteristics described in the inventory are equally good. The aim of the inventory is to describe how you learn, not to evaluate your learning ability.

Instructions

There are nine rows of four words listed below. Within each row, rank order each of the four words assigning a 1 to the word which best characterizes your learning style, a 2 to the word which next best characterizes your learning style, a 3 to the next most characteristic word, and a 4 to the word which is least characteristic of you as a learner. Be sure to assign a different rank number to each of the four words in each row. Please do not make ties.

1.	___discriminating	___tentative	___involved	___practical
2.	___receptive	___relevant	___analytical	___impartial
3.	___feeling	___watching	___thinking	___doing
4.	___accepting	___risk-taker	___evaluative	___aware
5.	___intuitive	___productive	___logical	___questioning
6.	___abstract	___observing	___concrete	___active
7.	___present-oriented	___reflecting	___future-oriented	___pragmatic
8.	___experience	___observation	___conceptualization	___experimentation
9.	___intense	___reserved	___rational	___responsible

CAREER TYPES

The following vignettes are descriptions of various careers of physicians. Please read them carefully since you will be asked to answer questions about the one which best corresponds to your future career.

CAREER NUMBER 1

This physician is in one of the clinical specialities such as medicine, surgery, pediatrics, neurology, etc. He (or she) is highly specialized in one of the subspecialties of a major specialty. For example, if an internist, he is a gastroenterologist, a kidney specialist, a pulmonary specialist, an endocrinologist, etc. If a surgeon, he is an orthopedic surgeon, a plastic surgeon, an abdominal surgeon, a thoracic surgeon, etc.

This physician is an excellent scientist and his or her education is basically biological. This doctor is affiliated with a medical school on a part-time basis, doing some teaching, but his major activity is interacting with patients in the practice of medicine. This doctor is so busy with his patient load that although he would like to, he can spend little time on the emotional, social, and family aspects of the patients' illnesses. Clinical professor describes this physician.

CAREER NUMBER 2

This physician is in one of the clinical specialties or subspecialties that are characterized by limited patient interaction. These include pathology, anesthesiology, radiology, etc. He may or may not be affiliated with a medical school, however, he is primarily involved in his practice, often based in a hospital.

CAREER NUMBER 3

This doctor is in one of the other clinical specialties (e.g., pediatrics, internal medicine) and may or may not be in a subspecialty. He is not affiliated with a medical school, but with an excellent community hospital. This doctor has a full-time private practice.

CAREER NUMBER 4

This doctor is in one of the subspecialties of a major specialty, similar to the physician in Career 1 or 2. However, this physician is full-time with a medical shcool in which he devotes about 70 percent of his time to research, often in a basic science. He has minor teaching duties and spends approximately 30 percent of his time in patient care, hospital based, which is largely carried out by supervising residents. "Academic medicine" is applied to this type of career.

CAREER NUMBER 5

This physician is full-time with a medical school. After graduation from medical school, he was a post-doctoral fellow for two years in one of the basic medical sciences and now teaches and does research full-time in a medical school in a basic medical science. He has no clinical practice.

CAREER NUMBER 6

This physician majored in college in a physical science such as mathematics, computers, engineering, or physics, and has a career involving various mixtures of research, teaching and patient care. This doctor is mainly concerned with medical problems which involve his knowledge of these sciences. These would include applying computers to medicine, systems analysis, biomedical engineering, artificial organs, cardiac monitoring, etc.

CAREER NUMBER 7

This doctor is a psychiatrist. He is either full-time with a medical school or affiliated with one, works in a community clinic or in a full-time private practice. This physician is primarily concerned with research and/or treatment of patients with psychiatric problems.

CAREER NUMBER 8

This physician is a Public Health Physician. He works in a governmental agency and is primarily concerned with the administration of health programs.

CAREER NUMBER 9

This physician is also a Public Health Physician. However, he is primarily concerned with research in bacteriology, environmental health, etc.

