PERSPECTIVES ON VOCATIONAL DEVELOPMENT

With original contributions by
David V. Tiedeman, Anne Roe, Donald E. Super, and John L. Holland

Edited by John M. Whiteley and Arthur Resnikoff

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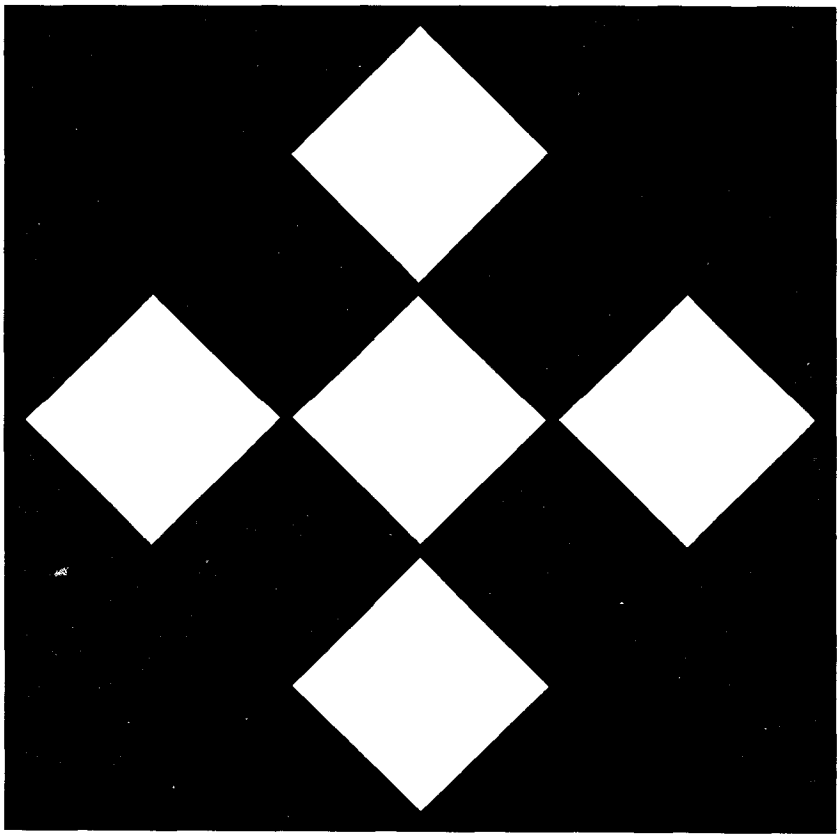

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To our parents

Contents

Preface ix

PART I/Introduction 1

Chapter 1 Vocational Development Theory: An Introduction
John M. Whiteley, Arthur Resnikoff 3

PART II/The Present 9

Chapter 2 Vocational Development Theory: Persons, Positions, and Processes
Donald E. Super 13

Chapter 3 The Present Status of a Theory of Vocational Choice
John L. Holland 35

Chapter 4 Perspectives on Vocational Development
Anne Roe 61

Chapter 5 Can a Machine Develop a Career? A Structure for the Epigenesis of Self-Realization in Career Development
David V. Tiedeman 83

PART III/The Future 105

Chapter 6 Vocational Development Theory in 20 Years: How Will It Come About?
Donald E. Super 109

Chapter 7 The Future of Vocational Development Theory and Its Practical Implications
John L. Holland 121

Chapter 8 Prospectus
Anne Roe 127

Chapter 9 A Machine for the Epigenesis of Self-Realization in Career Development
David V. Tiedeman 139

PART IV/Special Applications 171

Chapter 10 An Experimental Computer-Based Educational and Career Exploration System
Frank J. Minor, Roger A. Myers, Donald E. Super 173

Chapter 11 An Empirical Occupational Classification Derived from a Theory of Personality and Intended for Practice and Research
John L. Holland, Douglas R. Whitney, Nancy S. Cole, James M. Richards, Jr. 183

Chapter 12 Classification of Occupations
Anne Roe, Dennis Klos 199

Chapter 13 Can a Machine Counsel?
Allan B. Ellis, David V. Tiedeman 223

Preface

Historically, vocational behavior has been among the least understood areas in the psychology of human behavior. Over the last several decades, however, important insights into the determinants of vocational behavior have been gained as a result of the conceptual shift from a trait-factor model to a developmental model which relates vocational choice to the broader aspects of human behavior. At the center of this important redirection have been four theorists: Donald E. Super, John L. Holland, Anne Roe, and David V. Tiedeman.

One of the best ways to gain a grasp of the field as it currently exists is to study the work of the people most influential in shaping the field's basic concepts, its priorities for inquiry, and its models for research. This book presents the writing of four of the most influential and distinguished theorists. Super, Holland, Roe, and Tiedeman have written comprehensively about vocational development and about their highly original and frontier contributions; they have also detailed the significant elements in the field's theory and practice.

Part I of the book provides a brief introduction to vocational development theory and a discussion about attempts to solve the important questions facing the counselor. In Part II, Super, Holland, Roe, and Tiedeman articulate the development of their theories and current status of their work. In Part III, "The Future," the contributors indi-

cate what developments must occur in the next 20 years if we, as counselors, are to render the type of professional service that will be necessary according to our best projections of the vocational issues then confronting people. In Part IV, special applications of vocational development theory are presented by each contributor.

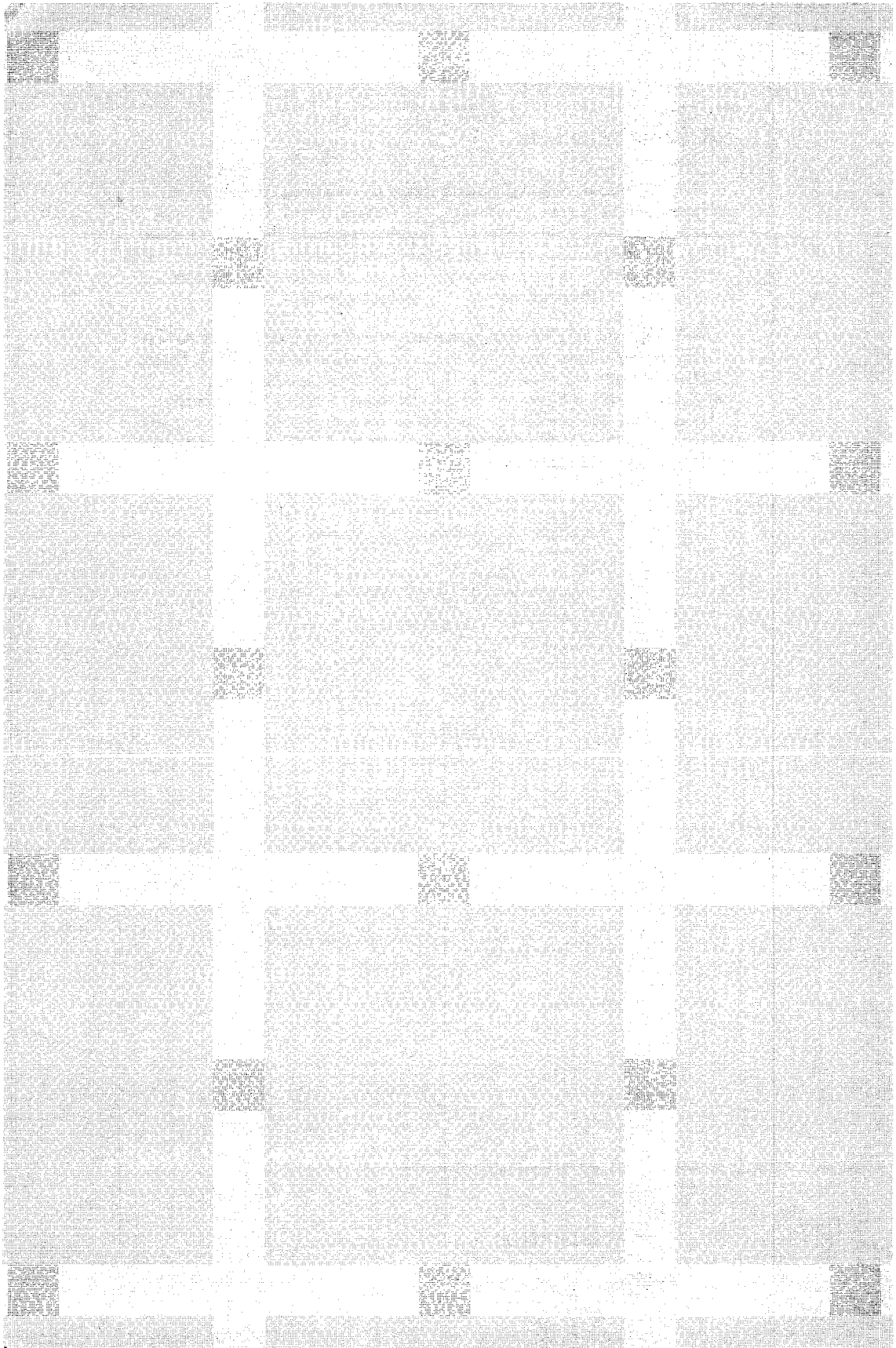
This book, in a nutshell, is an attempt to articulate the best from the past, to assess the needs of the future, and to illustrate the frontier research of our contributors in the field of vocational behavior.

John M. Whiteley
Arthur Resnikoff

Acknowledgments

This collection of original contributions to vocational development theory reflects the sustained efforts of Donald Super, John Holland, Anne Roe, and David Tiedeman. To each is owed a debt of gratitude from the editors, and from the many people whom they'll never meet but who will live more productive and rewarding lives because of the dedicated labors of these distinguished scientists.

Finally, special appreciation is due to several staff members at APGA: E. E. Hunter whose vision led to the conception of the APGA Press, Robert Malone who assisted with organization aspects of our endeavor, and Leah Jackson who has shepherded this book through the editorial and production aspects of final preparation. The quality of workmanship in the composition of the book reflects her sustained effort and good judgment.



PART I/Introduction

CHAPTER 1

Vocational Development Theory: An Introduction

John M. Whiteley, Arthur Resnikoff

Although vocational development theories are taught in many counseling programs, they are often treated as an intellectual exercise having minimal relation to practice. Because of the manner in which the theories were originally presented, many students and practitioners question, with good reason, the importance or usefulness of these theories. Specifically, this questioning typically takes the form of asking what vocational development theory can add to methods of helping clients understand their behavior in order to engage intelligently in the lifelong process of decision-making in the occupational area of their lives.

As useful as vocational development theory is to the practitioner, as we will explore later in this chapter, there are still many unanswered questions about its current state of development as an area of inquiry. Osipow (1968) has maintained that many of these questions are unanswered because there has been no systematic research or study on them due to a "scarcity of systematic thinking about career development." He goes on to list a number of pertinent areas. For example, how much, when, and what kinds of occupational information help

individuals at different age levels learn about the world of work? Or, what kind of information is best integrated into the way a person views himself? What kinds of personality dimensions make sense in terms of educational and vocational planning? Do we look at factors such as risk-taking, flexibility, rigidity, and congruence of self with ideal image?

What are interests? What relation, if any, do interests have to personality? This question is one that John Holland has attempted to answer in his work and that he discusses later in this book. However, his method of examination is only one of many ways to approach the issue.

What else besides interests and some way of measuring ability must be taken into account to help a client make vocational plans? In what kind of framework can counselors best conceptualize clients who claim that they have no interests? What are some of the ways we can classify such people and develop methods of approaching them? How does indecisiveness, for example, relate to a person's future self-concept and his career development?

Do the conceptualizations we now have in the field of vocational development theory adequately explain the process of vocational growth? Further, since the studies of vocational growth that do exist are based largely on middle class children, are they relevant at all to black or Puerto Rican youngsters? How similar are the different socioeconomic groups with regard to (a) expectations of entry into particular careers, (b) exposure to various vocational role models, and (c) ethnic group or class occupational values? The method of intervention the counselor would use in dealing with decision-making is strongly influenced by the answer to these questions.

Osipow (1968) has summed it up well:

> What the counselor decides to do when faced with such situations depends upon his ideas and conceptions about interests, what they are, how they are acquired, and what factors determine career patterns in the normal cause of events, and what circumstances can prevent a pattern from crystallizing as it should. Questions such as these, viewed in a cohesive theoretical framework, may be systematically studied. Furthermore, the results of research obtained in such a context are more likely to be integrated into counseling practice than results of research that do not stem from theory.

Isolated research reports outside a total program of empirical investigations are difficult to integrate into practice because the counselor simply cannot make them relevant to what he is doing. These reports

are typically done on diverse and largely incomparable populations, with different instruments, research designs, and definitions of terms.

Given the important questions facing the vocational counselor, what can theory in general and vocational development theory in particular contribute to their resolution?

The Functions of Theory

Hall and Lindzey (1957) outlined a number of characteristics of theory that are relevant to full utilization of development theory. Among the functions were that theory:

> . . . leads to the collection or observation of relevant empirical relations not yet observed. . . . permit[s] the incorporation of unknown empirical findings within a logically consistent and reasonably simple framework. . . . organiz[es] and integrat[es] all that is known concerning a related set of events. . . . prevent[s] the observer from being dazzled by the full-blown complexity of natural or concrete events [pp. 13–14].

In the process of vocational guidance, the work of the counselor would likely be inefficient and haphazard without the aid of a theory. The problem the vocational counselor faces is that his professional practice typically gives him too limited a set of observations from which to build a systematic theory of his own.

Shoben (1962) has pointed out that theory is inevitable for the counselor, whether that theory be clearly delineated or subtle. The counselor simply must find a means of making sense out of what the client says or does, and theory is the means of doing so. As Shoben (1962) notes, the processes of making sense

> . . . may be highly articulate or essentially covert; they may be carried out systematically or without regard to any comprehensively formulated cognitive structure; they may reflect a commitment to a particular theory or a willingness to borrow whatever ideas that may be useful at the moment; they may be executed intuitively or on the basis of highly objective considerations. The point is that classification, decisions with respect to what is important and what is not, and directional concepts are integral in the counseling enterprise [p. 617].

In their work, counselors operate on the basis of a myriad of other assumptions. The question is not whether counselors relate to their clients on the basis of their ideas of human behavior; rather, the issue is how explicit those ideas happen to be, or how well the counselor can verbalize his approach. The more implicit the ideas are, perhaps the less likely they are to be changed. One reason for that rigidity is that

the "unsystematized theory" is usually difficult to express, and, because it is not put into words, therefore difficult to argue against. With unsystematized theory, one may have difficulty with the consistency in his own behavior when faced on different occasions with the same set of stimuli. Since counselors must operate on some basis, implicit or explicit, it is worthwhile for them to examine their working hypotheses in approaching clients so that they may ascertain in some systematic way what seems to work for the client in that situation and what does not.

One of the purposes of a theory is to arrange ideas in some systematic manner. At best, a theory is a tight, internally consistent set of relationships that would explain a considerable range of behavior. For counselors, a theory has to be meaningful and have some direct relationship to the client and to the problems of concern to that client. Knowing this set of statements on human behavior, the counselor must be able to utilize the theory and the individual's unique data so that differences actually are effected in the counselor's behavior. These changes will depend on the whole set of feelings and thoughts that the counselor takes in from the client. Although we may give academic lip-service to a theory and thereby carry on an interesting discussion, the important question is still whether the theory makes a difference in practice, i.e., in how the counselor actually works with each client.

The Element of Outcome

Another aspect of a good theory is its capacity to predict different kinds of outcome. To be confirmed, a theory needs the weight of empirical data as a source of predictive validity. Many counselors often shy away from the idea of predicting some future development because they feel that such an assertion restricts an individual's freedom of action. But there need be no restriction of freedom. If a theory had a rather poor relation to actual behavior, the theory would either have to be modified in light of the data or discarded for a better explanation. A good set of explanatory constructs is a helpful way to make sense out of what a person tells the counselor. Theory, then, provides for a framework in which questions may be asked and hopefully answered so that the counselor may be more sure of his ideas.

Prediction is important because it connects different events over time. Prediction lends itself to inferences of cause and effect, and therefore provides information to the counselor about the potential effectiveness of various counseling strategies. This knowledge in no way restricts the

freedom of an individual; instead it expands his choice of alternatives by giving him information about the probable effects of his choices. Armed with such information, an individual can make more knowledgeable choices and may even decide to choose a course of action in which he may have a high probability of failure.

Knowledge of the *probable* future need not imply that an individual must make certain choices over other choices. For example, we can look at a youngster's vocational maturity scores and see that low vocational maturity is related to less vocational satisfaction through inappropriate occupational decisions. With this type of prediction, the counselor might well want to intervene in early adolescence to help the student achieve a higher level of vocational maturity.

John Holland's work, which asserts that individuals with certain kinds of clusters on an interest measure will tend to gravitate toward a certain group of occupations, allows for assumptions about the types of individuals attracted by different tasks. Different occupational settings have been found to have differential effects on individuals; an individual wishing to have a particular type of experience would best choose the type of setting that would meet his needs. He could make an appropriate choice if he knew better what effect it would probably have on him.

Approaches to Career Development

Clients present vocational counselors with a wide range of vocational issues. The way in which the counselor conceptualizes these issues depends upon the theory he advocates and, accordingly, how he chooses to render assistance to the client.

Applied specifically to vocational guidance, theory helps the counselor decide what data to gather about the client, what data to gather about the potential vocational environments, and what of importance to glean about a client's actions, interests, attitudes, values, personality, educational experience, and stated aspirations. The counselor must then determine, from all the information he hears and the reports he collects, what is relevant in helping the client to examine his current situation and develop future plans.

As with theories of personality, theories of vocational development can be functional in their orientation, concerned with the questions of how and why the individual relates to a portion of his world. At the same time, a theory in the area of vocational development represents a generalization, and a partial generalization at best, about the many

forces at work in the process of vocational guidance. It is premature and unrealistic to expect any theorists at this stage to have more than a partial theory about the factors involved in the development of this field.