CAREER NUMBER 10

This doctor is engaged in the family practice of medicine. His or her training is in internal medicine or pediatrics. In addition to training in his basic specialty, this physician may have some training in psychiatry, public health, and minor surgery. This doctor treats all members of the family, not only paying attention to their physical problems, but also to the emotional, social, and family aspects of their illnesses. Extremely complicated or unusual problems are referred to physicians in subspecialties.

CAREER NUMBER 11

This physician is a Primary Physician with training in internal medicine, pediatrics, and psychiatry. In delivering patient care, his services also include assessment of patients' total needs before these are categorized by specialty; determination of who shall meet the defined needs - physicians, general or specialist, non-physician members of the health team, or social agencies; attention at each step to the personal, social and family dimensions of the patient's problem; health maintenance and disease prevention are as important as cure and rehabilitation.

CAREER CHOICE

1. Although none of these careers may represent it exactly, please indicate which one of the career descriptions most nearly corresponds to the career you would like to have (not necessarily the one you expect to have).

First choice Career Number _____ 1

(16-18)* Which career would be your second choice? _____ 2

Which career would you least like to pursue? _____ 3

2. How certain are you that you will actually follow the career you have indicated? (check one)

(19)

Very Certain _____ 1

_____ 2

_____ 3

_____ 4

Very Doubtful _____ 5

3. Very often circumstances prevent people from following their first-choice career. If for some reason you actually expect to have a career different from the one you indicated above (e.g., lack of research funds for basic research), please indicate the career you actually expect to have.

Career Number _____

(20)

Please explain the discrepancy between your expected and preferred career if one exists. _____

_____

_____

_____

_____

_____

_____

_____

_____

*The numbers appearing in parenthesis in the left-hand margin are for coding purposes and should be disregarded by individuals answering the questionnaire.

SPECIALTY CHOICES

4. Although you may not have arrived at a "definite" decision for your own specialty, place a "1" next to your first choice and a "2" next to your second choice at this time. Place an "X" next to the specialty you are least interested in.

(21 - 26)

Family Medicine	_____ 1
Internal Medicine General	_____ 2
Medicine, Subspecialty:	
Allergy and Immunology	_____ 3
Cardiology	_____ 4
Gastroenterology	_____ 5
Pulmonary Diseases	_____ 6
Dermatology	_____ 7
Physical Medicine and Rehabilitation	_____ 8
Neurology	_____ 9
Other (what?) _____	_____ 10
Surgery, General	_____ 11
Surgery, Subspecialty:	
Abdominal	_____ 12
Neurosurgery	_____ 13
Orthopedic Surgery	_____ 14
Thoracic Surgery	_____ 15
Urology	_____ 16
Anesthesiology	_____ 17
Ophthalmology	_____ 18
Otolaryngology	_____ 19
Other (what?) _____	_____ 20
Pediatrics, General	_____ 21
Pediatric Subspecialty (what?) _____	_____ 22
Psychiatry	_____ 23
Psychiatric Subspecialty (what?) _____	_____ 24
Obstetrics and Gynecology	_____ 25
Radiology	_____ 26
Radiology Subspecialty (what?) _____	_____ 27
Pathology	_____ 28
Public Health - Bacteriology/Environmental	_____ 29
Public Health - Administration	_____ 30
Biomedical Basic Research (what?) _____	_____ 31
Other _____	_____ 32

TIME ALLOTMENT

5. As a physician, approximately what percentage of professional time would you ideally like to spend in each of the following professional activities? (Amounts should total 100%)

		Percent	
(27-34)	Research	_____	1
	Taking Care of Patients	_____	2
	Administration	_____	3
	Teaching	_____	4
	TOTAL	100%	

6. If you have made an initial decision, or have changed your mind about the type of medical career you were going to pursue, since you have been in medical school, please indicate when this decision(s) occurred.

	No changes	_____	5
	First Year	_____	1
(35-36)	Second Year	_____	2
	Third Year	_____	3
	Fourth Year	_____	4

7. If you have changed your career plans since you have been in medical school, what was your previous choice(s)?

	No Change	_____
(37-38)	Previous Career Number Choice(s)	_____

8. If you have changed your career plans, please briefly describe what led to the change. _____

_____

_____

_____

9. At the present time, do you have any doubts about medicine as a career for you? (Check one.)

	Yes, serious doubts	_____	1
(39)		_____	2
		_____	3
		_____	4
	No doubts at all	_____	5

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LOCATION OF WORK

10. Assume you are able, whether you are in private practice or academic medicine, to choose the location of your work with patients. Place a "1" next to your first choice, a "2" next to your second choice, and an "X" next to your last choice.

(40-42)

Ghetto	_____ 1
Rural	_____ 2
Suburban	_____ 3
Non-Ghetto Small Urban (city population less than 100,000)	_____ 4
Non-Ghetto Large Urban (city population more than 100,000)	_____ 5
Foreign Country	_____ 6
Indian Reservation	_____ 7
Military Service	_____ 8

PREDOMINANT WORK SETTING

11. As things stand now, in which of the following settings would you prefer to do most of your work? Place a "1" next to your first choice, a "2" next to your second choice and an "X" next to your last choice.

(43-45)

Individual or small group office practice (3 or less physicians)	_____ 1
Medium size group practice (4-10 physicians) single specialty	_____ 2
Medium size multi-specialty group practice	_____ 3
Large group practice, major ambulatory center, or free standing clinic	_____ 4
Institution or hospital-based practice, predominantly ambulatory care	_____ 5
Hospital-based practice predominantly in-patient care	_____ 6
Full-time university affiliated center	_____ 7
Government or Public Service, Planning/Administration	_____ 8
Other, (what?)	_____ 9

EDUCATION

12. Rank the following factors in order of their importance in helping you in the choice of your medical career type by writing "1" for the most important, "2" for the next in importance, and so on. If any one or more of these factors are not important, omit them from the ranking.

		Rank Assigned
	Example of physician in this career	_____ 1
	Work experience in health care delivery	_____ 2
	Research experience	_____ 3
	Other work experience (what?) _____	_____ 4
(46-57)	Courses in medical school (which?) _____ _____	_____ 5
	Funding available	_____ 6
	Influence from Medical School faculty	_____ 7
	Influence from family	_____ 8
	Influence from other medical students	_____ 9
	Influence from other friends	_____ 10
	Influence from physicians (non-family)	_____ 11
	Other (what?) _____	_____ 12

13. In medical school, to what extent have you enjoyed:

	Disliked				Greatly Liked
a. course work	1	2	3	4	5
(58-59) b. clinical work	1	2	3	4	5

14. Is there a physician in your family?

(60) Yes _____ 1
No _____ 2

15. If yes, what is the relationship of this physician to you?

(61) Parent _____ 1
Other _____ 2

16. What specialty or type of physician is this physician? _____

17. What was your college major or field of concentration? (Check one)

(62-63)

Biology	_____ 1
Chemistry	_____ 2
Sociology/Anthropology	_____ 3
Economics	_____ 4
Engineering	_____ 5
Government or Pol. Science	_____ 6
Humanities	_____ 7
History	_____ 8
Mathematics	_____ 9
Physics	_____ 10
Pre-Med	_____ 11
Psychology	_____ 12
Other (what?) _____	_____ 13

18. If you had not been going to medical school, would you have preferred to major in something else while in college?

(64)

Yes	_____ 1
No	_____ 2

19. If the answer is yes would it have been:

(65)

A Science	_____ 1
Humanities	_____ 2
Social Science	_____ 3
Psychology	_____ 4
Don't Know	_____ 5
Other (What?)	_____ 6

CAREER ASPECTS

20. What things are most important to you in your choice of a medical career type? (Check one category on each line.)

	Most Important 1	2	Average Importance 3	4	Least Important 5	
Being able to deal directly with people	____	____	____	____	____	1
Being able to help other people	____	____	____	____	____	2
The fact that medicine is a highly respected field	____	____	____	____	____	3
Having interesting and intelligent people for colleagues	____	____	____	____	____	4
Intellectual content of the work	____	____	____	____	____	5
Being my own boss	____	____	____	____	____	6
Being sure of earning a good income	____	____	____	____	____	7
The challenging and stimulating nature of the work	____	____	____	____	____	8
Using medicine to change society or the social system	____	____	____	____	____	9
Dealing with the psychological problems of patients	____	____	____	____	____	10
Geographical Preferences	____	____	____	____	____	11
Working Hours	____	____	____	____	____	12