The task confronting a counselor in rendering vocational guidance is especially complex, since there is the uniqueness of an individual's personal development to be considered, as well as the interplay of economic, educational, and social forces whose collective impact upon the client must be projected into the future.

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PART II/The Present

Donald E. Super indicates that his interest in vocational development theory began over 25 years ago. The view then current was of a "static matching of people and positions." Super chose instead to begin work toward a dynamic theory of how people "choose, enter and progress in their occupations." In subsequent years, this orientation toward development has enriched the field with new constructs and empirical findings. His basic interest remains, however, with "the differential psychology of occupations as contributory to a psychology of careers, on life stages and processes in vocational development, on patterns of career development, on the nature and causes of vocational maturity and its role in choice and adjustment, and on the individual as the synthesizer of personal data, the interpreter of experiences, and the maker of decisions."

In this chapter, Super surveys his ideas and the related research on vocational development theory. He identifies and discusses the major aspects of his thinking which lean toward formation of a theory, albeit in his opinion an imperfect one at this time. These elements include the differential psychology of occupations, the psychology and sociology of life stages and of developmental processes, patterns of career development, vocational maturity, and the phenomenology of decision-making.

John L. Holland traces the evolution of his theory from one that

began with attempts to predict vocational choice to a present theory that involves concepts of personality and environment and the interaction between them. Holland's theoretical notions are tied in directly, for the most part, with his empirical research. Many of his conceptions, in fact, arise from his data.

Holland has found six major personality types and a number of subgroups which are formed from combinations of these types. In a longitudinal study explained in his chapter, Holland has demonstrated the predictive efficiency of his classifications in relation to the occupational choices which people initially make and in which they establish themselves over time. The developmental hierarchy of an individual's interests, which can be assessed simply by means of special scoring interest inventories, impel an individual toward one of the six occupational environments which reflect his personality.

In other words, the profile resulting from the inventories is a representation of what a particular person is like, and his occupational choice is dependent upon both the view he has of himself and the perception he has of the area to which he is attracted. In later studies, Holland has shown that there is an interaction between a person's hierarchy, the environment in which he finds himself, and the direction in which a person changes with respect to that interaction.

Not satisfied with simply supplying a body of theory and research, Holland has endeavored to derive practical application from his work. He has developed a paper-and-pencil inventory which organizes information for vocational and educational guidance, and has attempted to build a comprehensive classification scheme which would allow students to see whether or not their individual occupational choices make sense for them.

Anne Roe traces the history of her work in the field of psychology, with a focus upon the evolution of her interests in the area of vocational development theory. In an attempt to find out how people end up in different occupations, her early work began with the comparison of different occupational groups on a variety of personality measures. As she became familiar with a number of different fields, she became aware of a number of different themes. She became interested in how the family relations of early childhood were related to later occupational choices. She focused on the closeness or warmth of parents toward their children, with the result that children develop differential attractions toward people or toward things.

In the process of showing how personality related to occupation, Roe realized the need for a method of organizing groups of occupations so that it could be shown how the patterning of personality is related to later occupational behavior. This thinking led her to a widely used occupational classification system which showed not only the type of career but also the level of achievement in that vocational area as well.

David V. Tiedeman's work in the area of vocational development

has differed from that of his colleagues in that he has focused on the decision-making aspect of career development. The first phase of his work was concerned with the area of occupational choice, but it later expanded to encompass the process of choice founded on an individual's personal belief system. As he became more interested in the processes of exploration and commitment in career development, Tiedeman realized that those processes "were specific manifestations of the general processes of cognitive development."

Therefore, viewing an individual's choice of career within the larger context of decision-making, Tiedeman, with the aid of a computer-based support system, has been attempting to creatively investigate the area of career development and choice. In order to study this problem further, he has, through the advent of computer simulation, developed a career model. In this article he addresses himself to the problem of whether a "machine" can develop a career; it serves as a prelude to building a rationale for such a development.

The Tiedeman model is an attempt to help individuals bring to their consciousness all the factors inherent in making decisions so that they will be able to make choices based on full knowledge of themselves and on appropriate external information. By a human-machine interaction an individual may be able to understand more fully his own career development and to participate in it with a greater degree of consciousness.

CHAPTER 2

Vocational Development Theory: Persons, Positions, and Processes

Donald E. Super

The book I wrote 26 years ago on the same general topic of vocational development theory was entitled *The Dynamics of Vocational Adjustment* (Super, 1942). A contemporary publication was called *Matching Youth and Jobs* (Bell, 1940). I was interested in the latter concept, and in the contributions of trait-and-factor theory, as was shown by my later book on tests (Super, 1949). But, as the title of my first text showed, even in those distant days I was interested in something more than a static matching of people and positions. I wanted a dynamic theory, and the concept of adjustment implied a capacity for change in persons, in the jobs they obtain, and in the occupations they pursue. The makings of a dynamic theory of how people choose, enter, and progress in their occupations were then largely lacking, but I drew on what I could find—not only in differential psychology but also in developmental psychology, in personality theory, in sociology, and in economics—that seemed to throw light on these processes.

Today my title involves the term *development*, for the intervening years have produced a new orientation in our field, and with it a good deal of theorizing about, and a substantial amount of data on, career

or vocational development. It is with much more confidence, and with much more substance than in 1942, that my focus is still on (a) the differential psychology of occupations as it contributes to a psychology of careers, (b) life stages and processes in vocational development, (c) patterns of career development, (d) the nature and causes of vocational maturity and its role in choice and adjustment, and (e) the individual as the synthesizer of personal data, the interpreter of experience, and the maker of decisions. Hence my title and subtitle, *Vocational Development Theory: Persons, Positions, and Processes.*

A Psychology of Occupations or of Careers? [1]

Vocational psychology, from its beginnings early in this century until shortly after 1950, was essentially a *psychology of occupations.* The occupation was the subject, and the persons in it were the source of data on the occupation. The occupation was studied by examining the characteristics of people engaged in or succeeding in it.

This conventional approach to vocational choice and success, commonly referred to as trait-and-factor theory but perhaps more appropriately called applied differential psychology, made great contributions, without which there would be no such field as vocational psychology. But its many landmarks, impressive though they are, need not be reviewed here. It is sufficient to say that a major achievement of differential applied psychology was the publication of data on occupational differences and aptitudes or interests as shown by standard tests. Thus, made available were the instruments and norms needed for "matching youth and jobs" (Bell, 1940). As the work of the Minnesota Employment Stabilization Research Institute (Paterson & Darley, 1936), of the British National Institute for Industrial Psychology (Earle, 1933), and of later investigations such as those of Campbell (1965) showed further that tests of known occupational validity contribute to better vocational counseling, it is little wonder that the readily usable tools of differential psychology made the trait-and-factor approach the foundation of vocational counseling in the counseling centers of organizations such as the Veterans Administration, of colleges and universities, of the YMCA, and of the Jewish Vocational Services.

In the earlier editions of his book, Shartle (1952) defined *occupation*

[1] This section is a revision of parts of articles that appeared in the *Personnel and Guidance Journal* (Super, 1961) and the *Vocational Guidance Quarterly* (Super, 1964).

as a group of similar jobs and positions, and *position* as a group of tasks performed by one person; he did not, however, mention careers. The typical study of an occupation by psychometric methods—yielding data about the characteristics of people doing a particular type of work at a certain point in time—therefore deals with a presumably static entity. It is only with the impact of vocational development theory that Shartle (1959) adopted my definition of career (Super & Bachrach, 1957) and that Project Talent, revived under Cooley's (Flanagan & Cooley, 1966) direction, used developmental constructs in analyzing psychometric data. The standard psychometric study of an occupation provides useful information for matching *men* with *occupations* or *jobs* (Ghiselli, 1966; Super & Crites, 1962), whether in vocational counseling or in personnel selection. But until recently, the procedure as used tells nothing about *careers*.

Careers versus occupations. A career is the sequence of occupations, jobs, and positions occupied during the course of a person's working life. Careers actually extend beyond either end of the working life to include pre-vocational and post-vocational positions such as those of students preparing for work and of retired men playing substitute-work roles. This has been done in the study of the exploratory years which is part of the Career Pattern Study (Super, Crites, Hummel, Moser, Overstreet, & Warnath, 1957), in some of the Harvard Studies in Career Development (O'Hara & Tiedeman, 1959), and in Project TALENT (Flanagan & Cooley, 1966). The psychological or sociological study of *careers* focuses on the continuity or discontinuity in the lives of individuals and on the patterns of continuity in the lives of groups (LoCascio, 1964; Super, 1954; Tiedeman, 1961), whereas the psychology and sociology of *occupations* stresses characteristics of single or categorized occupations (Paterson & Darley, 1936; Roe, 1956). Cooley's (Flanagan & Cooley, 1966) analysis of migrants into and out of curricular or occupational groups is a new and rare exception to this generalization. The essentially static *differential* psychology of occupations and the essentially *developmental* psychology of careers are both needed, although this need has not always been made clear. In stressing the need for a psychology of careers, my intent is to combine it with the psychology of occupations and with self-concept theory in order to constitute a sound and workable vocational psychology, a psychology of vocational development or of career development. This should provide a more complete basis for vocational counseling than any now available.

The occupational model has methods quite appropriate for prediction from one point in time to another point. This model takes predictor data at an early stage of the career and uses regression methods to predict later success in one occupation, or it uses discriminant analysis as a means of assessing the likelihood of being found—later—in each of several possible occupations. The fact that the subject may hold several different positions at successive ages is irrelevant. The prediction of success in law, accounting, or sales at some time in adulthood is treated as though this position, at this moment in time, were the equivalent of an adult lifetime, of a career.

Career prediction seeks to take into account the sequence of occupations, jobs, and positions that a given person is likely to occupy. But statistical methods are only now being adapted to prediction from one point in time to a later series of points in time.

The career model of developmental vocational counseling is one in which the individual is conceived of as moving along one of a number of possible pathways through the educational system and on into and through the work system. His starting point is his father's socioeconomic status; he climbs up the educational ladder at a speed fixed both by his psychological and social characteristics and by the resources provided from his family environment. He enters the world of work at some point, determined in part by the rung on the educational ladder, which he has reached at the time of leaving education for work. He progresses through an entry job into other jobs, which may or may not be related to each other in constituting a career field in the sense of continuous, progressive achievement. Career prediction should be the essence of vocational counseling when more is involved than a decision about a specific job, but counselors have little in the way of data and instruments to help make such predictions. Present prediction methods fit the occupational, not the career, model. It is encouraging, however, that attention is now being paid to the statistical analysis of vocational development (Flanagan & Cooley, 1966; Gribbons & Lohnes, 1968; Lohnes, 1965) with promises of important methodological and eventually practical outcomes.

Stages and Processes in Career Development

Developmental psychology has long made use of the concept of life stages. Borrowing particularly from Charlotte Buehler (1933), I applied it to vocational choice and adjustment nearly a generation ago (Super,

1942). But it was the study by Eli Ginzberg and associates (Ginzberg, Ginsburg, Axelrad, & Herma, 1951) that (a) first succeeded in directing the attention of the majority of those interested in vocational psychology and vocational guidance to the possible contributions of a developmental approach, and (b) made people receptive to later work of this type (Super, 1951, 1953; Super & Bachrach, 1957; Super et al., 1957; Super, Starishevsky, Matlin, Jordaan, 1963).

Ginzberg (1951) developed a schema of periods and stages within a period from about age 6 until about age 25. The process of occupational decision-making can, he contended, be analyzed in terms of three periods: fantasy, tentative (interest, capacity, and value stages), and realistic (exploration, crystallization, and specification stages).

The validity of Ginzberg's theorizing was merely suggested in his own study by subjectively treated data from small and unrepresentative samples. The increasing realism of occupational preferences has tended to be confirmed (Gribbons & Lohnes, 1964b; O'Hara & Tiedeman, 1959), but the precise succession of determinants has not generally been verified. The trend from fantasy to realism tends to be supported; however, interest, capacity, and values have been found to play more nearly concurrent roles, and external reality is actually a consideration before the age of 18. The stages of exploration, crystallization, choice, and clarification were refined by Tiedeman and O'Hara (1963) in developing a paradigm of the decision-making process, and Harren (1966) found support for it in a study of liberal arts students. Merton, Reader, and Kendall (1957) had already found that specification of an occupation does come in the late teens, while noting that the age of choice depends also upon curricular organization.

I have found Ginzberg's theorizing and the related research helpful, especially in the context of the more complete developmental plan developed in Buehler's (1933) study of the problems, activities, and interests of various ages. This analysis led to the identification of the five familiar life stages: growth (childhood), exploration (adolescence), establishment (young adulthood), maintenance (maturity), and decline (old age). A somewhat similar classification of life stages was developed by Miller and Form (1951). Their data were the work histories of a representative sample of men. Analyzing these histories for stability and change in the sequence of positions that constitute the career, they identified the initial (while in school), trial (early, short-lived, full-time work), stable (normally mature adult), and retirement (after giving up employment) work periods.

Some men continue to change occupations throughout life, while others have stable periods followed by new periods of trial, which in turn lead to stabilization for a second or third time. Thus there are stable (direct entry into the life work), conventional (trial leading to stability), unstable, and multiple-trial careers. The life stage processes continue more or less throughout life, repeating themselves in the sequence: initial-trial-stable-decline. Tiedeman refines this concept (Tiedeman, O'Hara, & Matthews, 1958) in theorizing about *position* choice, each decision concerning the occupancy of a position involving exploration, establishment, and maintenance.

Men at each of the socioeconomic levels can be classified according to career patterns. Stable and conventional career patterns are more common at the higher levels; multi-trial and unstable patterns at the lower levels.

A number of questions in vocational psychology are raised by these life stage and career pattern concepts in findings that were never raised by trait-and-factor theories of occupational choice and success. Parental socioeconomic status is, as sociologists keep stressing, the starting point of the career pattern as one of its major determinants. Intelligence, many psychological studies show, is related to adult occupational status. But other variables also determine movement from position to position as the career unfolds, and these determinants interact as the attainment of one position at one point in the career influences movement toward and attainment of the next position. These questions have typically not been the concern of sociologists who, in studying mobility, have been fixated on status. Economists have been interested in only economic variables, such as pay and fringe benefits, as factors in labor mobility. Psychologists, too, were generally unaware of the concept and nature of careers and of the importance of studying them until quite recently (Flanagan & Cooley, 1966; Super, 1953, 1954, 1963a; Tiedeman, 1961; Tiedeman, O'Hara, & Matthews, 1963). My early book on the *Dynamics of Vocational Adjustment* (1942) went almost unnoticed for a long time.

The theory of developmental tasks (Havighurst, 1953), fundamentally similar to that of life stages, postulates that people at each age are confronted by a set of tasks with which society expects them to deal effectively, and that success in coping with the tasks of one age is essential to dealing with those of the next stage. This contribution of Havighurst is another refinement of which my colleagues and I in the Career Pattern Study (Super et al., 1957) have made use in developing the concept of vocational maturity.

Vocational Maturity

It has seemed most important (Super et al., 1963) to focus on the exploratory and establishment stages in the longitudinal study of vocational development. I conceive of these as involving, respectively, the tentative, transition, and trial (with little commitment) substages in exploration, and the trial (with more commitment), stabilization, and advancement substages in establishment. The vocational developmental tasks are seen as:

Crystallizing a vocational preference
Specifying it
Implementing it
Stabilizing in the chosen vocation
Consolidating one's status
Advancing in the occupation.

The various attitudes and behaviors involved in these tasks include, for example, awareness of the need to crystallize (or specify, implement, etc.) a preference, the use of resources, awareness of factors to consider, awareness of contingencies, and acquisition of information concerning the preferred occupation.

In the Career Pattern Study (CPS) my colleagues, students, and I have collected and analyzed data to test this theorizing about vocational development. The story is now familiar of how all of the eighth and ninth grade boys and their parents in Middletown, New York, in 1951–52, were interviewed and tested (Super et al., 1957). It was the second monograph (Super & Overstreet, 1960) which reported on analysis of vocational maturity in ninth grade boys; the third, still in process (Heyde & Jordaan, in press), deals with grades 9 and 12; and the fourth (Super, Kowalski, & Gotkin, in press) examines the predictive validity of this group with regard to vocational maturity.

Vocational maturity was defined as the behavior of the individual, compared with that of others coping with the same tasks. That boys of the same age deal in varying ways and degrees with the same tasks is assured by the structure of school curricula: the ninth grade is a choice point at which certain decisions have to be made.

Two findings in this first study of vocational maturity in ninth grade boys were particularly important. First, the presumed indices of vocational maturity based on criteria widely used by counselors did not correlate with each other as measures of the same basic variable should correlate, whereas a series of novel indices assessing the planfulness and time perspective of the boys did have construct validity. Secondly, the level of vocational development attained by

these ninth grade boys strongly suggested that they were not ready to make sound vocational or pre-vocational decisions. They had not attained an understanding of themselves or of the world of work so that they could decide on curricula leading toward particular types of occupations. Vocational maturity did appear to be related to ability, to opportunity for the arousal of interest and for the use of abilities, and to the taking advantage of such opportunities.

The 9th grade measures have been reworked (Heyde & Jordaan, in press) to insure comparability at the two grade levels, after which a factor analysis revealed that there were six factors with identical structure in 9th and 12th grades, 9 factors with somewhat similar structure, and 4 which were different in a total of 19 extracted. Thus some factors were unique to the 9th grade, and still others appeared only in the 12th grade (it should be remembered that the subjects were the same boys and that the measures were identical). The factors common at both levels were largely factors of occupational information (educational, psychological, economic); other factors involved planning, independence, crystallization of interests, and specification and implementation of preferences.

These data suggest, furthermore, that the realism of the late teens is the reality of the self, of its abilities and interests, rather than a realization of opportunities beyond the realm of personal experience.