(66-77)

21. With respect to your decisions about the type of medical career you would like to pursue, is there any other information you think is important, or anything else you would like to say here:

APPENDIX B

Discussion of Questionnaire Survey Results

Questionnaire Survey Results

Career Choices

The hypotheses in this study concerned the career choices of medical students. The questionnaire solicited information about career choices in several ways. Students were asked to indicate the "type" of career that most interested them from the eleven different descriptions of physician careers (see questionnaire). In addition, students were asked to indicate their choice of medical specialty or sub-specialty. Then, a series of questions asked students to describe their preferred allocation of professional time among various activities (teaching, research, patient care, or administration), their preferred location and setting of practice, and how certain they were of the decisions they had made about their medical career, their professional values, decision points, and course preferences.

While there were several specific hypotheses predicting relationships between medical career choices and learning styles, the additional information gathered was useful in understanding further the relationship between career choice and learning style. Therefore, in addition to the discussion of the specific hypotheses concerning choice in Chapters 5 and 6, the responses to most of these other questionnaire items will be presented here in the Appendix in summary form. Responses from the freshmen and senior classes have been tabulated by class to provide some general descriptions of the intentions and experiences of these medical students. Some of these results are also discussed in greater detail in chapters 5, 6, and 8.

Career Plans

Tables 24 and 25 show the distribution of first and last choices of medical career types (question 1).

The overall results indicate that more clinically oriented careers such as sub-specialists/clinical professor, specialty private practice, family practice and primary care are the most popular choices, while basic science research and public health are the least popular. Freshmen are more inclinced towards careers in family medicine and primary care than seniors and less inclined towards subspecialty/clinical professor or academic medicine. Chapter 8 discusses some possible causes of these differences.

Specialty Choices

Within their career-type choices students were asked to indicate their specialty choices (Question 4). Tables 26 and 27 display the distribution of responses for first choice of specialty.

While some of these specialty choices are indicated by the career-type choice (Table 25) the particular orientation of those who chose to go into a career of specialty or subspecialty practice can be gleaned from Tables 26 and 27.

Career Changes

Tables 28 and 29 contain information on student career choice changes during medical school. About 2/3 of the seniors have made a career choice change during medical school. Seven percent have made more than one change.

Table 24. Percentage of Senior and Freshman Indicating a First Choice for Various Medical Career Types (Q.1).

	Medical Career Type					
	-1- Sub-Specialist-Clinical Professor	-2- Limited Patient Interaction	-3- Specialist Private Practice	-4- Academic Medicine	-5- Basic Science	-6- MD Engineer
Freshman N = 72	16.7	0	23.6	0	0	2.8
Seniors N = 64	37.5	6.3	17.2	4.7	0	0

	-7- Psychiatrist	-8- Public Health Administration	-9- Public Health Research	-10- Family Medicine	-11- Primary Physician
Freshman N = 72	4.2	0	1.4	34.7	16.7
Seniors N = 64	4.7	0	0	20.3	9.4

Table 25. Percentage of Senior and Freshman Indicating a Last Choice for Various Medical Career Types (Q.1).

Medical Career Type

	-1- Sub-Specialist Clinical Professor	-2- Limited Patient Interaction	-3- Specialist Private Practice	-4- Academic Medicine	-5- Basic Science	-6- MD Engineer
Freshman N = 72	4.2	9.7	2.8	2.8	43.1	15.3
Seniors N = 62	3.2	6.5	3.2	3.2	37.1	17.7

	-7- Psychiatrist	-8- Public Health Administration	-9- Public Health Research	-10- Family Medicine	-11- Primary Physician
Freshman N = 72	11.1	9.7	0	0	1.4
Seniors N = 62	8.1	9.7	4.8	3.2	3.2

Table 26. Percentage of Freshm n and Their First Choice of Specialty (Q.4)

N = 69

Family Medicine		39.1
Internal Medicine		33.1
Internal Medicine General	18.8	
Medicine, Subspecialty:		
Allergy and Immunology	0	
Cardiology	5.8	
Gastroenterology	0	
Pulmonary Diseases	0	
Dermatology	1.4	
Physical Medicine and Rehabilitation	0	
Neurology	4.3	
Other	1.4	
Surgery		5.7
Surgery, General	1.4	
Surgery, Subspecialty:		
Abdominal	0	
Neurosurgery	2.9	
Orthopedic Surgery	0	
Thoracic Surgery	0	
Urology	0	
Anesthesiology	0	
Ophthalmology	1.4	
Otolaryngology	0	
Other	0	
Pediatrics		13.0
Pediatrics, General	10.1	
Pediatric, Subspecialty:	2.9	
Psychiatry		5.8
Psychiatry, General	5.8	
Psychiatric Subspecialty:	0	
Obstetrics and Gynecology		1.4
Radiology		0
Radiology, General	0	
Radiology, Subspecialty:	0	
Pathology		1.4

Table 26. Percentage of Freshmen and Their First Choice of Specialty (Q.4) (Continued)

Public Health		0
Public Health - Bacteriology/Environmental	0	
Public Health - Administration	0	
Biomedical Basic Research		1.4
Other		0

Table 27. Percentage of Seniors and Their First Choice of Specialty (Q.4)

N = 64

Family Medicine		9.4
Internal Medicine		42.3
Internal Medicine General	25.0	
Medicine, Subspecialty:		
Allergy and Immunology	1.6	
Cardiology	4.7	
Gastroenterology	6.3	
Pulmonary Diseases	0	
Dermatology	0	
Physical Medicine and Rehabilitation	0	
Neurology	1.6	
Other	3.1	
Surgery		23.5
Surgery, General	0	
Surgery, Subspecialty:		
Abdominal	0	
Neurosurgery	0	
Orthopedic Surgery	3.1	
Thoracic Surgery	1.6	
Urology	3.1	
Anesthesiology	1.6	
Ophthalmology	4.7	
Otolaryngology	3.1	
Other	6.3	
Pediatrics		9.4
Pediatrics, General	6.3	
Pediatric, Subspecialty:	3.1	
Psychiatry		4.7
Psychiatry, General	4.7	
Psychiatric Subspecialty	0	
Obstetrics and Gynecology		6.3
Radiology		1.6
Radiology, General	0	
Radiology, Subspecialty	1.6	
Pathology		3.1

Table 27. Percentage of Seniors and Their First Choice of Specialty (Q.4) (Continued)

Public Health		0
Public Health - Bacteriology/Environmental	0	
Public Health - Administration	0	
Biomedical Basic Research		0
Other		0

Of all changes, 45% resulted in a change of specialty within a particular career type (e.g., pediatrics to surgery) while 55% represented a change in the type of career (e.g., private practice to academic medicine).

Table 28. Year of Medical School of First Career Choice Change for Freshmen and Seniors (Q.6).

	Year of Change				
	1st yr.	2nd yr.	3rd yr.	4th yr.	None
Freshmen N = 70	13.0 %	0	0	0	87.0 %
Senior N = 62	6.5 %	11.3 %	37.1 %	11.3 %	33.9 %

Table 29. Year of Medical School of Second Career Choice Change for Freshmen and Seniors (Q.6).

	1st yr.	2nd yr.	3rd yr.	4th yr.	None
Freshman N = 70	0	0	0	0	100%
Senior N = 62	0	1.6 %	1.6 %	3.2 %	93.5 %

Time Allocation

Table 30 indicates the average amounts of their professional time students plan to spend on various professional activities (Question 5). Patient care clearly represents the focus of most students' activities. Seniors do, however, indicate more interest in teaching and research than freshmen.