The stability of vocational maturity during the high school years was studied by correlating 9th grade with 12th grade scores, and by comparing means. Information concerning training and hours, awareness of factors and of alternatives (but not of contingencies) in occupational choice, and wisdom measures yielded test-retest correlations ranging from .28 to .46 over the three-year interval; but factors such as planning, acceptance of responsibility, information concerning other aspects of the preferred occupation, and awareness of contingencies, which had looked promising in the ninth grade study, were found to be unstable over the three-year period in high school. The development of these traits appears to be quite irregular.

Specificity of information about the preferred occupation tended to increase with age and experience, as did knowledge about psychosocial conditions of work, entry and advancement opportunities, and supply and demand. Increased age brought greater independence of work experience. Specificity of preference, degree of commitment, and consideration of alternatives were higher in 12th grade, as was consistency of preference. Ninth graders considered more occupations and fields of work, as might be expected early in the exploratory stage.

Only 16 percent of the 12th graders had the same specific occupational preference as in 9th grade, and 22 percent aimed at the same field of work at a different level. Only 13 percent were strongly committed to their vocational preference, 18 percent were only moderately committed, and more than 68 percent minimally.

The later educational and work histories of some 200 of the CPS boys who were first studied in junior high school were collected when they were about 25 years old. Changes of educational or vocational positions were classified according to the floundering, trial, instrumental, establishing, or stagnating quality of their coping behavior. Over half of the position changes involved floundering (aimless), and more than one-third involved trial (clearly purposive) behavior.

Job changes during the years after high school and vocational status at age 25 were dichotomized as positive or stabilizing and as negative or floundering. About 80 percent were engaging in positive, stabilizing, coping behavior at age 25. About half of these had never floundered much. The other half, whose early moves had involved much floundering, were nevertheless progressing at age 25. But as many as one-fifth were still not handling their vocational developmental tasks well. The prevalence of floundering during the early 20's is clear, as is the fact that settling down does indeed begin in the mid-20's.

We have experimented also with a more quantitative and precise method of assessing early career behavior (Gotkin, in Super, Kowalski, & Gotkin, 1967). These were:

Change in equity
Realism of reasons for making a move
Improvement in use of abilities
Improvement in outlets for interests
Progress toward goal
Improvement in socioeconomic status
Improvement in educational level
Number of moves
Number of times unemployed
Number of months unemployed
Number of months self-supporting.

Operationally defined, *change in equity* is increase or decrease in rate of pay and in use of skills rated on a 7-point scale. Self-support is defined by the adequacy of income according to standard social work budgets. The average number of changes of positions was six for the seven-year period. The scales for *improvement in use of abilities* and *in outlets for interests*, and for the *number of moves*, although psychometrically adequate, lacked the expected relationships with other

variables, and the first two showed no improvement from first to final change of position. The other measures did have construct validity as shown by their intercorrelations, by correlations with judgments of floundering and trial, and (when applicable) by changes in scores from first to final change of position.

The novel measures of vocational maturity and conventional measures such as intelligence, socioeconomic status, and school grades in grades 8 or 9 and 12 (for the same subjects) were treated as predictor variables in a study of relationships with adult criteria. Career development and career behavior measures, college grades (for those who went to college), and self-estimates of occupational and career success and satisfaction at age 25 were the criteria of adult success.

Vocational maturity in the 9th grade, judged by occupational information, planning, and interest maturity, were significantly related to vocational success in young adulthood. Many of the other vocational maturity measures, particularly agreement of preferences with personal characteristics and consistency of vocational preferences, lacked predictive validity for success at age 25.

In the 12th grade vocational maturity, judged by the same measures as in grade 9, proved even more valid. Information about training and education required for the preferred occupation yielded a significant number of anticipated relationships. Those with educational and occupational level attained by age 25 were moderately high, and those with career development and stabilizing-floundering were fair. Supply and demand information when in grade 12 showed a logical as well as significant relationship with realism in changing positions after entering the labor market and until age 25.

Agreement between abilities possessed by the student and the abilities required by the occupations in which he was interested in grade 12 was related to realism of reasons for changing positions, to self-estimated occupational satisfaction and career success, to floundering-stabilizing at age 25, and to college grade point average. When an attempt was made to replicate the predictive validity of this wisdom or realism measure in a second 12th grade sample, it failed. It had not appeared valid in grade 9, and appeared unrelated to other logically similar variables in grade 12.

One impressive finding of this 10-year analysis of the careers of junior high school boys is the predictive validity that conventional school variables have for occupational and career as well as for educational criteria. Even ninth grade data of this type yielded correlations of .25 to .35 with young adult criteria. That parental socioeconomic level

still plays an important part in vocational development may seem discouraging, but one interpretation of the predictive validity of social status, intelligence, grades, and participation in school and community activities is actually encouraging. The value of using educational resources well is suggested because the boys who are given opportunities in school and out-of-school and who use these opportunities during their school years tend also to make good use of their later career opportunities.

It is perhaps more informative than disappointing that some of the presumed measures of vocational maturity fail to have predictive validity in the 9th grade or even in the 12th grade. The measures of the wisdom or realism and consistency of vocational preferences, which lacked construct validity in the ninth grade (that is, they did not intercorrelate as expected), could hardly have predictive validity.

Measures of awareness of choices to be made and of information and planning bearing on the choices, which seemed to have some construct validity in 9th grade, do have both 9th and 12th grade predictive validity for vocational development in young adulthood. The major negative conclusion of the earlier ninth grade study must therefore be modified to read as follows: Although ninth grade vocational behavior has not yet reached a stage of development at which it is systematically related to other concurrent variables, it has proceeded far enough to have some predictive value.

Even more encouraging is the validity of certain 12th grade measures of vocational maturity. By age 18 vocational development has progressed far enough so that information concerning the preferred occupation, planning, and interest maturity are related to success, to vocational coping behavior, at age 25.

Using modifications of some of the procedures of the Career Pattern Study, Gribbons began, at Harvard in 1958, a longitudinal study of 111 eighth grade boys and girls (Gribbons & Lohnes, 1968). He was joined by Lohnes, who was particularly interested in pursuing some of the statistical problems of career, as contrasted with occupational, prediction.

Eight Readiness for Vocational Planning (RVP) Scales resulted from the scoring of structured interview material. Three of the eight RVP scales are both conceptually and operationally different from my VM scales, and the remaining five are similar conceptually but somewhat different operationally. This may account for some of the differences in the findings of the two studies.

Vocational maturity as measured by the RVP scores increased from

grades 8 to 10. Gribbons and Lohnes conclude that their scales do, therefore, measure vocational maturity. The considerable overlapping of 8th and 10th grade scores was considered a show of substantial readiness for planning in some 8th graders and a substantial lack of it in some 10th graders.

Readiness for Vocational Planning scores in the eighth grade had *as much* predictive validity for curriculum choice and level of occupational preference as scores made two and one-half years later. RVP scores in grade 8 were *better* predictors of 12th grade educational and occupational planning than were RVP scores in grade 10. They also yielded *better* predictions of educational aspirations, level of occupational aspirations, field and level of actual occupation two years after high school, and two-year post-high-school career adjustment. This was true, even though 10th grade scores were less related to verbal ability, less homogeneous, and therefore more discriminating. Gribbons' RVP scores, unlike the Career Pattern Study's VM indices, showed no appreciable relationship to socioeconomic status.

Some major contradictions exist in Gribbons and Lohnes' findings. If Readiness for Vocational Planning is indeed vocational maturity (increasing with age, becoming less dependent on verbal ability, and differentiating increasingly well among high school students), 10th grade scores should be better predictors than 8th grade scores of later educational and vocational criteria. A maturing trait should become more valid as it matures, as it did in the Career Pattern Study (and as later measures, taken closer to the criterion date, generally do), not less valid as in Gribbons and Lohnes' study.

Until there is more compelling evidence, it seems necessary to conclude that the vocational development of 8th and 9th graders (CPS data), and that of 10th graders (CDS findings) have not progressed sufficiently for directional vocational decision-making. Even in the 12th grade (CPS data) there appears to be only a limited basis for sound directional vocational decision-making in the majority of students. Exploration is more relevant than training.

Coping behaviors and differential careers processes were also studied by Gribbons and Lohnes. Interpreting my five types of coping behavior (floundering, trial, stagnation, instrumentation, and establishment) as stages through which people must go rather than as types of behavior which may or may not be manifested, they hypothesized additional types of career processes, sequences, or patterns. *Emerging maturity* is the process involved in sequentially manifesting the several standard types of coping behavior. Additional career processes include

constant maturity, the consistent and persistent pursuit of the goal first stated; *degeneration,* the progressive deterioration of aspirations and achievement; and *constant immaturity,* fixation on unrealistic goals and without advance in level of achievement. Nearly half of each sex fell into the *emerging maturity* category, something less than a third showed *degeneration,* rather more than one-tenth of the boys and one-fifth of the girls showed *constant maturity,* and one-fifth of the boys and one-tenth of the girls showed *constant immaturity.*

Somewhat less than half of the boys were rated successful two years after high school graduation on the basis of high school aspirations and actual employment; a slightly larger number were unsuccessful, and about one-sixth were unratable (military). Girls were more frequently unsuccessful: More than one-half were not maintaining careers, but more than one-third were successful in maintaining careers, and one-tenth were unratable (military or housewives). Success was significantly related to differential career processes or patterns in high school.

Differential career patterns in high school were not related to the RVP score in either 8th or 10th grade. Gribbons and Lohnes concluded that they had, surprisingly, found no relationship between vocational maturity (RVP) in junior and senior high school, and differential career processes or behaviors from grade 8 to 12. The results were so in conflict with theory and with other findings that the authors reject them and expect positive results in future studies. In view of the newness and undoubted defects of both RVP and VM scales, and the possible deficiencies of the pioneer studies in this field, caution does seem warranted.

Role and Self

Actions are determined by a person's perceptions of himself and of the situation in which he finds himself, by the manner in which he construes his world: this has been accepted as axiomatic by many psychologists (e.g., Kelly, 1955). Widespread acceptance does not, of course, prove validity. Important here is the fact that such theories are common and were bound to have impact on vocational development theory. Although the emphasis on trait-and-factor theory which characterized vocational psychology until the 1950's resulted in little use being made of phenomenological theories in studying vocational development, I have found these latter theories helpful in providing a framework for career development. The postulate (Super, 1951, 1953) that (a)

in expressing a vocational preference, a person puts into occupational terminology his ideas of the kind of person he is; (b) in entering an occupation, he seeks to implement his self-concept; and (c) in stabilizing in an occupation, he attempts to achieve self-actualization—this postulate, together with life stage theory, has provided the framework not only for a large part of my *Psychology of Careers* (Super, 1957) but also for my more recent theorizing and research (Super, 1963b).

Central to a theory of vocational development are the processes of the *formation, translation* into occupational terms, and *implementation* of self-concepts. If the theory is to cover the whole life span, a series of self-concept *modification* and *adjustment* processes must also be formulated. The deciding individual, construing himself and his environment in his own way, is a major determinant of his own career, even though he operates in a context of external determinants. The formation process includes exploration of the self and of the environment, the differentiation of the self from others, identification with others who can serve as models, and the playing of these selected roles with more or less conscious evaluation of the results (reality testing). The translation of self-concepts into occupational terms may take place through identification with an adult role model (a global translation in which one says, "I am like him" or "I want to be like him"), experience in a role in which one has been cast (discovery of vocational aspects of the self-concept, as when being drafted and assigned to training leads to the discovery of unsuspected interests and outlets), or learning that some of one's attributes should make one fit well into a certain occupation. The implementation process involves action, as in obtaining the specialized education or training needed for the preferred occupation or finding employment in it. Modification takes place after entry and with experience as realities cause further adjustments; preservation of the self-concept is typical of the maintenance stage as the established person seeks to hold his own in a changing technology; and further adjustment is called for as capacities and role expectations are drastically modified by aging.

The adequacy of the translation and implementation has been a major topic of research. Blocher and Schutz (1961) hypothesized that the similarity of self and occupational concepts is greater for occupations in which one has expressed an interest than for those in which one has little interest, while Oppenheimer (1966) did the same for preferences in typical studies. On an adjective checklist or rating scale, the subjects described their actual and ideal selves as well as the typical member of the most and least preferred occupation. They also indi-

cated their occupational preferences. The similarities between the self and the most and least liked occupations were then compared. As hypothesized, the self-concepts were most like those of the preferred occupations.

The results of studies such as these, Vroom (1964, p. 73) points out, may show that occupational choice is the result of perceived similarity of self and occupation, or they may merely demonstrate that in projecting, people attribute the traits which they see in themselves to preferred occupations. It seems likely that both processes are at work. The critical question is the importance of projection in the average subject, as compared with the numerous cues received concerning the characteristics of people in the occupations from contacts with them. There is some relevant evidence.

College students do distort occupations in terms of their own characteristics; this is shown by studies of the relationships of needs and values to occupational perceptions (Gonyea, 1961; Grunes, 1957; Raylesberg, 1949). Engineering freshmen who make high scores on social values tend to see engineering as an occupation which serves society, and those who stress theoretical values tend to see engineering as a scientific occupation. Nevertheless, the Strong Vocational Interest Blank scores of engineering students and of high school students aiming at engineering resemble those of engineers more than they do those of men in other occupations. The common cues do appear to be more important than individual biases.

In one of a series of studies of the translation model (Healy, 1967; Oppenheimer, 1966; Shiner, 1963; Starishevsky, 1967; Starishevsky & Matlin, in Super et al., 1963), Bingham (1966) hypothesized that change of occupation is a function of the degree to which self and occupational concepts agree. He administered a modification of Kelly's Role Construct Repertory Test to 82 full-time graduate students in year-long guidance institutes. All experienced teachers who had decided to become school counselors, were tested at the beginning and end of training. Similarly tested was a control group of 44 employed secondary school teachers with no guidance aspirations. Both groups rated themselves and the occupations of teacher and counselor, using the traits elicited by the Role Rep Test. Measures of agreement between self and occupational descriptions, called the *level of incorporation*, were obtained.

New counselors (ex-teachers) showed higher levels of incorporation of their self-concepts in their concepts of counselors than of teachers. They attributed more similar traits to themselves and to the occupation

to which they were changing, than to themselves and the occupation which they were relinquishing. They made higher incorporation scores as counselors than did the teachers who served as controls. Surprisingly, the year of professional preparation led to no increase in similarity of self- and counselor descriptions.

Because teaching and counseling are both educational occupations, the selection of subjects for this study of change of occupation in implementing a self-concept was not ideal. Teachers changing to life insurance or to law might have been better subjects for testing this hypothesis.

It would be desirable to follow up Bingham's work by obtaining teacher, counselor, and other transfer-occupation incorporation scores from new graduates beginning work as teachers, prior to any consideration of transferring from teaching. Later entry into counseling or other transfer fields versus persistence in teaching could then be correlated with uncontaminated incorporation scores. The predictive power of self-concept translations could then be conclusively evaluated.

The preservation process was one of the first studied. Brophy (1959) used, with employed nurses, methods similar to those later used by Blocher and Schutz, supplemented by job and life satisfaction questionnaires. The nurses described the kind of person their jobs required them to be. Nurses whose self- and job concepts agreed were better satisfied with their jobs than were those whose self- and job concepts were not similar. Cognitive dissonance theory might suggest that one interpret these results as showing that occupationally dissatisfied nurses describe their jobs in incompatible terms as a means of preserving their self-concepts, but it is more logical to conclude that nurses who find their jobs incompatible are dissatisfied with them. The best interpretation of current findings therefore appears to be that because occupational perceptions are determined more by external than by personal characteristics, the congruence of self- and occupational concepts (level of incorporation of self in occupation) determines choice and adjustment.

A person pursuing an occupation finds that others have certain expectations of him by virtue of his position. He develops a concept of occupational role. The study of role conflict and its resolution has constituted the principal application of role theory to occupations. Wispé (1955) found that life insurance salesmen are expected to be both altruistic ("Mr. Friendly") and materialistic ("million-dollar-a-year man"). Suffering discomfort from these conflicting value expectations, the salesmen resolve them by suppressing the less firmly rein-

forced altruistic tendencies. Therefore, part of their occupational concept and, if they are altruistically motivated, their related self-concepts, suffer. Similarly, Air Force instructors (Getzels & Guba, 1954) suffer from role conflict: The regular officers minimize the expectations associated with their instructor roles and play up the situationally reinforced authoritarian military, while the reserve officers with teaching backgrounds (and altruistic self-concepts) remain dissatisfied and conflicted because of incompatibility of strong personal altruistic values and situationally dominant authoritarian military roles.

Of Comprehensive and Segmental Theories

In concluding this survey of my thinking and of related research on vocational development, I wish to say something about theory and about my own ideas on the present state of theory in this field. Not, let me add hastily, because I am inclined to view myself as a philosopher of science, for I do not, but because others theorize about theory and, in the process, have sometimes misunderstood my own expectations in theorizing.

This article, like one of its precursors (Super, 1953), does carry the word *theory* in its title. In neither case is this intended to convey the idea that the paper presents a comprehensive theory of vocational development. Rather, it is intended to convey the idea that theory and theoretical issues are discussed. Some vocational psychologists have taken the position that our field is not yet ready for a comprehensive theory of vocational development or choice. Others claim that vocational behavior is too complex to be embraced in a theory. Still others suggest that such a theory may in time become possible if we will learn more about theory-building before we try to build theories.

My position is a simple one. Theories, as I understand them, seek to organize knowledge. They do so both to facilitate research which will add to the store of knowledge and to make our present knowledge useful in practice. When theories are incomplete, when data on some topics are unavailable or inadequate, no theory can be truly comprehensive. All we can hope for, in such circumstances, are segmental theories—that is, theories that organize whatever we do know on a given segment of a topic—and for the provisional organization of these incomplete segments into imperfect wholes.

In my introductory statement I identified the major segments which, as I see things, are now available for the construction of an imperfect theory of vocational development. These are: the differential psychol-

ogy of occupations (including aptitude and motivation of interest, value and need theory), the psychology and sociology of life stages and of developmental processes, patterns of career development, vocational maturity, and the phenomenology of decision-making. I have slighted one segmental theory, that of differential psychology or of traits and factors, because it is so well known, although I have been identified by some writers as a trait-and-factor theorist (perhaps because they had read *Appraising Vocational Fitness*, my 1949 and 1962 segment). I have shown, I believe, that developmental psychology and sociology provide some of the substance needed for a segmental theory of the stages of a career and of progression from one stage to the next. I have reviewed some of the work on career patterns and attempted to show how what we know in that area fits into more comprehensive theorizing. I have described work on vocational maturity which, in my judgment, helps to elucidate these decelopmental processes, and which will contribute more as others pursue the work which my colleagues and I have begun. And, finally, I have discussed how I have sought to develop another segmental theory of vocational choice, using self-concept theory, which may prove to be not just one unit in a larger framework but rather the mortar binding the other units into a solid structure. Despite the hope that I hold for a phenomenological approach, I am reluctant to be identified, as has also happened as a result of publications in 1951 and 1963, as a self-concept theorist. This is because, as normally understood, this term seems to leave out of consideration the objective situational and personal variables which, in my 1942, 1953, and 1957 formulations, I have taken very much into account.

If, then, my approach must be labelled, let it be as differential-developmental-social-phenomenological psychology. For it is only as we make use of all of these fields and also of aspects of sociological and economic theory that we will eventually construct a theory of vocational development that deals adequately with the complex processes by which people progress through the sequence of positions constituting a career.

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CHAPTER 3

The Present Status of a Theory of Vocational Choice

John L. Holland

I am going to present the history of a theory or, if you will, the *authorized* history of a theory, as opposed to a number of unauthorized histories. I will provide a summary of a special point of view, summarize some recent projects and promising ideas, and suggest some practical applications. In other words, this will be a history of the origins, development, and present status of a particular theory. It will illustrate the influences of good and bad luck, good and bad advice, and the discrepancy between training for and engaging in research. It will be a guided tour through my better ideas and results, avoiding some long stretches of correlational wasteland.

The first statement of my theory grew out of my personal experience in vocational counseling and, beginning in 1953, my constructing a vocational preference inventory (Holland, 1965). I thought there was something to the notion of personality types, although I had been taught that this idea was dangerous and unscientific. The first theoretical statement that was developed can be summarized like this (Holland, 1959):

1. There are six kinds of occupational environments.
2. Everyone has a developmental hierarchy estimated by his coded

interest inventory scores which impel him toward one of six occupational environments. This hierarchy is a product of a person's development.

3. Everyone has a level hierarchy which impels him to a particular level of vocational choice. The formula for this is analogous to intelligence plus self-evaluation.
4. These hierarchies are mediated by self- and occupational knowledge.

In this first statement, I said that there are perhaps six kinds of occupational environments in the world and that everybody has a developmental hierarchy (assessed by his coded interest inventory scores) which impels him toward one of these environments. This statement is another way of saying that an interest inventory profile is a representation of what a particular person is like. If we can learn how to use the profile, it can be helpful in vocational guidance. A person's responses to the inventory are the products of how that person grew up, not just superficial things called "interests." They are as deep or fundamental as the relationship the person had with his parents or siblings.

Next I stated that everyone has a hierarchy that impels him to a particular level of vocational choice. The formula is analogous to intelligence plus self-evaluation. Finally, there are hierarchies of where a person is going in terms of the major direction of his interests. The level to which he is going is mediated by what the person knows about himself and what he knows about occupations. At no time in this early formulation did I explain how that works.

Let us turn next to the testing of the theory to see if it is really any good. If you use the suggested definitions in that first statement for types and environments, do you get the expected results? Or, does the theory explain or make sense out of vocational choices? Based on the first five major studies (Holland, 1962, 1963, 1963–64, 1964; Holland & Nichols, 1964), I have found that the interest types are helpful for organizing a wide range of information about people. It is hard, in fact, to find information about people that is not related in some way to occupational interest. I have also found that interest types could be defined with different methods to get similar results. It doesn't really make much difference whether you use that well-known instrument, the Vocational Preference Inventory, or the Strong Vocational Interest Blank, the major field of study, or the person's vocational choice. While you do get similar results, you do not get identical

results. The formulations for direction and level of vocational choice have been found to have useful validity when tested empirically. Research by others (Schutz & Blocker, 1961; Stockin, 1964; Wall, Osipow, & Ashby, 1967) also supports their utility.

Finally, it was found that the formulations for types may be extended to assessments of the environments in which people live and work. Astin and I did a study using a measure called the Environmental Assessment Technique (EAT) (Astin & Holland, 1961). We learned that we could tell what a college environment was like simply by performing a census of the kinds of people that were in the environment. Astin went on to do another study (Astin, 1963) which also supported the initial work. In a more recent study, Richards and Seligman (1968) have extended the Environmental Assessment Technique to a study of faculty. Their extension of the EAT involves counting the number of faculty, students, and courses in different fields, then organizing the fields according to my theory.

Incidentally, another thing I learned from these studies was the danger of undergeneralization. We are often warned about the dangers of overgeneralization, but the danger of undergeneralization is never doing anything very different because you can't imagine anything except the data in front of you. The danger of overgeneralization is that you may say something that nobody believes, but since few people read journals, this risk is not really very significant.

In the process of doing these first five studies, I realized the importance of the prediction and the stability of occupational choice. If we could learn to predict occupational choice in the college environment, we would have a way of studying one segment of the career pattern or, in my terminology, the work history. I do not see a sharp dichotomy between the prediction of occupational choice and the study of careers.

I also learned something about the deficiencies of the theory from these first studies. (I like to think that my summary of the deficiencies is very thorough.) First of all, many of my definitions were far too ambiguous. Second, a number of necessary definitions were simply not there, even by inference. Third, the initial statement permitted the testing of only general rather than specific hypotheses. It was difficult to say much about what the results should be because the formulations for each type were stated so briefly and were not parallel with one another in content or terminology. Moreover, the formulations had only limited scope, dealing largely with vocational choice. There was also much overlap among types in the findings, and the theory usually failed to produce expected results for female samples. Most of all, the

theory needed a better classification scheme. Since the whole theory rests on the six formulations of occupational types, a clearer and more comprehensive explication of the types was necessary.

Then, too, the theory needed other revisions. To start, I felt that the scope of the theory should be increased from vocational choice to vocational behavior and effective performance. I saw the need to move from a theory of vocational choice to a theory of personality, and the need to interpret and define environments in terms of types. The first statement said only that there were six environments, without mentioning how to assess them. Therefore, I decided to write a more formal statement (Holland, 1966)—a theory of personality types and environmental models. My goal was to provide a more systematic theory, to expand the scope of the theory, to relate it to more recent evidence, and to attract students and researchers. In my second statement, I improved existing definitions and tried to add some that were missing. I provided a set of coordinating definitions that became the first six scales of the Vocational Preference Inventory (VPI). I added and revised concepts, and wrote more extensive and parallel formulations for the types and environmental models. I tried to deal with a broader range of behavior than just vocational behavior, and tried to make the theory more systematic, with improvement in its terminology.

The second statement of the theory, the 1966 revision, contains the same major concepts, although the terminology underwent a few revisions:

> Personality types and patterns: Intellectual, Realistic, Social, Conventional, Enterprising, and Artistic
> Environmental Models and patterns: Intellectual, Realistic, Social, Conventional, Enterprising, and Artistic

What we mean by personality profiles is essentially equivalent to what we mean by personality patterns.

Next I clarified two concepts that had previously been ambiguous—consistency and homogeneity. The first definition of consistency grew out of my clinical experience, and in 1959 I suggested the ideas—"modal and atypical" profile patterns—but gave no explicit definition. In 1966, I reviewed the 30 possible combinations of two letter high point codes for the six scales of the VPI and decided which combinations seemed to be consistent or inconsistent, then compared them with the formulations for the types to see if these assignments made sense. This rational analysis yielded an explicit set of consistent and inconsistent codes. Consistent codes are pairs of VPI scales representing personality patterns that appear to go together psychologically. In other words,

persons with these personality patterns have similar values, coping mechanisms, personality traits, etc.

In 1959, I defined homogeneity as a "well-defined developmental hierarchy (one developmental pattern dominating all others)." In 1966, this ambiguous definition was changed to ". . . the difference between the highest and lowest scores on the six variables used to determine a person's . . . resemblance to a personality type . . ." (Holland, 1966b). The greater the difference, the greater the homogeneity. This concept was also extended to the assessment of the environment. Subsequent research (Holland, 1968) has shown that these concepts possess some validity.

Next we dealt with the nature of the interactions between types and environments. In the first statement of the theory, I only implied that a realistic-type person in a realistic environment represented congruency, but if the realistic-type person were in some other environment, that interaction was incongruent. It was all or none; there were no degrees of congruency. However, in the second statement, there is an attempt to suggest that congruency is not just all or none, as indicated in Figure 1.

With respect to outcomes, which this second statement was supposed to predict and explain, I wrote about vocational behavior, academic performance, and creative behavior. Finally, I put in a table of definitions which pointed out explicitly how to define the types and the environments (See Table 1).

How much of an improvement, then, was this second statement? Although it was more systematic, I found that unfortunately I had some of the same old problems. First of all, I needed a better classification for person's occupational choices of fields of study because the

FIGURE 1. Expected Degrees of Positive or Negative Interplay Derived from the Formulations About Types and Environments

	Interactions					
Persons	Environments					
	R	I	S	C	E	A
R	++	+	−	−	−	−−
I	+	++	−	−	−−	+
S	−−	−	++	−	+	+
C	−	−	+	++	+	−−
E	−	−−	+	−	++	+
A	−	−	+	−−	−	++

TABLE 1.[a] Personality Types and Their Definitions

Definition	Personality Types					
	1 Realistic	*2 Intellectual*	*3 Social*	*4 Conventional*	*5 Enterprising*	*6 Artistic*
Vocational Preference Inventory (VPI) Scale scores	Realistic	Intellectual	Social	Conventional	Enterprising	Artistic
Strong (SVIB) Scale scores	Aviator (Group IV)	Physicist (Groups I–II)	Social Science Teacher (Group V)	Accountant (Groups VII–VIII)	Sales Manager (Group IX)	Artist, Musician, Author-Journalist
Kuder Preference Scales	Outdoor, Mechanical	Scientific	Social Service	Computational, Clerical	Persuasive	Artistic, Musical, Literary
Choice of major field	Engineering, Agriculture	Physics, Math	Education, Social Science	Accounting, Economics	Business Administration, Political Scientist	Art, Music
Choice of vocation	Surveyor, Mechanic	Chemist, Physicist	Teacher, Vocational Counselor	Accountant, Clerk	Salesman, Executive	Artist, Writer
Current occupation Work history	↓	↓	↓	↓	↓	↓
Personal survey scores	Realistic	Intellectual	Social	Conventional	Enterprising	Artistic

[a] From Holland, 1966b.

Note.—For example, persons with high scores on any of the following scales are assumed to resemble the Realistic personality type: Realistic Scale (Vocational Preference Inventory); Aviator Scale and remaining Group IV Scales (Strong Vocational Interest Blank); Outdoor and Mechanical Scales (Kuder Preference Record); Realistic Scale (Personal Survey); choices of major fields such as agriculture and engineering and of occupations such as mechanic, farmer, or engineer.

use of the VPI scales was still inadequate and too limiting. I then did a study in which I developed a psychological classification scheme for occupations and major fields, which consisted simply of calculating the means profiles for people who said they were going to enter different fields of study or different occupations (Holland, 1966a). Although this kind of study has been done many times before, mine differed in that I had a rationale for the scales in the classification. I calculated the mean VPI scale profiles for people aspiring to different fields, produced a classification, and thereafter, used that new classification, and discovered that not only did the classification arrange things pretty much as before but it also clarified a number of things. For example, it separated engineers, placing about half of them into the science area and the other half into the skilled trades.

The classification study has certain important scientific virtues. It is empirical and proceeds on a single principle—the six scales of the VPI representing the six types. I also have a way of revising the scheme. Normally with classifications, each time a new occupation appears with which you are unfamiliar, you call in your friends and say, "Where do you think we ought to put this one?" Such a practice is not only unscientific but time-consuming and ambiguous. Some unpublished analyses have been done comparing the new classification method with the traditional scheme in which things that sound like science are sorted into science, and things that sound like skilled trades go into skilled trades, and so on; findings have revealed that the new classification scheme yields more efficient predictions than the traditional one.

Next, another study was performed to learn if the second statement of the theory would produce positive results in a typical college student sample (Holland, 1968). This longitudinal study used representative college freshmen and sophomores from 31 schools, ranging from two Ivy League schools to a series of state universities and colleges, junior colleges, and teachers' colleges.

It was found that the notions of the theory worked well, in fact much better than they had before. For instance, Table 2 illustrates what happens when students are sorted by their highest VPI code, then considered with respect to some other personal variables. Table 3 shows students who had the same peak, i.e., highest VPI score, but differed on the next scale; for example, enterprising-realistic people, enterprising-intellectual, enterprising-social, enterprising-conventional, and enterprising-artistic. If one examines the table to see whether the

(Continued on page 46)

TABLE 2.[a] Relation of One-Digit VPI Codes to Student Characteristics (Women)

Student Characteristics		*One-Digit VPI Codes*						F[b]
		Real (N = *31*)	*Int* (N = *554*)	*Soc* (N = *3033*)	*Conv* (N = *271*)	*Ent* (N = *148*)	*Art* (N = *1284*)	
Competencies								
Scientific	X	3.52	*4.51*	2.83	2.28	2.47	2.87	65.84
	SD	2.49	2.42	2.14	1.81	2.14	2.21	
Technical	X	*9.45*	5.63	4.78	4.90	5.26	4.97	19.72
	SD	4.10	3.31	3.07	3.13	3.69	3.23	
Business	X	2.00	1.94	2.03	*2.48*	2.32	2.02	9.29
	SD	1.11	1.24	1.25	1.20	1.39	1.24	
Social and education	X	6.19	6.67	*8.01*	6.62	7.61	7.56	40.19
	SD	2.72	2.90	2.38	2.50	2.73	2.63	
Arts	X	8.23	9.68	10.07	7.76	10.87	*13.89*	106.34
	SD	5.37	5.34	5.50	4.58	6.11	6.41	
Leadership	X	3.55	4.24	5.07	4.16	*5.53*	4.97	12.75
	SD	2.91	2.97	3.07	3.07	3.32	3.11	
Life goals								
Developing useful product	X	1.29	*1.35*	1.19	1.20	1.23	1.24	9.05
	SD	.45	.63	.50	.57	.55	.58	
Developing scientific theory	X	1.42	*1.74*	1.19	1.16	1.21	1.23	85.15
	SD	.55	.88	.52	.49	.55	.60	
Producing artwork	X	1.48	1.56	1.45	1.41	1.66	*1.97*	65.66
	SD	.84	.87	.79	.75	.94	1.06	
Becoming expert in finance and commerce	X	1.45	1.34	1.37	*1.85*	1.72	1.33	31.58
	SD	.66	.66	.70	1.01	.91	.68	
Active in religious affairs	X	2.52	2.74	*3.03*	2.96	2.62	2.72	26.08
	SD	.95	1.03	.94	.93	.99	1.05	
Executive responsible for work of others	X	1.84	1.84	2.01	2.14	*2.32*	1.85	15.84
	SD	.77	.84	.88	.91	.90	.87	

(Continued)

Self-ratings								
Originality	X	2.13	2.31	2.24	2.12	2.45	*2.59*	54.22
	SD	.71	.71	.66	.67	.68	.74	
Mechanical ability	X	*2.39*	1.85	1.57	1.67	1.68	1.63	21.09
	SD	.90	.82	.70	.77	.78	.75	
Popularity	X	2.26	2.23	2.36	2.27	*2.40*	2.33	4.55
	SD	.67	.65	.63	.66	.69	.65	
Understanding of others	X	2.58	2.71	*2.84*	2.60	2.78	2.84	9.74
	SD	.71	.73	.67	.63	.67	.70	
Math ability	X	2.10	*2.36*	1.90	2.32	1.95	1.86	38.58
	SD	.82	.99	.85	.97	.83	.88	
Conservatism	X	2.03	2.22	2.18	*2.31*	2.20	2.10	6.68
	SD	.54	.71	.63	.63	.74	.69	
Personality and attitudinal scales								
Preconscious activity (originality)	X	17.52	19.81	18.12	14.49	17.07	*22.20*	215.60
	SD	4.76	4.61	4.49	4.30	49.4	4.50	
Dogmatism	X	16.68	16.26	17.05	*18.26*	17.68	16.60	6.56
	SD	6.50	5.52	5.53	5.30	5.09	5.48	
Academic type	X	4.29	*5.00*	4.57	4.27	4.39	4.87	10.78
	SD	1.99	2.03	1.92	1.82	1.93	1.95	
Vocational type	X	*4.71*	4.16	4.57	5.01	4.58	4.01	30.24
	SD	1.51	1.65	1.67	1.79	1.67	1.68	
Nonconformist type	X	3.23	2.82	2.74	2.61	2.94	*3.11*	11.10
	SD	1.75	1.55	1.58	1.53	1.88	1.74	
Collegiate type	X	4.42	4.56	5.22	4.87	*5.18*	4.69	19.98
	SD	1.76	1.99	1.97	1.95	1.97	2.06	
Interpersonal competency	X	10.06	10.63	*11.78*	10.51	11.51	11.62	18.93
	SD	3.39	3.30	3.20	3.35	3.45	3.26	

[a] From Holland, 1968.

[b] All F ratios are significant beyond .05 level.

Note.—Italicized means in Tables 2, 3, and 4 indicate theoretical predictions. If the prediction is correct, italicized should mean the highest χ.