Table 30. Average Desired Percentage Allocation of Professional Time for Freshmen and Seniors (Q.5)

	Research Time	Patient Care Time	Administration Time	Teaching Time
Freshman N = 70	6.7	75.7	5.0	13.7
Seniors N = 64	10.8	63.7	4.7	21.7

Location and Setting of Practice

Tables 31 and 32 indicate student preferences for the location and setting of their professional practice (Questions 10 and 11). Interestingly, seniors are attracted somewhat more than freshmen to rural areas. With respect to settings, freshmen seem to prefer individual or small group practice as a setting as compared to seniors, while seniors, consistent with their career choices, are drawn more towards hospitals and university centers.

Table 31. Percentage of Freshmen and Seniors Indicating Their First Choice for Location of Professional Practice (Q.10)

Location of Work

	Ghetto	Rural	Suburban	Non-Ghetto Population Less 100,000	Non-Ghetto Population More 100,000	Foreign Country
Freshman N = 71	4.2	21.1	25.4	15.5	26.8	4.2
Seniors N = 63	4.8	28.6	20.6	14.3	25.4	4.8

	Indian Reservation	Military Service
Freshman N = 71	1.4	1.4
Seniors N = 63	1.6	0

Table 32. Percentage of Freshman and Seniors Indicating Their First Choice for Setting of Professional Practice (Q.11)

Work Setting

	Individual or Small Group Practice Less than 3	Single Specialty Group Practice 4-10	Multi-Specialty Group	Free Standing Clinic	Hospital Based Ambulatory
Freshman N = 70	50.0	4.3	21.4	10.0	2.9
Seniors N = 63	19.0	14.3	28.6	7.9	1.6

	Hospital In-Patient	University Affiliated Med Center	Government Public Service Plan/Administration	Other
Freshman N = 70	2.9	8.6	0	0
Seniors N = 63	11.1	15.9	0	1.6

Medical Career Doubts

The final career choice question asked students how certain they were about staying in medicine (Question 9). Table 33 has the results of this question. Surprisingly, nearly 18% of the senior class expresses some doubt about a career in medicine even after 4 years in medical school. Freshmen on the whole appear slighly more certain about a medical career.

Table 33. Percentage of Freshmen and Seniors and Their Doubts About a Career in Medicine (Q.9)

	Serious Doubts 1	2	3	4	No Doubts 5
Freshman N = 70	1.4	7.1	5.7	30.0	55.7
Seniors N = 63	4.8	0	12.7	33.3	49.2

Factors Influencing Career Decisions

Several questions were asked that tried to identify factors which influenced students' career choices. Tables 34 and 35 describe student responses to Question 12 which asked them to rank several possible sources of career influence in order of their importance. These tables further describe data discussed in Table 7. Work experience in health care, and examples of physicians in their chosen career were of primary importance

Table 34. Percentage of Freshman Indicating the Rank Order Importance of Factors Influencing Their Choice of a Medical Career Type (Q.12).

	Rank Order of Importance									
	1	2	3	4	5	6	7	8	Not Ranked	N
Example of a Physician in This Career	29.6	25.4	12.7	5.6	1.4	2.8	1.4		21.1	71
Work Experience in Health Care	21.1	11.3	9.9	9.9	1.4	2.8	0	1.4	42.3	71
Research Experience	4.2	7.0	4.2	8.5	5.6	4.2	0	0	66.2	71
Other Work Experience	5.6	0	1.4	7.0	4.2	4.2	0	1.4	76.1	71
Courses in Medical School	2.8	5.6	8.5	5.6	2.8	2.8	2.8	0	69.0	71
Funding	1.4	0	0	2.8	0	0	2.8	1.4	91.5	71
Medical School Faculty	1.4	4.2	7.0	8.5	5.6	0	7.0	4.1	62.0	71
Family	5.6	9.9	18.3	5.6	8.5	4.2	1.4	2.8	43.7	71
Other Medical Students	0	1.4	5.6	4.2	5.6	7.0	2.8	4.2	69.0	71
Friends	2.8	8.5	7.0	11.3	5.6	1.4	1.4	2.8	59.2	71
Physicians (Non-Family)	5.6	19.7	8.5	2.8	11.3	7.0	2.8	0	42.3	71
Other	19.7	4.2	1.4	2.8	0	0	0	0	71.8	71

Table 35. Percentage of Seniors Indicating the Rank Order Importance of Factors Influencing Their Choice of a Medical Career Type (Q.12).