TABLE 3. Relation of Two-Digit VPI Codes to Student Characteristics (Men)

Student Characteristics		*Two-Digit VPI Codes*					F [b]
		ER (N = *77*)	*EI* (N = *67*)	*ES* (N = *153*)	*EC* (N = *196*)	*EA* (N = *96*)	
Social and educational	X	5.45	5.91	*6.82*	5.80	6.31	4.14
	SD	2.82	3.27	2.80	2.64	3.04	
Artistic	X	6.05	6.30	7.93	5.81	*11.00*	15.74
	SD	5.29	4.39	6.11	5.26	6.40	
Leadership	X	4.30	5.10	*5.46*	5.17	5.80	2.73
	SD	3.12	3.27	3.25	2.95	3.22	
Life goals							
Producing artwork	X	1.27	1.33	1.32	1.29	*1.59*	3.55
	SD	.55	.76	.65	.72	.80	
Becoming expert in finance and commerce	X	2.03	2.43	2.02	*2.89*	2.26	20.75
	SD	.97	.95	1.00	.99	.99	
Self-ratings							
Originality	X	2.32	2.61	2.48	2.32	*2.72*	6.43
	SD	.81	.83	.66	.66	.77	
Mechanical ability	X	*2.43*	2.15	1.99	2.02	1.90	4.73
	SD	.86	.97	.90	.85	.85	
Popularity	X	2.47	2.63	*2.78*	2.61	2.73	3.05
	SD	.78	.75	.67	.70	.65	
Understanding of others	X	2.57	2.78	*2.90*	2.69	2.83	3.20
	SD	.76	.75	.74	.71	.72	
Math ability	X	2.13	*2.36*	1.92	2.20	1.86	5.25
	SD	.89	.93	.91	.90	.74	
Personality and attitudinal scales							
Preconscious activity (originality)	X	13.47	15.48	15.27	13.59	*18.14*	21.72
	SD	4.34	4.60	4.23	3.74	4.57	

(Continued)

Interpersonal competency	X	10.91	11.73	*12.37*	11.77	12.49	3.37
	SD	3.15	3.31	3.26	3.44	3.16	
		AR (N = *41*)	*AI* (N = *145*)	*AS* (N = *161*)	*AC* (N = *6*)	*AE* (N = *146*)	
Competencies							
Scientific	X	3.51	*4.42*	3.36	3.50	3.12	6.15
	SD	2.41	2.38	2.50	.96	2.30	
Technical	X	*12.24*	11.14	9.70	6.17	10.93	4.63
	SD	4.72	4.68	4.60	2.91	4.94	
Business	X	1.46	1.85	1.81	*2.33*	2.22	3.36
	SD	1.17	1.33	1.32	.94	1.50	
Social and educational	X	5.10	5.97	*6.77*	6.00	6.58	3.46
	SD	2.89	2.87	2.91	3.51	3.05	
Artistic	X	9.54	12.19	*13.08*	12.50	12.73	2.61
	SD	5.70	6.77	6.15	5.62	6.53	
Leadership	X	4.07	4.59	5.18	4.83	*5.72*	3.54
	SD	3.06	2.98	3.21	2.41	3.17	
Life goals							
Developing useful product	X	1.66	*1.52*	1.32	1.17	1.43	2.67
	SD	.84	.76	.65	.37	.70	
Developing scientific theory	X	1.37	*1.66*	1.33	1.50	1.38	4.91
	SD	.65	.85	.61	.76	.61	
Becoming expert in finance and commerce	X	1.66	1.46	1.45	*2.17*	2.02	11.55
	SD	.84	.74	.80	1.07	.97	
Executive responsible for work of others	X	2.00	2.00	2.03	3.00	*2.50*	8.65
	SD	.99	.89	.92	.58	.89	

second scale predicts the person's attributes on the other variables as it should, one will find that it does seem to work.

These results strongly imply that the formulations for the individual types have some validity and that their use in interpreting personality patterns or profiles also has validity. Simply put, the results imply that VPI profiles can be interpreted with some accuracy by using the typology given in a *Theory of Vocational Choice and Environmental Models* (Holland, 1966b).

Three-digit profiles were then examined using the theory as is indicated in Table 4. In this case people were used who were the same on the first two scales; for example, women who were social-intellectual-realistic, social-intellectual-conventional, social-intellectual-enterprising, and social-intellectual-artistic. The notions from the theory were found to still explain the outcomes to some extent. Most importantly, this recent evidence demonstrates that the person's personality profile, as assessed by just three VPI scales, does have empirical meaning and is generally consistent with the reformulations. To summarize: The predictions for one to three letter codes were accurate 64 to 84 percent of the time. The predictions are *better for women* than for men; and they decrease in accuracy as they move from the highest peak down. For example, the predictive efficiency for women is 84 percent using one peak at a time, all six peaks compared; the efficiency goes down as one goes from one peak to using two-digit and three-digit codes.

In that same study, we made some predictions of vocational choice using the revised, theoretical classification. Table 5 summarizes the findings for two samples for which predictions were made over an 8- or 12-month period. The first line indicates how well the person's first expressed vocational choice predicted what he told us 8 or 12

TABLE 4.[a] Relation of Three-Digit VPI Codes to Student Characteristics (Women).

Student Characteristics		*Three-Digit VPI Codes*				F
		SIR (N= *22)*	*SIC* (N= *34)*	*SIE* (N= *78)*	*SIA* (N= *175)*	
Competencies						
Technical	X	*7.45*	6.12	5.41	5.05	3.51
	SD	5.29	3.54	3.60	3.16	
Artistic	X	8.91	*7.97*	*9.62*	*10.58*	2.63
	SD	4.07	5.99	5.56	5.38	

(TABLE 4, *Continued*)

Personality and attitudinal scales						
Preconscious activity (originality)	X	16.73	16.74	18.18	*19.55*	7.23
	SD	4.79	4.13	3.94	4.02	
Vocational type	X	*4.36*	5.06	4.72	4.11	4.11
	SD	1.55	1.76	1.66	1.75	
Interpersonal competency	X	12.86	10.41	*12.32*	11.71	3.77
	SD	3.49	2.86	2.84	3.27	
		SER (N= *15)*	*SEI* (N= *43)*	*SEC* (N= *130)*	*SEA* (N= *173)*	
Competencies						
Scientific	X	1.93	*3.35*	2.09	2.48	4.95
	SD	1.57	1.96	1.68	2.09	
Technical	X	*6.93*	4.77	4.39	4.49	3.67
	SD	3.26	2.55	2.88	2.87	
Social and educational	X	7.93	8.81	8.06	*8.89*	3.53
	SD	2.72	2.47	2.52	2.17	
Artistic	X	7.60	9.88	8.54	*11.17*	7.75
	SD	3.67	4.04	5.05	5.36	
Life goals						
Developing useful product	X	1.67	*1.21*	1.09	1.17	7.36
	SD	.87	.55	.31	.46	
Developing scientific theory	X	1.47	*1.23*	1.12	1.12	3.50
	SD	.81	.56	.39	.40	
Self-ratings						
Math ability	X	1.60	*1.93*	1.92	1.69	3.15
	SD	.80	.79	.81	.70	
Personality and attitudinal scales						
Preconscious activity (originality)	X	15.40	17.09	15.62	*18.20*	10.99
	SD	3.26	4.51	3.98	3.96	
Academic type	X	5.00	*5.14*	4.27	4.38	2.70
	SD	2.07	1.80	2.02	1.86	
Interpersonal competency	X	11.13	12.53	11.85	*12.80*	3.29
	SD	2.75	2.76	3.07	3.10	
		SAR (N= *16)*	*SAI* (N= *206)*	*SAC* (N= *93)*	*SAE* (N= *443)*	
Competencies						
Scientific	X	1.81	*3.46*	2.76	2.62	9.71
	SD	1.24	2.14	2.29	1.89	
Social and educational	X	7.25	7.80	7.98	*8.58*	7.23
	SD	2.63	2.45	2.29	2.19	

[a] From Holland, 1968.

TABLE 5.[a] Summary for Spring Sample

Kinds of Prediction	*Percentage of Correct Predictions*	
	Men (N = *1,773*)	*Women* (N = *2,336*)
Expressed vocational choice—total	68.7	78.2
VPI—highest scale	45.1	59.6
Expressed vocational choice—same	82.5	86.4
Expressed vocational choice—different	64.2	71.9

[a] From Holland, 1968.

months later. Using the classifications developed earlier, about 69 percent correct predictions for men and 78 percent for women were obtained. The second line shows the predictive value of the highest VPI scale which, unfortunately, was not particularly good—45 percent for men and 60 percent for women. Next a look was taken at those people whose first two vocational choices (as indicated by their responses on a coded checklist) belonged to the *same* occupational classification; for example, both initial responses fell in intellectual or both fell in the social category. This subgroup was large, and the predictive efficiency of a person's initial choice was high—between 83 and 86 percent for men and women. It was also found that if the first two initial expressions of choice were in *different* classes, the efficiency of prediction was below the level obtained from using only the first choice without regard to the second choice. Perhaps the most significant thing about these findings was that they indicated that I could finally make some efficient predictions by using the typology; that there was, indeed, something to certain concepts in the theory. It then occurred to me that perhaps we ought to define the types in the theory only in terms of expressions of choice rather than using the VPI because self-expressions provided more efficient and consistent predictions. The VPI could be retained as a vehicle for making new classifications and for coordinating the definitions in the theory itself.

Some other analyses in this recent longitudinal study are especially persuasive. Table 6 shows how accurate the predictions are when different variables representing different constructs in the theory are combined. In this table, the top line consists of the people whose first two peaks are consistent; for example, an engineering student whose VPI profile is consistent with a skilled trades and science profile, who is high on homogeneity, and who can state what role he wants to play. For that particular subgroup, the efficiency of prediction is very high.

TABLE 6.[a] Prediction of Final Vocational Choice from Student's VPI Profile and Role Preference

VPI Profile						*Samples (Males Only)*					
Consistency		*Homogeneity*		*Preferred Role*		*Fall % Hits*	*f*	*Spring % Hits*	*f*	*Fall-Int % Hits*	*f*
C	+	Hi	+	Explicit	=	51.8	305	53.4	509	68.2	107
I	+	Hi	+	Explicit	=	52.2	115	53.0	185	54.4	49
C	+	Lo	+	Explicit	=	44.2	330	45.0	420	51.2	63
I	+	Lo	+	Explicit	=	45.0	160	37.3	233	47.5	56
C	+	Hi	+	Ambiguous	=	33.3	126	39.5	124	46.4	13
I	+	Hi	+	Ambiguous	=	26.2	42	32.1	56	30.0	10
C	+	Lo	+	Ambiguous	=	31.8	195	39.1	156	27.1	13
I	+	Lo	+	Ambiguous	=	25.6	86	28.9	90	19.4	6

[a] From Holland, 1968.

At the bottom are the people whose VPI profiles have peaks that would not seem to go logically together, i.e., conventional-artistic (they are inconsistent). In addition, they have flat profiles, indicating low homogeneity, and they are unclear about what role they want to play. The most interesting thing about this table, however, is the last column. The largest sample that could be found was controlled for the same kind of initial VPI interest; in this case, all subjects had peaks on "intellectual." The same method was applied to this sample, and similar results were obtained with predictions running from only 19.4 percent, which is almost chance, up to 68 percent. The lowest predictive efficiency is for students with flat, inconsistent VPI profiles who lacked a vocational role preference. The highest percentage is for students with a well-defined, consistent VPI profile who expressed a vocational role preference. The remaining combinations of consistency, homogeneity, and role preference are then arranged in expected order between the extremes of 19 to 68 percent.

After I completed this last study, I realized that I had overlooked some rather important analyses; therefore, Whitney and I undertook a further study to examine some additional ideas (Holland & Whitney, 1968). We felt that rather than just studying how the six types start and end, we should also study how the various types and subtypes change over time. The results of this study can be seen in Table 7.

First, using the revised classification, we coded students' initial and final vocational choices for 8- or 12-month intervals. Then we attempted to see whether they remained in the same main classes and subclasses over this period. To make the results easier to understand, a box score is given at the bottom: "SO" stands for same occupation; therefore, with no classification at all, 50 percent of the men and 60 percent of the women remain the same. "SSG" stands for same subgroup. For example, if a person initially chose an occupation coded RIS and his final choice was coded RIS, he stayed in the same subgroup. "C" stands for closely related subgroup and refers to those subgroups for which the first two VPI letters are the same but the next letter is

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Note for Table 7.—Students who were undecided (N = 545) gave unclassifiable responses (N = 152), or subgroups with numbers less than 50 (N = 454) were omitted to reduce the size of this table.

Box Score	*SO*	*SSG*	*CR*	*R*	*cr*	*r*	*Unr, unc Undecided*
Men	50	4	6	9	6	4	21%
Women	60	14	5	5	6	3	6%

TABLE 7. The Relation of a College Student's First Vocational Choice to His Vocational Choice 8 to 12 Months Later (Men)

1st	Second Vocational Choice																						
VC	RIS	RIE	REI	IRS	IRE	IRA	ISR	ISA	IER	SRI	SIE	SEI	SEA	SAI	CER	ESA	ECR	ECS	EAS	ASI	ASE	AES	
RIS	63	5	3	3	2		2				1	1	3	1				3	1				
RIE	2	179	11	2	22	3	4		1	2	1	2	1	3	2	2	2	13	1				
REI		11	29	1			1			1			3				1	3					
IRS	4	2	5	72	1	3	15	3		3	1	2	2			2				1	1		
IRE	6	49	2		213	15	6	6	4			4	1	2	5	4		10	2	1	2	3	
IRA	1	9	1	6	17	91	7	4	1	2	1	1			2	1	2	2	5	1			
ISR	6	4	1	9	5	8	103	7	3	9	9	3	2		5			4	1	2	2		
ISA	1			2	4	4	4	177	3	1	2	2	5	9	2	3	1	4	4	3	2	1	
IER	1		1	1		2	2	4	51			2		1	2	1	1	8	1				
SRI	3				1		4		1	87	1	2	3	1				5	1	1	1		
SIE		1	1	1	1			1		9	52	5	10	4				4	3	2	1		
SEI				1	4					6	13	99	10	2	1	3	3	2	4	1	2		
SEA	1		1							1	5	3	22	4		5		1	7		1		
SAI					1					1	3	1	2	37			1	1		3		2	
CER		1			2							2	2	1	73		3	18	4	1			
ESA	1	2			1				1		2	4	7	1	1	24	1	3	12		1	1	
ECR	1	1			2							1			1		13	12		2			
ECS	6	1	1		2	1	1	1		1		4	1	2	10		21	102	7			2	
EAS					5			3				5	4	1	3	7	2	6	109	2		2	
ASI	1		1		2			1		3		2		3		1			2	44	17	4	
ASE			1				1			2	6	2	4	2					1	6	35		
AES					1								2					1	1	3	1	21	

[a] From American College Testing Program Research Report No. 25, 1968.

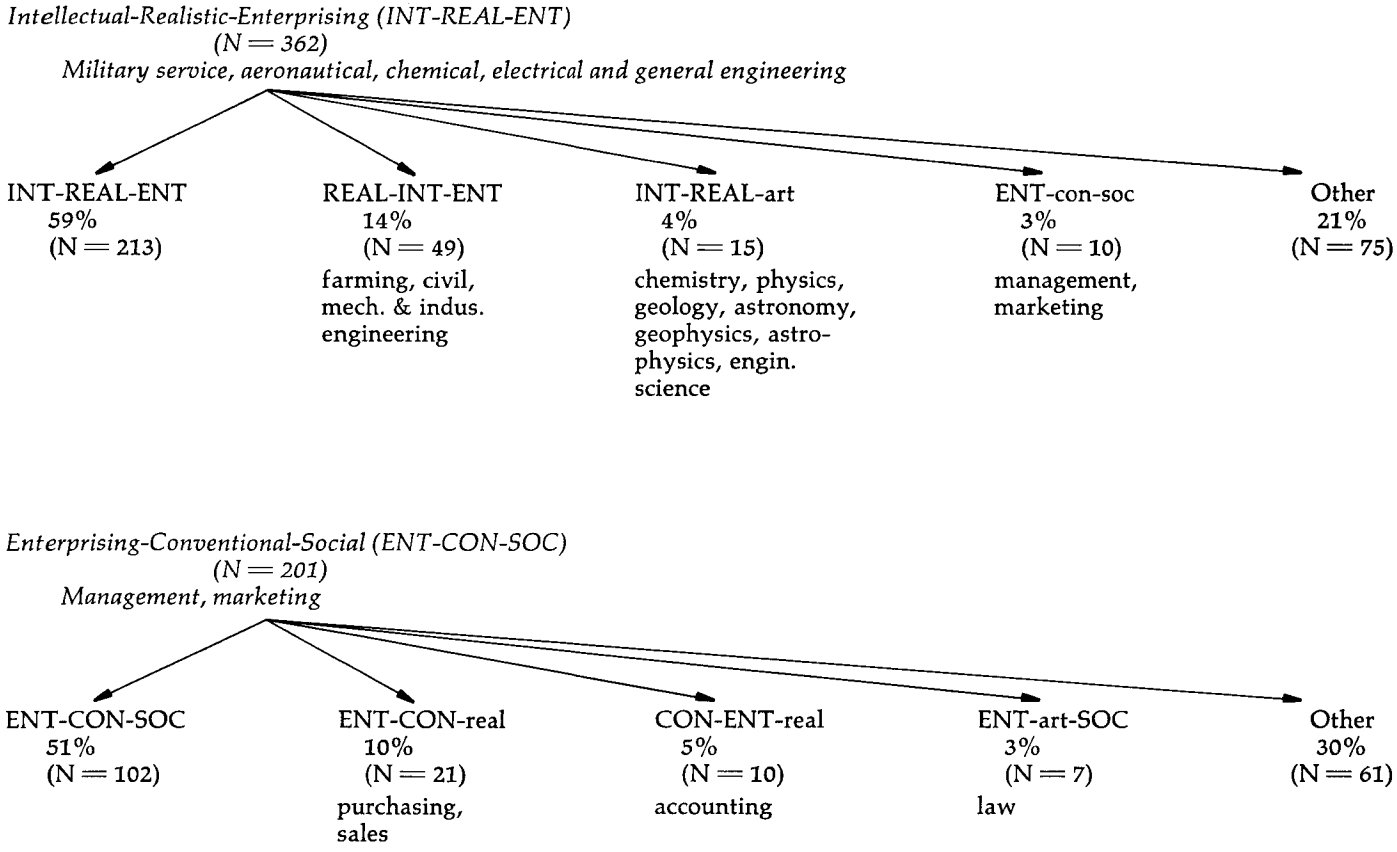
different. Then there is another type of related subgroup in which the first two letters are reversed (instead of RIS, IRS). This subgroup is analogous to Anne Roe's notion of the similarity of adjacent categories, but refers here not only to similarities between major classes but also to similarities in some subgroups within major classes. The results indicate that enormous efficiencies can be obtained when just looking at what people say. But equally important, there is a built-in theoretical explanation for why these results came about.

Because Table 7 is hard to comprehend, other more concrete tables were prepared. For example, Table 8 is from the same report and is one of a series of tables that shows in some explicit detail where people in a particular group start and where they go (Holland & Whitney, 1968). For example, the top of Figure 2 shows what changes occurred among 362 men who started in occupations classified as intellectual-realistic-enterprising. The largest percentage, 59 percent, stay in the same subgroup; a smaller percentage go into a closely related subgroup, and so on, with the percentages decreasing as the occupational subgroup becomes less similar to the original classification.

We did another analysis to see whether or not what we were doing was significant beyond chance, and discovered that our results were 21 to 30 percent better than those from chance only. We therefore concluded that the changes were lawful, that students were not always misguided people, that self-expressions of choice are powerful predictors, and that we ought to pay more attention to classifications.

Now I will report an important discovery Whitney and I made recently: that we could use a hexagon to arrange occupational classes and to define the internal relationships in the theory. We were looking at some data one day trying to build a better classification scheme for women. First we tried to arrange women's occupations in order of a Masculinity-Femininity dimension. Then we tried arranging occupations in terms of their popularity among women, that is, the most popular occupations as a first class, the next most popular group of occupations as a second class, and so on. Both of these systems made sense, but neither was entirely satisfactory. At the same time we were reanalyzing some of Anne Roe's work and learning a great deal. It occurred to me that it might be useful to diagram our theory as, for example, Anne Roe diagrams hers—in a circle. I therefore began arranging our data in a circle, too, basing it on the correlational matrix for a large sample. But when I got to the end it didn't seem to work out. Whitney then pointed out an overlooked relationship which completed a diagram that did work but which, much to our surprise,

FIGURE 2.[a] College Students' First Vocational Choices in Relation to Original Classification (Men)



[a] Adopted from American College Testing Program Research Report No. 25, 1968.

implied a hexagon rather than a circle. Accordingly, we drew a hexagon, and then proceeded to map all of the relationships suggested by the intercorrelations of the matrix.

The results of this discovery are illustrated by the diagrams in Figure 3. In looking at the hexagons for men and women, one can see that those personality types with the highest positive correlations are arranged together on the outside of the hexagon, whereas those types with the smallest correlations are farthest apart on the diagram. Then the intermediate distances have correlations of intermediate size. The diagram also led to the development of a new definition of consistency for personality patterns. Around the edge, one can see that the types that are adjacent are consistent, i.e., R, I, A, and so on, standing for realistic-intellectual, intellectual-artistic, artistic-social, social-enterprising, etc., all the way around. We found that these relationships held for both men and women. At the time we discovered the hexagon, I was in the process of rewriting the formulations for the third statement of the theory, and when I reviewed my draft, I was pleased to find agreement in that those occupational types farthest apart on the diagram according to their empirical correlation—like realistic and social—were also most opposed in terms of their theoretical formulations.

One other analysis is important to mention. I asked a colleague, James M. Richards, Jr., to determine whether or not the six types or concepts really did have independent variance; that is, did each of them really contribute something different? If they did not, we had another problem in that one of the main assumptions is that the types are relatively independent formulations. Accordingly, Richards did a

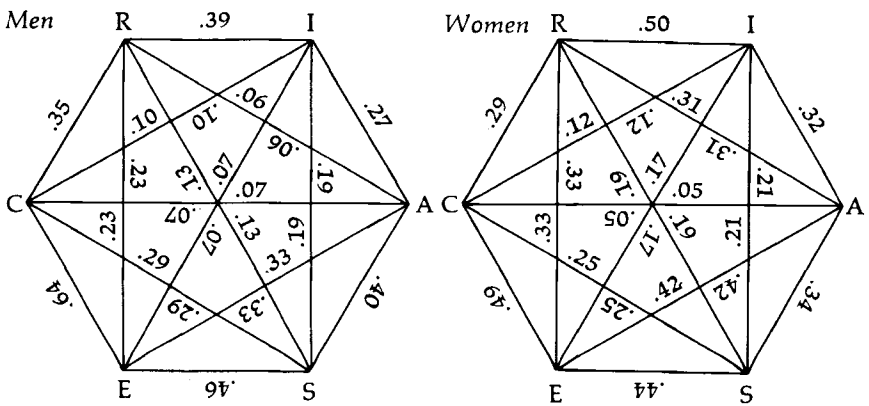


FIGURE 3. Hexagon Relationship of Occupational Classes

diagonal factor analysis and concluded that each scale did, in fact, contribute something independent (Richards, 1968). His analysis did not demonstrate that there were only six types, but it did suggest that there were at least six, perhaps more.

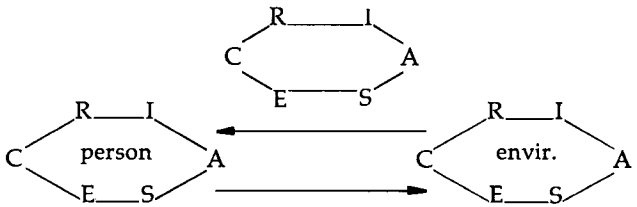
Recently I have been trying to write a more systematic and useful theory, the present form of which appears in Table 8. This third statement begins with three organizing axioms. It is stated that there are six personality types, and six environmental types and that everything about a person's behavior can be determined by his interaction with his environment. In this statement I am trying to develop a succinct set of axioms, laws, and hypotheses, and so far have met with some success in doing this for both personality types and environmental models. The statement includes the same supplemental concepts used before: homogeneity, consistency, and congruency. Next we come to the hexagon. One of the things that a theory needs is some explicit way or ways to show all the internal relationships. In this third statement, I am trying to explain all interrelationships in terms of the hexagon. The whole theory is, in fact, being rewritten to explain a wide variety of relationships. For example, the theory states that people who are similar will tend to like one another, while certain dissimilar types will have difficulty getting along. I actually tested this idea without realizing it in an obscure monograph written some time ago (Holland, 1964). The results of that test helped to explain consistency in terms of the hexagon. I also decided that it would be a good idea to look for other data to support this new interpretation of interrelationships. I went back and looked at six other matrices with sample sizes ranging from 100 to several thousand, including groups of employed adults, junior college students, and several other groups, and found that, in the case of males, the hexagon was always there as it was in the case of females, except for one correlational matrix in which the social and enterprising types were interchanged. These findings helped to strengthen and reconstruct the theory.

And, finally, the last statement deals with some additional outcomes. The theory was rewritten to deal more effectively not only with vocational and social behavior but also with educational behavior, personal effectiveness, and what I call "environmental responsiveness." In its final version, it will be a more comprehensive and systematic theory than it originally was, although it remains to be seen whether it will be more useful.

One of the first practical applications of some of the notions in this particular theory is the creation of something that I call the Guidance

TABLE 8. Third Statement

1. Organizing axioms
   a. In our culture, all persons can be assessed by their resemblance to each of the following personality types—Realistic, Intellectual, Social, Conventional, Enterprising, and Artistic.
   b. The environments in which people live and work can be assessed by their resemblance to each of the following model environments —Realistic, Intellectual, Social, Conventional, Enterprising, and Artistic.
   c. A person's behavior is determined by his interaction with his environment.
2. Personality types and patterns (structured according to axioms, laws, hypotheses)
3. Environmental models and patterns (structured according to axioms, laws, hypotheses)
4. Supplemental concepts: homogeneity, consistency
5. Interrelationships (calculus) determined largely by hexagon.



6. Outcomes
   Vocational behavior, social behavior, etc.

Profile (GP)—Two-Year College Edition. This profile is a paper-and-pencil inventory that organizes information for vocational-educational guidance. The VPI in the GP is used primarily to classify fields and to assess a student's attitudes about occupations, but not to predict his vocational choice. The GP includes a section on competencies which match the areas of interest in the VPI and a section on student potential for various kinds of talent. The scoring is generally obvious to the student, and with only a few exceptions the student can understand exactly what's going on as he takes the inventory. The GP deals with the sort of things we think are relevant to this particular theory as well as others. A report form was designed which uses the hexagon idea: The scales are arranged so that the vocational interest scales occur in hexagon order, which is RIASEC (Realistic, Intellectual, Artistic, Social, Enterprising, Conventional). Likewise, the Potential

Scales are arranged in the same hexagon order, as are the student's competency scores. Therefore, if a person is consistent, he should get a similar set of three profiles, or a family of related profiles. Normally, interest inventories include a variety of scales arranged in random order. But the GP, if it works well, should make the interpretation of profiles easier and more sensible.

Another practical application growing out of the theory is the attempt to build a comprehensive classification scheme. From the experiences we had using both Anne Roe's classification and our own, though she has since remedied hers, it was discovered that they are not exhaustive and they tell more than is necessary about some rare occupations and nothing about some common ones. I have, therefore, been trying to develop a classification scheme for all of the most common occupations in the United States. A preliminary classification for two-year college students illustrates how this more comprehensive scheme will look (See Table 9). Among other things, we think this study will allow students to look at some classifications and see how their occupational choices do or do not make sense for themselves. It should also be useful for understanding and interpreting people's expressions of choice.

One of the things research has done for me is make me much more sensitive to what people are saying about what they want to do. I was trained in the tradition in which the counselor listens to the student briefly, says a few superficial things, and administers the Strong. I have come to believe that the best thing to do is to *listen* to the student and occasionally administer some superficial instruments.

To conclude, then, I feel that this comprehensive scheme will enable us to organize information for many purposes. It's hard to say exactly what all of the practical applications will be, but some will be to study the curricula and to provide a way of putting together things which are similar, which is, after all, the underlying concept of most interest inventories. It might even be possible to use the formulations as diagnostic categories in vocational counseling. I find that I tend to do this myself, and that I ask such questions as: What are you best at? What are you threatened by and most incompetent at? How do you spend your time? How do you conceive of yourself? I go through the whole formulation this way and organize people along my scheme. Not just whether they look like a particular type, but exactly what the profile seems to be for that person. Of course, this depends on how much of my delusional system one chooses to believe and what a person's facility is for using this as opposed to some other method.

TABLE 9.[a] A Classification Scheme for the Vocational Choices of Two-Year College Men

Vocation	*VPI Code*	*N*
Realistic Class		
Architectural & Civil (Eng. Tech.)	RIE	59
Architecture & Arch. Drafting	RIE	80
Drafting	RIE	116
Electrical & Electronic (Eng. Tech.)	RIE	191
Electricity & Electronics (Tr. & Ind.)	RIE	68
Engineering	RIE	53
Forestry	RIE	67
Industrial (Eng. Tech.)	RIE	43
Mechanical (Eng. Tech.)	RIE	149
Metal & Machine (Tr. & Ind.)	RIE	86
X-Ray Technician	RIC	5
Industrial Arts	RSI	26
Agriculture	REI	120
Air Conditioning (Eng. Tech.)	REI	30
Printing	RES	38
Radio & TV	RES	46
Construction (Tr. & Ind.)	REC	20
Mechanics (Tr. & Ind.)	REC	172
Intellectual Class		
Aeronautical & Aerospace (Eng. Tech.)	IRA	54
Science (Physical)	IRA	19
Medical Technology	IRS	11
Science (Biological)	IRS	43
Veterinary Science	IRS	28
Aviation (Tr. & Ind.)	IRE	64
Chemical (Eng. Tech.)	IRE	20
Metallurgical (Eng. Tech.)	IRE	5
Pharmacy	IRE	17
Dentistry	ISR	29
Mathematics	ISR	28
Medicine	ISA	38
Artistic Class		
Art	ARI	45
Photography	ARE	18
Music	*ASR*	34
Journalism	ASE	13
Speech & Drama	ASE	16
Social Class		
Therapy	SRI	16
Police Science	SRE	45
Social Science	SIR	19
Foreign Language	SIE	8
English	SAE	16
Psychology	SAE	51
Religion	SAE	19
General Education	SER	26
Phys. Educ. & Recreation	SER	85
Sociology	SEI	17
Teaching	SEI	287
Political Science	*SEI*	16
History	SEA	47
Social Service	SEA	24
Enterprising Class		
Secretarial & Clerical	EAS	5
Law	ESI	98
Food & Hotel Technology	ESC	22
Real Estate	ESC	9
Business Adm. & Mgt.	ECS	382
Economics	ECS	10
Salesmanship & Retailing	ECS	89
Conventional Class		
Data Processing	CER	123
Accounting	CES	182

[a] Adopted from the Manual for the American College Testing Program Guidance Profile, 1968.

Note.—Letters in italics indicate that groups have identical average scores on the VPI.

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CHAPTER 4

Perspectives on Vocational Development

Anne Roe

Perhaps the best way to convey my perspective on vocations is to review briefly my work in the field, to show you—and myself—how I got where I am. As any research worker knows, one thing leads to another.

My first work in the field of vocational developments, done in 1926 when I was a graduate student at the University of Denver, came about in a rather odd way, because it had little to do with my own interests at the time. For some reason, an orthodontist in Denver was a fellow student in a seminar in educational research. He was interested in the dental school at the University and wanted to do a study of qualifications for entrance to that school. Having even less training in research than I had at that point, he asked me to work with him, at his expense. Hence my first two published papers (Roe & Brown, 1927, 1928) reported that intelligence had some relationship to rank and grades in dental school, but that none of the Downey Will-Temperament Tests seemed relevant. This finding was not very illuminating or exciting, and for almost 20 years I did little even remotely related to vocations.

I have had to turn to my publications file to check, but I am happy to report that I did not ignore occupational background completely in a long monograph on adult intelligence, published in 1936 (Roe,

Weisenburg, & McBride, 1936). Two brief paragraphs reported that among these normal adult subjects the professional and business groups did better on three verbal tests than did the labor groups, but not on the nonlanguage tests. Again, hardly world-shaking.

My next psychological publication was a long monograph on intelligence in mental disorder (Roe & Shakow, 1942). Here again, I briefly reported differences in occupational distributions between each of the many subgroups and a normal group, and that's as far as it went.

In both these studies occupations were classified by the 5-category Taussig Scale. I cite these studies here because use of such a crude classification and the little use made of occupational information was characteristic of clinical research then. I fear it is still characteristic of most clinical reports.

In my next relevant monograph (Roe, Burks, & Mittlemann, 1945)—on the adult adjustment of foster children whose own parents had been variously alcoholic, psychotic, or normal—I did a little better. I don't know why now, but this time I used the Minnesota Classification, which included eight groups, a short progressive step. Furthermore, in this study were included some further occupational items: the foster mother's and the child's satisfaction with the vocation chosen by the child. This is certainly an advance, and we could report that while satisfaction with vocation had no relationship to their own family background, the foster children were generally better satisfied with their vocational choice than with their educational attainment. Further,

> relation to type of vocation is not marked, except that all of those who seemed indifferent are engaged in semi-skilled or unskilled labor. Nor is satisfaction with work experience intimately related to the kind of worker the child is, or to the mother's satisfaction with the vocation, or, unlike education, to general satisfaction with the upbringing.

I had worked chiefly as a clinical psychologist (although my training was in experimental), but except for the study of intelligence in mental disorder and another long study of alcohol education in the public schools (and a textbook in zoological statistics!), my interests and work had been primarily with adequately functioning adults. With my next assignment, a lasting focus on occupations began.

I say assignment, for in essence that is what it was. At that time I was on the staff of the Section of Alcohol Studies of Yale University's Laboratory of Applied Physiology, and when the study of foster children was complete I was free to tackle something else. The chief suggested a study of the relationship between use of alcohol and

creativity in painting, and thought a library study of famous painters of the past would be appropriate. A library study sounded very dreary to me, and, remembering the cordial cooperation of the subjects who had taken part in the study of adult intelligence, I suggested that perhaps the best way to find out what relation, if any, there was between alcohol intake and creativity would be to ask the painters themselves. A great deal of doubt was expressed on all sides that this could be done, but it was agreed that I could have a few months, some limited funds, and a chance to try it.

The preliminaries, in fact, took several months before I could even begin to approach any artists. A first problem, of course, was selection of the subjects. Obviously, for the purpose of the study, they had to cover a wide range of use of alcohol, not an easy matter to determine from the outside. I thought also that I should have representatives from different schools or types of painting, and that I should have subjects for whom painting was fully professional and who had attained considerable recognition as painters. This was solved through two approaches: First, I read art criticism at endless length, noting artists invited to important shows, serving on juries, and so on. Then I consulted several art critics and museum curators, most of whom were horrified at the idea but one of whom was particularly helpful. He suggested that my best approach was to go first to two painters whom he named as leaders of two very different schools, with the idea that if they would cooperate and let their cooperation be known, it would help in getting a similar response from others. So it was. Ultimately I selected 23 painters, and 20 of them agreed to become subjects.

While all this was going on I was also taking intensive training in the use of the Rorschach and the Thematic Apperception Test (TAT), neither of which I had had occasion to work with before. It seemed to me that if I could actually get to talking with painters, these tests might amuse them, and that, particularly with the Rorschach, I might also find out some interesting things about the test, especially its relationship to "creativity." If I could get to such a group of men at all, it seemed worthwhile to do as thorough a clinical study of each as possible, even though it went far beyond my assignment. This pursuit resulted in a major shift in my research, as will soon be evident.