	Rank Order of Importance									
	1	2	3	4	5	6	7	8	Not Ranked	N
Example of a Physician in This Career	24.2	33.9	11.3	1.6	4.8	3.2	0	1.6	19.4	62
Work Experience in Health Care	22.6	24.2	8.1	12.9	0	0	6.5	0	25.8	62
Research Experience	4.8	3.2	11.3	1.6	4.8	3.2	1.6	4.8	64.5	62
Other Work Experience	1.6	6.5	4.8	4.8	6.5	0	0	0	75.8	62
Courses in Medical School	16.1	8.1	6.5	4.8	4.8	1.6	1.6	1.6	54.8	62
Funding	0	0	0	1.6	3.2	1.6	1.6	0	91.9	62
Medical School Faculty	11.3	6.5	9.7	8.1	4.8	9.7	9.7	0	40.3	62
Family	6.5	3.2	8.1	4.8	6.5	1.6	3.2	3.2	62.9	62
Other Medical Students	1.6	1.6	3.2	19.4	4.8	6.5	3.2	3.2	56.5	62
Friends	1.6	3.2	6.5	4.8	6.5	6.5	0	3.2	67.7	62
Physicians (Non-Family)	3.2	6.5	17.7	1.6	11.3	9.7	1.6	1.6	46.8	62
Other	6.5	3.2	1.6	3.2	1.6	1.6	1.6	0	80.6	62

for both freshmen and seniors. Seniors listed medical school courses as somewhat less important. Further, medical school faculty were not listed as important by many seniors (and certainly not by freshmen) indicating that the physician role models identified as influential were not medical school faculty.

Medical School Courses

Students were asked how much they enjoyed their course work and their clinical work (Questions 13a and 13b). Tables 36 and 37 show that most seniors preferred their clinical experiences. Many freshmen, of course, have not yet had any clinical experience, therefore there are only 45 freshmen responses in Table 37.

Table 36 Percentage of Freshmen and Seniors and the Extent to Which They Enjoyed Their Courses (Q.13a)

	Disliked 1	2	3	4	Greatly Liked 5
Freshmen N = 71	5.6	28.2	18.3	38.0	9.9
Seniors N = 64	7.8	26.6	34.4	23.4	7.8

Table 37. Percentage of Freshmen and Seniors and the Extent to Which They Enjoyed Their Clinical Work (Q.13b)

	Disliked 1	2	3	4	Greatly Liked 5
Freshmen N = 45	0	0	6.7	40.0	53.3
Seniors N = 64	1.6	6.3	7.8	46.9	37.5

Physician Relatives

Table 38 indicates the percentage of students who have parents or other relatives who are physicians (Question 14 and 15). Approximately 1/3 of each class has a physician relative, approximately half of this 1/3 are parents.

Table 38. Percentage of Freshmen and Seniors Having a Physician as a Parent or Other Family Member (Q. 14, & 15)

	No Physician Relative	Physician Parent	Relative Non-Parent
Freshmen N = 72	66.7	19.4	13.9
Seniors N = 64	65.6	15.6	18.8

College Majors

Tables 39 and 40 indicate the college majors of the respondents and also indicate what different major they would have preferred, if any, if they were not planning on going to medical school (see questions 18 and 19). Biology and pre-med form the bulk of medical students college majors. Over 40% of both freshmen and seniors would have preferred a different major, often a humanities or social science

Values

In Tables 41 and 42 are described the importance to the students of a variety of factors or values that influenced their choice of type of medical career. Most important seem to be dealing with and helping people, and the intellectual content and challenge of the work. Freshmen find the challenge and the people aspects even more important, and the intellectual content less important than seniors. Freshmen also seem to value patients' psychological problems and changing society more than seniors. Seniors show more concern about being their own boss, working hours, and geographical preferences.

Table39. Percentage of Freshmen and Seniors and Their College Major (Q.17)

College Major

	Biology	Chemistry	Soc./ Anthro.	Educ.	English	Govt./ Pol. Sci.	Human.	History
Freshmen N = 72	23.6	5.6	0	0	6.9	0	9.7	1.4
Seniors N = 64	28.1	4.7	0	0	4.7	4.7	4.7	1.6

	Math.	Physics.	Pre-Med.	Psychology	Other	Six Yr. Med.
Freshmen N = 72	2.8	0	26.4	16.7	1.4	5.6
Seniors N = 64	1.6	1.6	23.4	9.4	3.1	14.1

Table 40. Percentage of Freshmen and Seniors Indicating College Majors They Would Have Preferred if They Were Not Attending Medical School (Q. 18 and 19).

	Preferable College Major							
	Science	Humanities	Social Science	Psychology	Don't Know	Other	No Change Preferred
Freshmen N = 72	11.1	15.3	9.7	1.4	0	2.8	59.7
Seniors N = 64	8.1	21.0	6.5	3.2	1.6	3.2	56.5

Table 41. Percentage of Freshmen Indicating the Importance of Certain Values in Their Choice of Medical Career Type (Q. 20).

	Most Important		Average		Least Important
	1	2	3	4	5
Deal with People	73.6	19.4	5.6	1.4	0
Help People	73.6	25.0	1.4	0	0
Respected Field	8.3	23.6	33.3	22.2	12.5
Colleagues in Field	12.5	30.6	30.6	16.7	9.7
Intellectual Content of Work	31.9	45.8	18.1	2.8	1.4
Be Own Boss	27.8	37.5	18.4	8.3	6.9
Income	1.4	43.1	23.6	16.7	15.3
Challenge of Work	65.3	25.0	8.3	1.4	0
Change Society	15.3	9.7	31.9	26.4	16.7
Deal with Psychological Problems	25.0	31.9	26.4	13.9	2.8
Geographical Preference	5.6	12.5	36.1	23.6	22.2
Working Hours	1.4	11.1	30.6	23.6	33.3

Table 42. Percentage of Seniors Indicating the Importance of Certain Values in Their Choice of Medical Career Type (Q. 20)

N = 64	Most Important 1	2	Average 3	4	Least Important 5
Deal With People	50.0	42.2	6.3	0	1.6
Help People	53.1	34.4	9.4	3.1	0
Respected Field	4.7	26.6	40.6	15.6	12.5
Colleagues in Field	15.9	31.7	28.6	9.5	14.3
Intellectual Content of Work	43.8	32.8	18.0	3.1	1.6
Be Own Boss	39.1	32.8	18.8	4.7	4.7
Income	6.3	31.3	34.4	17.2	10.9
Challenge of Work	51.6	35.9	12.5	0	0
Change Society	4.7	18.8	18.8	21.9	35.9
Deal with Psychological Problems	17.2	15.6	32.8	14.1	20.3
Geographical Preference	9.4	26.6	17.2	17.2	29.7
Working Hours	7.8	15.6	20.3	17.2	39.1

Biographical Note

Mark Plovnick was born in New York City, New York on June 8, 1946. Upon graduation from the Bronx High School of Science he attended Union College, Schenectady, New York where he graduated in 1968 with a Bachelor of Science degree in Mechanical Engineering and a Bachelor of Arts degree in Economics, with honors.

From 1968 to 1974 he attended the Sloan School of Management where he received a Master of Science degree in Management with a concentration in Organization Development in 1970. He continued at the Sloan School in the doctoral program in the Organization Studies Group.

He has published several papers in the areas of career development and planned organization change. In recent years he has been focusing on the transfer of behavioral science knowledge to health care systems, under grants from the Robert Wood Johnson Foundation.

He is currently doing post-doctoral research at the Sloan School and has an adjunct faculty position at the Boston University Medical Center.