The most effective summary of the findings regarding alcohol and creativity appeared in *The New Yorker* several weeks after a report on the study had appeared in the *New York Times:*

HOMILY FOR ART STUDENTS

Study of Painters Shows Drink Does
Not Help Creative Work.—*The Times*

Turners, Dürers, or Bellinis
Do not spring from dry Martinis
Goya's genius, Rubens' powers
Did not stem from whiskey sours.
Fumy brandies, potent ciders
Make no Holbeins, make no Ryders.
Alcohol's ingurgitation
Is, in short, no substitution
For creative inspiration
Or artistic execution.
  Guzzle vino
    Till you're blotto—
Splotches will remain but splotches.
  Perugino,
    Ingres, Giotto
Were not born of double Scotches.
Nor, alas, will full sobriety
Whisk you into their society.
—*Arthur Kramer*

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Of extraordinary interest to me, however, were all the other things that turned up. The rich material in the interviews, the discussion of the painters' work and why it had taken the turns it had (particularly for those whose styles and purposes had changed during their careers), and especially the ways in which these could be related to personality data—all this material was utterly fascinating to me. I had had no expectation of such rewards, and I think now that it was the greatest luck how my first study of a group chosen by occupation happened to be painters. I doubt that there can be any other group in which the relations between experiences, personality, and work could be so clearly displayed; for an artist's work is in essence a statement about himself as perceiver of the world (Roe, 1946a, 1946b, 1946c, 1946d).

Obviously the next thing to do was to repeat the study with another occupational group, and it was decided to do so with writers, but external and personal events intervened. I was just getting well started on the selection process when my husband returned from two years at war, and we moved back to New York. For a time I tried to carry on by commuting to New Haven, but this proved unsatisfactory to everyone, so I gave it up and took on an administrative research job with the Veterans Administration. It had been a long time since I had done any typical clinical work, and I had no wish to resume it.

In the meantime, I had been able to catch members of the Society of Vertebrate Paleontology at an annual meeting and persuade them to take the Group Rorschach. This group was more homogeneous than the previous group studied and provided interesting contrasts among the members themselves and with the previously studied artist group (Roe, 1946e, 1947). My appetite was whetted further.

About this time the National Institute of Mental Health (NIMH) was just beginning its program of research grants, and I heard about it from colleagues at a meeting of the American Psychological Association (the first one, incidentally, that I had been to in many years). After some thought I drew up a proposal for three years of research; much to my surprise—and somewhat to my horror when I realized more fully what I had proposed to do—I was given the grant. The plan of the study was essentially a simple one. I would get three groups of subjects—biologists, physicists, social scientists (psychologists and anthropologists)—chosen for eminence in research (on the basis of peer estimates) and would repeat the techniques used with the artists—interviews, Rorschach, TAT, study of their work. In addition, for these groups I wanted some measures of intellectual functions, not so much for absolute level as for relative levels of different functions in the different groups.

The grant was extended to cover three years and nine months, and following that I had a Guggenheim Fellowship for a year, most of which was spent working over the data from this study. This research was enormously rewarding both professionally and personally. The artists and these scientists were, I believe, the first groups of persons functioning at a high level to be studied systematically and clinically. All the 64 scientists who took part cooperated fully, and studies of scientists done since then have added to but not changed any of the conclusions that were drawn. (There have been no other studies of so high level a group.) I was fairly well aquainted personally with biologists and social scientists but not with physicists, and while some of the findings could have been anticipated, they were totally undocumented and there were others that were quite unexpected. (Incidentally, when I was drawing up the plans for this study I went to talk to the then head of one of the foundations supposedly interested in research. He heard me out, then assured me that apart from the fact that he was not interested in supporting clinical research, I would learn nothing he couldn't tell me from his comfortable armchair without the fuss. I hope he knows how wrong he was.) The results have been reported in eight technical papers, three monographs (Roe, 1951a,

1951b, 1953a), and a book (Roe, 1953b), and I won't attempt here to do more than try to note the findings which led me to further studies. Beyond the group of 64 men studied individually, I also collected Group Rorschachs from university faculties in the same disciplines so that I would have additional background material, because there was nothing in the literature on normal personalities at this level.

The three groups differed from each other in some aspects of their personal histories, in their cognitive abilities, in their personality structures, and in their use of imagery; these differences were consonant with their professional pursuits. Obviously there were individual differences among members of the same group, and a number of exceptions in one aspect or another, but on the whole the patterns were quite consistent. Furthermore, although the faculty groups differed little from the eminent men in the same field, those in different fields differed among each other in the same ways as the elite group had. There were some patterns in subgroups I had not expected: Theoretical and experimental physicists, although more like each other than either was like any other group, differed markedly. (It seems that any physicist could have told me this in general terms, but I had not known it.)

The biologists and physicists were quite like each other in a number of ways, particularly in their general attitudes toward persons as well as toward their own families, and in these general respects were quite different from the psychologists and anthropologists.

Two sets of findings in areas I had not specifically planned to include forced themselves on my attention: early family relations and imagery. The first led me into later work, but I have done nothing further on imagery and am disappointed that so little attention has been paid to it. What turned out to be quite marked differences in use of imagery, associated with field of work, came to my attention very early in the first year's work with the biologists. In discussing the subjects' work, and how and why they went from one problem to the next, I became aware that their description of their working habits quite frequently implied mental processes very different from my own. There was, of course, the possibility that this was simply a sex difference, though I could find no report of it. The data are crude and incomplete, but they do show that in general biologists and experimental physicists rely heavily upon visual imagery in their thinking, that theoretical physicists characteristically employ verbal or other nonvisual symbolizations, and that psychologists and anthropologists char-

acteristically employ verbal—usually auditory verbal—imagery in their thinking. Most of the scientists make use of imageless thinking, but this is even more difficult to pin down than imaginal techniques. There could be significant implications for training here which have not been followed up. I can add that there seemed to be some relation with father's occupation as well as with performance on the various tests (Roe, 1951c).

The quite marked differences in early relations within the family did not appear until I was working with the last group, the social scientists. I did note, in reporting on the first group of the biologists, that ". . . there is a strong impression of a general dearth of close ties, even for those who lived in an unbroken household"; it was also noteworthy that 7 of the 20 biologists lost a parent at an early age. This strong impression resulted both from interview material and from analysis of the TAT's. In the second year I worked with the physicists, and my summary on this point is: "Very few of them speak of or give any indication of closeness to their fathers as children, but there are none among the physical scientists who did not respect their fathers even though they may have rebelled against them"—only a few did overtly although there was some concealed rebelliousness. Even though there is less information about their mothers, there exists little evidence of closeness. The patterns for the psychologists and anthropologists are quite different: Over half of these men had reacted with marked rebelliousness to a quite common pattern of overprotection and firm control which they had experienced, and a number of them were still angry or rejecting or disrespectful of one or both of their parents.

The social scientists—as children and still, as adults—have had much greater interest in personal interactions than the other groups. Both biologists and physicists tended strongly to general avoidance of intimate interpersonal contacts, and showed a considerably later than usual expression of sex interests (and perhaps a generally more placid one; there are considerably fewer divorces among them).

The next part of the story of the scientists took place some years later, it is reported here more appropriately than in its proper chronological place. I was able to reinterview all but one of the scientists still living in 1963, to study changes in their activities over the intervening years. The most striking result was the paucity of the changes; even among those who had officially retired, most were still involved in research. It was also possible to do some studies of productivity

over time and to inquire into the activities of their children (Roe, 1965a, 1965b).

Naturally I was enormously intrigued by these relations among personalities, life histories, and professions, and when the work with the scientists had been concluded I considered setting up similar studies of other, but quite different, occupational groups. Before this got under way, David Shakow and James Miller, then consulting editors for publishers John Wiley & Sons, suggested that I write a book about the psychology of occupations in general. The idea appealed to me, although the amount of work it would require seemed enormous (and was even greater than I had anticipated). But I also felt that it would give me just the direction I needed and would force me into a much more general overview of the whole field of work than I had ever contemplated. I could not possibly have undertaken this task, however, if I had not had a husband who was able and happy to support me and if Wiley had not given me a contract at the start. (Gordon Ierardi was then their editor.) An additional factor was that this project would leave me free to travel, which was always a part of the family plans. I could spend winters gathering data from libraries and summers in the West, writing—for three years, in fact, of fairly concentrated work.

I had the wits to go to Donald Super and Albert Thompson and talk it over with them. I think that I have never adequately conveyed my debt to them, and in particular to Super, who not only encouraged me but also gave me access to a complete bibliography in the field, which had been put together by Fred Strodtbeck. I would have had a much harder time without that, for I was almost totally ignorant of most of the relevant literature. I had heard of the Strong Vocational Interest Blank and the Kuder Preference Record but had never used them and had little idea of their usefulness. That's about as far as my knowledge of anything relating to occupations went, other than what I had learned myself about restricted groups of persons.

I read and read. The Columbia University Psychology and Teachers College libraries had most of what I needed; the New York Public Library had some; and some I just had to give up on. One serious lack in my understanding at that time was the field of the sociology of occupation. I was surprised at the amount of material and dismayed by its inadequacies, and particularly by its hodgepodge nature. It was all so unorganized, and perhaps my major problem at the start, when I was ready to begin to think about actually writing, was to find some organizing principle that would make psychological sense.

For all of the men I had studied as individuals, the artists and the

scientists, work was much more than a means of making a living, and it seemed to me that this must be true of many if not all professionals, but I had little idea of its meanings to others. Still, my memories of the other adults I had studied so much earlier were that even the blue collar workers among them found their work meaningful, although we had not discussed it at all in that framework. I particularly recalled, for example, one subject of low intelligence and poor background who found his job as hawker of hot dogs at ball games the most important thing in his life, largely because it brought him in touch with the local greats in the political and sporting worlds, all of whom apparently knew him by name. And there were others, for example, a rigger whose pride in technical skill was great and whose scorn of the timid earthbound, a major source of ego satisfaction for him.

I needed, then, some basis for understanding the possible meanings work had for the individual. And I also needed, just as desperately, some scheme for organizing all the different kinds of jobs into a coherent framework so they could be considered in groups and related to the people in them. Census classifications were clearly useless for this purpose. I found the answer to the first problem in using Maslow's general personality theory, which I think I first came into contact with in Centers' paper on motivational aspects of occupations (Centers, 1948).

The second problem was more difficult, for I found nothing helpful in the literature except for a few analyses of interests. It seemed appropriate for a classification of occupations to be related to classifications of interests. Another problem with census classifications is the fact that none of them is based on a single kind of categorization; they confound type or level of occupation, as, for example, professional, with location of work, such as agricultural. After considerable mulling over the problem, it seemed to me that if one could separate the major focus of the work from the level at which it was performed, there would be considerable advantage. With much paper shuffling, I finally came up with an 8 x 8 classification of occupations, with one set of categories concerned with the kind of work, based largely on interest factors, and the other set of categories concerned with the level at which the work was performed. Here again, Super was a great help, for he and a seminar group worked with this scheme and found numerous validity problems. As a result, I dropped two levels and rearranged the other categories. The categories are listed in Table 1 and the arrangement shown in Figure 1.

I do not remember at what point I realized that the primary focus

TABLE 1. Classification of Occupations

Classification by primary focus of activity: Groups

I. *Service.* These occupations are primarily concerned with serving and attending to the personal tastes, needs, and welfare of other persons. Included are occupations in guidance, social work, domestic and protective services.

II. *Business Contact.* These occupations are primarily concerned with the face-to-face sale of commodities, investments, real estate, and services. Also included are such occupations as demonstrators, auctioneers, and some kinds of agents. A distinction is made in sales occupations between those in which the job is personal persuasion, which belong here, and those in which the selling is routine, and the person-to-person relation relatively unimportant, which belong in Group III.

III. These are the *managerial and white collar jobs* in business, industry, and government, the occupations concerned primarily with the organization and efficient functioning of commercial enterprises and of government activities.

IV. *Technology.* This group includes occupations concerned with the production, maintenance, and transportation of commodities and utilities.

V. *Outdoor.* This group includes agricultural, fishery, forestry, mining, and kindred occupations: occupations primarily concerned with the cultivation, preservation, and gathering of natural resources.

VI. *Science.* These are the occupations primarily concerned with scientific theory and its application under specified circumstances, other than technology.

VII. *General Cultural.* These occupations are primarily concerned with the preservation and transmission of the general cultural heritage: education, jurisprudence, the ministry, journalism, etc. All elementary and high school teachers are included in this group. At higher levels teachers are placed in the appropriate subject matter groups, e.g., Science, Business, etc.

VIII. *Arts and Entertainment.* These occupations include those primarily concerned with the use of special skills in the creative arts and in the field of entertainment (including sports). Both creators and performers are included.

Classification by Level of Function

This classification is based upon degrees of responsibility, capacity, and skill. It should be noted that these are not exactly correlated. Whenever there are marked differences, level of responsibility is considered primary. By level of responsibility is meant not only the number and difficulty of the decision to be made but also how many different kinds of problems must be decided. This is an aspect that has not been much considered, yet in terms of the meaning and value of the occupation to the individual it is of the utmost importance.

1. *Professional and Managerial 1:* Independent Responsibility. This level includes not only the innovators and creators but also the top managerial and administrative people, as well as those professional persons who have independent responsibility in important respects. For occupations at this level there is generally no higher authority, except the social group. Several criteria are suggested:

(TABLE 1, *Continued*)

a. Important, independent, and varied responsibilities.
b. Policy-making.
c. Education: When high-level education is relevant (it is not required in the creative arts, for example, or a necessity for dictators, or even for our own high government officials) it is at the doctoral level or equivalent.

2. *Professional and Managerial 2:* The distinction between this level and the first level is primarily one of degree. Genuine autonomy may be present but with narrower or less significant responsibilities than in Level 1. Suggested criteria are:
   a. Medium-level responsibilities, for self and others, both with regard to importance and variety.
   b. Policy interpretation.
   c. Education at or above the bachelor level, but below the doctorate or its equivalent.
3. *Semi-professional and small business.* The criteria suggested here are:
   a. Low-level reponsibility for others.
   b. Application of policy, or determination for self only (as in managing a small business).
4. *Skilled.* This and the following levels are classical subdivisions. Skilled occupations require apprenticeship or other special training or experience.
5. *Semi-skilled.* These occupations require some training and experience but markedly less than the occupations in Level 4. In addition, there is much less autonomy and initiative permitted in these occupations.
6. *Unskilled.* These occupations require no special training or education and not much more ability than is needed to follow simple directions and to engage in simple repetitive actions. At this level, group differentiation depends primarily upon the occupational setting.

categorization could be arranged on the basis of the kinds of interpersonal interactions which were involved. There were no data available at that time to make any sort of check on the usefulness of the category or its relation to other aspects of the occupational life, except those few reported in *The Psychology of Occupations* (Roe, 1956). But with the classification in hand, it was possible to get some order into the presentation of such studies as the literature then afforded. Perhaps the most striking result of all this was the realization of how very many lacunae there were in the research material.

I should point out there, I think, that a major lack in that book is a real understanding of the role that family social background plays in the occupational life history, and a general lack of acquaintance with the important sociological literature on the subject.

My next attempt at generalizations was presented in the paper, "Early Determinants of Vocational Choice" (Roe, 1957) in which I suggested that different qualities of early parent-child interaction would

Levels	*I. Service*	*II. Business Contact*	*III. Organi-zation*	*IV. Technol-ogy*	*V. Outdoor*	*VI. Science*	*VII. General Cultural*	*VIII. Arts and Entertainment*
1. Professional and managerial. Independent responsibility								
2. Professional and managerial. Medium level								
3. Semi-professional and small business								
4. Skilled								
5. Semi-skilled								
6. Unskilled								

FIGURE 1. Classifications of Occupations (Primary Focus: Groups)

result in the development of different interests and, through that, of different occupational choices. This required, first, that I develop some categorization of parent-child interests and relate it to the classification of occupations. It looked lovely (see Figure 2) but turned out not to work as stated, as a number of studies by others pointed out.

I still thought, however, that early parent-child interactions must be very important in the development of interests, particularly with relation to the discrimination between major interests in people or in other aspects of the environment, and on this problem Marvin Siegelman joined me in research supported by NIMH. The full report appeared (Roe & Siegelman, 1964), but in brief it seems fair to say that this person or not-person orientation is related to later major orientation, but does not by itself account for any large amount of the variance (perhaps about 10 percent). In working out techniques for checking on this problem, we devised a Parent-Child Relations Questionnaire (Roe & Siegelman, 1963), which has since proved very useful in a number of studies, e.g., showing significant differences in early parent-child relations of those who had varying peer status,

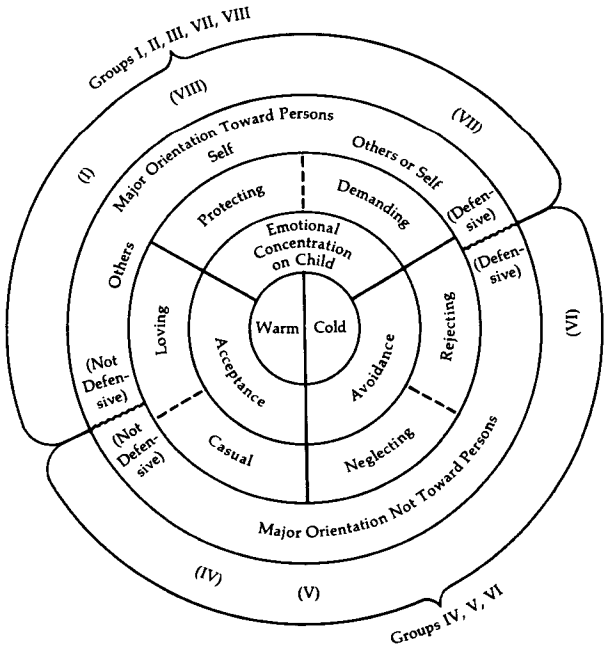


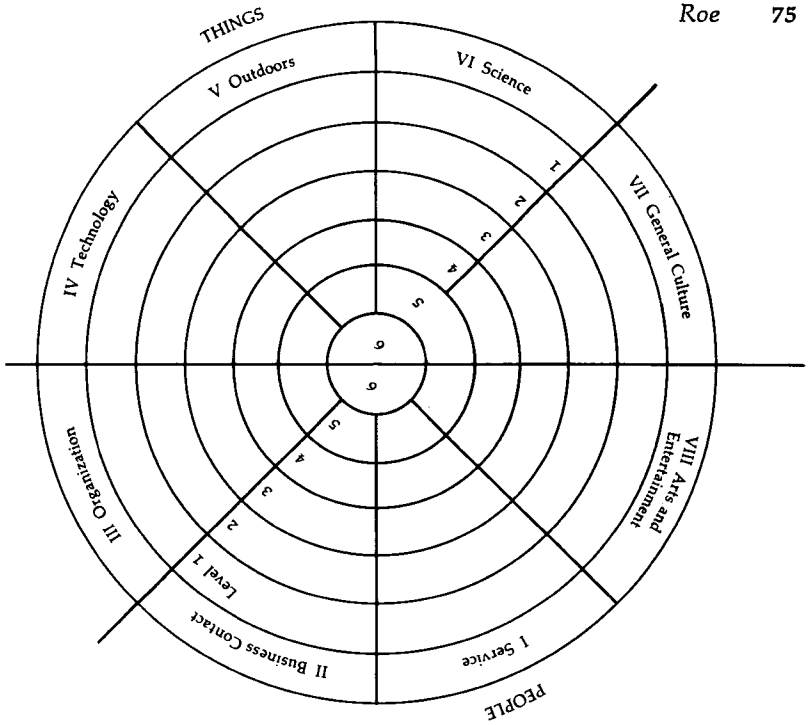
FIGURE 2. Hypothesized Relations Between Major Orientation Occupational Choice and Parent-Child Relations

between delinquents and nondelinquents, among various kinds of physical illnesses, and in a number of other comparisons. An improved version of this questionnaire is now in progress, and we are preparing a comprehensive report on the various studies. It has been translated into a number of other languages, and I hope we will have considerable cross-cultural data before much longer. Some are already in. For example, there are some fascinating comparisons between a study of French workers and foremen, and a study of leaders and nonleaders on an American campus.

Meantime more work has been done on the classification of occupations, which has also proved a useful device on other grounds. When the new *Dictionary of Occupational Titles* (DOT) classification appeared, I was much impressed by its use of three categories of people, data, and things, and rather thought that I would drop my own classification when I got to revising *The Psychology of Occupations*. However, at that time, I discovered that the Center for Interest Measurement at the University of Minnesota had over 800 occupational histories covering up to 20 years of many of the original subjects in Strong's development of the SVIB. This made it possible to make a check of one of the basic assumptions of my classification, that the categories of primary focus were so arranged that the relationship between any two categories was closer the nearer the categories were to each other in the system. It would then be expected that men changing occupations would be more likely to change within their original category, and next most likely to move into the category on either side of that, and so on. It was possible to make a good check of this, and it turned out to hold, much better, I must confess, than I had dared hope (Roe, Hubbard, Hutchinson, & Bateman, 1966; Roe & Hutchinson, 1968).

Since then, I have classified all the occupations listed in the *Occupational Outlook Handbook* for 1966, and these are available to anyone working in the field. This makes the question of validity of classification by various persons practically irrelevant, although the Lunneborgs, among others, have found validity adequate. The Lunneborgs (1968) incidentally, have found another use for the classification: Occupation of father enters effectively into prediction equations for success in law and architectural school. So I am continuing to use the classification, although I am working on a slightly modified form of presentation of it. A first attempt at this is shown in Figure 3.

I became interested in the general problem of occupational change, particularly in the adult years, and Rhoda Baruch and I did a pilot study



Note.—This arrangement makes it clear that Group VIII is related to Group I as it is to Group VII. It also suggests that there is less differentiation at the lower levels, and that transfer from one group to another should be easier there. At Level 6, there are only two major categories, one concerned with interpersonal interactions, the other with things.

FIGURE 3. A Suggested Arrangement for Occupational Classification

on it. We had hoped to get information on the various elements entering into the decision to make a change, but perhaps our most striking finding was the fact that very few of our subjects felt themselves as acting decisively and intentionally in the situations of change. For a surprising number of subjects, change was ascribed to fortuitous events (Roe & Baruch, 1964b).

The last few years at Harvard University before my retirement due to ill health were exciting and fruitful ones because of the establishment there in collaboration with David Tiedeman and others of a

Center for Research in Careers (Moment & Roe, 1966), which made possible not only my own work but the work of a number of others in the field and brought all of us in much closer touch with the general field of occupations than had been possible before.

More recently I have prepared a paper on roles of women psychologists, and looked for some relationships between childrearing practices and creativity. It turns out that perhaps a degree of parental neglect is not a bad thing for developing creative behavior, or at least that nonintrusiveness on the part of the parent is a help. Both of these papers are in press, as is a discussion of personality as it relates to the professions involved in mental health care.

A major preoccupation has been to find some way of expressing succinctly my perception of the variables that enter into vocational behavior, their relative importance, how they interact, and how these interactions may change over time. To this end I have tried to develop a formula. I have presented several versions of this to different groups (most recently at the American Personnel and Guidance Association's 1968 convention), but the one given here differs in a number of respects from the earlier ones. The formula is algebraic in appearance, and I had originally thought it possible to give at least approximate numerical values to some of the symbols, but further reflection (and a thoughtful husband) have made it evident that the state of the art does not permit this adjustment at present. The formula does already serve as a teaching and mnemonic device, however. It is essentially a shorthand description of the elements I think may be involved in vocational behavior and their possible interrelationships and interactions.

The formula contains both upper and lower case letters, with the lower case letter representing coefficients which may vary over time and circumstances and which indicate the weight to be attached to the corresponding upper case symbol. Such weights can not yet be assigned with any precision. The description, condensed in the formula, applies to one individual at a given point in time. For the same individual at a different time and under different circumstances, the weights represented by the lower case letters would be expected to differ in response to the different situation, or to changes within the individual induced by experience. It would also be possible to compare two individuals by use of the formula, separately for each.

The formula is written:

$$(eE + bB + cC) + (mM) + S(pP \times gG \times tT \times iI) + (lL + aA)$$

So far as possible, letters have been used as symbols which call to mind the area symbolized, and different kinds of factors are segregated within different parentheses. Except for S, upper case letters each indicate a complex of factors. They are listed by name here, and described more fully in the paragraphs that follow:

E. The general state of the *E*conomy
B. Family *B*ackground
C. Chance
M. *M*arital situation
S. *S*ex
P. *P*hysical
G. Intellectual (*g*)
T. *T*emperament and personality
I. *I*nterests and values
L. *L*earning, education
A. *A*cquired skills

The first parenthesis isolates factors over which the individual has no control, but which have great influence upon the choices open to him or attractive to him:

E—The overall state of the economy, war or peace, depression or inflation, may have a strongly limiting or an expanding influence. The draft may effectively make this factor outweigh all the others. But during war times or periods of general expansion, occupations may be opened to groups (such as women or Negroes) previously unadmitted to them, or may have lowered standards for other groups. The influence of a general depression is all too well known to those of us in the older generations. In addition, a particular local labor market, either in terms of specific jobs or geographical area, is also a factor well beyond the control of the individual looking for a job. The fortunes of an employer (to the extent that they are not directly affected by any given employee) should also be considered here.

B—The importance of the family of origin is becoming increasingly understood as a very major factor, and this symbol includes race, religion, and socioeconomic circumstances. The family background may also dictate amount and kind of education and modes of child-rearing, and it strongly affects the aspirations and expectations of the children.

C—Chance factors, such as meeting an old friend unexpectedly who knew of a job opening, and many other kinds of chance happenings do enter importantly and more often than we may like to think. At the same time, the individual's reaction to these events is not a matter of chance.

M—Marital status is given a parenthesis to itself. For the unmarried, of course, this term is omitted and even for the married its effect on vocational decisions may be practically nil. But the willingness or unwillingness of a spouse to make a change in location, the need for

a particular physical environment or special medical care for a spouse or child, and many other aspects of family life may be important in determining the course of events. The essential element, as in the case of illness of a family member, may be beyond the individual's control, but the marital situation in general is not; hence this category does not belong with those in the first parenthesis.

In the next parenthesis are combined, as mutual multipliers, the usual categories of characters as they are specific to one individual. Although not written into the formula, it is assumed that each of these characteristics is a product of genetic inheritance and experience, but the relative importance of inheritance and experience is not known for any of them. Nor do we know whether or not the importance of *S*ex is the same for the phenotypic expression of all of these, but I have entered it as a general modifier. This part of the formula expresses the uniqueness of an individual, and the terms are entered as multiplying each other to indicate the intimacy of their interaction.

P—This refers to physical capacities, not only the obvious details of appearance and strength but also special sensory and perceptual capacities.

G—This term covers cognitive abilities in general, such as "g" and special abilities of all sorts.

T—Temperament and personality as the terms are usually used, are subsumed under this term.

I—Interests and values are entered separately from *T*, in part because they have been dealt with separately by most investigators.

The last terms, *L* and *A*, refer to learned skills of various sorts. *L* is taken to refer to general education and experience, while *A* refers to special skills and techniques usually acquired by organized training methods.

Can we make any generalizations about some of the relationships suggested in the formula? There are a few. Most important, perhaps, is one concerning the probable sizes of the coefficients. I would suggest, as a general principle, that the farther from the mean of the appropriate reference group any individual's characteristic is, the higher will be the coefficient for that characteristic. To use the most obvious examples in each set of variables: In times of extreme social disturbance, as war or depression, the value of *e* will be larger than when the economy is just coasting along or on a moderate up- or down-swing. Similarly for *p:* Whether aberrant physical characteristics are present from birth or develop later, extreme deviations will weigh heavily in any vocational

behaviors. This is perhaps most clearly seen in the suddenly handicapped, where what has been a negligible factor now outweighs other factors in importance. This seems to me a fairly important observation in terms of general vocational choice predictions. It can be restated and expanded in these terms: for those who fall within the middle ranges of the population in all or most relevant characteristics, occupational choice will depend upon the relevant sex stereotypes and the immediate, perhaps chance, opportunities. If this is, in fact, the case, it would explain many failures in attempts to make vocational predictions, and it suggests other ways of approaching this problem.

There is probably an age-related shift in *b*, the coefficient for the situation of the family of origin. It would be expected, in general, that the size of this coefficient would decrease with age.

Although this formula was developed with just the occupational life and life history in mind, it may have further applicability. The occupational life is only one aspect of the total life and should, of course, be viewed within this framework. Situations, experiences, and activities relevant to career begin at birth and continue throughout life. It follows that any attempt at construction of theories of vocational development should be based in a general psychological, particularly developmental, theory.

Unfortunately, psychology has as yet no generally accepted theory encompassing normal development from the cradle to the grave, although a number of theories do attempt to explain some, more or less isolated, aspects of development. Developmental theories have evolved around different themes, but few of them have considered development beyond early adulthood, except as later "life stages" have been briefly designated and described. Most of the major themes used in such theories are self-limiting, in the sense that the developmental changes encompassed by them are rarely seen to persist beyond early adulthood. Super is primarily responsible for introducing the use of life stages into vocational development which has given both breadth and clarity to our understanding.

These developmental theories are also limited in the range of behaviors they seek to explain. When one considers that the sheer number of hours spent during the average lifetime of a man and of many women devoted to work is so much greater than the hours that are devoted to any other single activity (except perhaps sleep), it seems odd that so little attention has been paid to the work life. I have come to feel strongly that developmental psychology has more to learn from vocational psychology at the moment than vocational

psychology has to learn from developmental. Perhaps time will bring about an amalgam of the two.

Finally, let me try to sum up in a few statements what I have learned through all of this:

1. The life history of any man and many women, written in terms of or around the occupational history, can give the essence of the person more fully than can any other approach.
2. Situations relevant to this history begin with the birth of the individual into a particular family at a particular place and time, and continue throughout his life.
3. There may be differences in the relative weights carried by different factors, but the processes of vocational decision and behavior do not differ in essence from any others.
4. The extent to which vocational decisions and behaviors are under the voluntary control of the individual is variable, but it could be more than it sometimes seems to be. Deliberate consideration of the factors involved seems to be rare.
5. The occupational life affects all other aspects of the life pattern.
6. An appropriate and satisfying vocation can be a bulwark against neurotic ills or a refuge from them. An inappropriate or unsatisfying vocation can be sharply deleterious.
7. Since the goodness of life in any social group is compounded of and also determines that of its individual members, the efforts of any society to maintain stability and at the same time advance in desired ways can perhaps be more usefully directed toward developing satisfying vocational situations for its members than any other. But unless the vocation is adequately integrated into the total life pattern, it cannot help much.
8. There is no single specific occupational slot which is a one-and-only perfect one for any individual. Conversely, there is no single person who is the only one for a particular occupational slot. Within any occupation there is a considerable range in a number of variables specifying the requirements.

I do not think these statements are negated by the undoubted fact that working hours are becoming shorter for many people in our society. The meaningfulness of work is only part dependent upon time, particularly for vocations that are intrinsically appealing.

The marked changes in the occupational structure of our nation reflect far-reaching changes in social dynamics. They are particularly

exemplified in the increase of service occupations. This shift, along with other current phenomena, from the hippies to racial riots, seems to me to be accompanying a much higher degree of personal awareness of oneself and of others. Such awareness may be disastrous, unless it is accompanied by not only the feeling of personal control and decision-making but also by the possibility and encouragement for it. This change in awareness, I believe, may herald a new and important advance in the evolution of man and his cultures, or if it is not understood and used properly, of man's destruction.

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CHAPTER 5

Can a Machine Develop a Career? A Structure for the Epigenesis of Self-Realization in Career Development

David V. Tiedeman

The discussion of phases in my development of a career language is based on my present belief that my work in career development and that of my students and associated colleagues at Harvard is best conceived in five phases. The first phase, which started in 1947, found me at work on occupational choice. The second, which began in 1953 because of Super's paper on theory in vocational development (1953), started me wrestling to unite occupational choice and self-concept. Beginning around 1957, I found it necessary to expand my concern with occupational choice and to encompass the process of choosing anything that is found in a belief system. The resulting union of

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I am indebted to my friend and colleague, Allan B. Ellis, whose question, "Can a machine counsel?" had such penetrating effect that it put me onto the question which became the theme of this paper.

choosing and developing in a career brought me into the third phase of my thought, which involved both the realization that career and vocation are not identical, and also the belief that career is more fundamental than vocation. By 1962, my understanding of choosing enabled me to work simultaneously with it and with the process of incorporating and of taking the initiative with what is originally another's conception. This change brought me into the fourth phase of my thought, and also gave rise to my concern for the processes of exploration and commitment in career development. Finally, around 1963 I found myself with a realization that the processes of exploration and commitment are specific manifestations of general processes in cognitive development as well as in career development. This permitted me in turn to become more explicit about the development and application of those general cognitive processes in the realm of career

Gordon Dudley and I (Tiedeman & Dudley, 1967), in association with Frank Field, Wallace Fletcher, and Chris Kehas, have assembled our recent joint work in a multilithed volume entitled *Thought, Choice, and Action: Processes of Exploration and Commitment in Career Development.* This volume is organized according to the phases of development in my own thought, as I have just sketched them. It represents an effort to bring my thought up to date since 1963 when I published it with Robert O'Hara (Tiedeman & O'Hara, 1963) as *Career Development: Choice and Adjustment.* Dorsey Press has recently agreed to publish a revised version of the new volume. Hence I shall rely upon it to inform further those persons curious not only about my ideas but also how my colleagues and I justify their existence.

Thesis

My theory of vocational development relies on the term "career" rather than "vocational development." I want to treat the concept of career imaginatively here, and therefore feel that the distinctions between vocation and career are both valid and powerful. I hope their pursuit may bring the whole enterprise of studying vocational development to a new level of organization, one with career, not vocation, as the central conception.

We have been asked to comment where we think the study of vocational or career development may be in 20 years, by 1988, in fact. This task challenges our intuition. I am sure that each of us will be humble in the face of all those contingencies which ordinarily delay the emergence of the now possible and of the later emerging. However,

I address myself to the general effort by describing a computer-based Information System for Vocational Decisions (ISVD) and by considering the implications of spreading, studying, and developing the concept of that System beyond its current level and without current limits of incompleteness. I feel that the interactive possibilities inherent in the growth of ISVD are at the heart of important conceptual developments in guidance and individual career development. I elect to address the question straightforwardly: "Can a machine develop a career?"

One may first be inclined to dismiss this question lightly. However, similar to A. W. Turing (1964) and my colleague Allan Ellis, I consider this question to be an extremely penetrating one. It is intended to cut through the confused and ordinarily emotion-laden feelings that generally surround a discussion of machines and men, particularly in guidance and with such issues as career development. Furthermore, the question is intended to stimulate an examination of the conditions of machine and career together in order to understand them more fully.

I hope to make clear here that career is like motion, a time-extended working out of self. The necessity for creating this impression of motion in the mind of a person comprehending his career makes the concept of the machine an apt analogy of the dynamics among the states and properties which are both the ground from which career forms and the object toward which it tends. By imagining career as an ever-evolving procedure or machine, we provide a vehicle for comprehending the motion or flow inherent to the understanding of growth and maturation in career development. It is meaningless to negate the question, "Can a machine develop a career?" out of hand. In order to determine whether the question has meaning and power, it is first necessary to analyze what is meant both by a career and by a machine.

An Imitation Career as Instrument in Career Development

A chronology. A machine can be programmed to record the dates on which an individual enters and leaves each event in his work history. If this record were magnified so that it also showed the hours of particular days on which the person worked, the chronology would more accurately portray the position in which the individual's work pattern existed within the structure of his life. Such a record, however, would become more complicated than it is ordinarily conceived of in the field of vocational psychology. Therefore, let's conceive the chronology in its presently limited sense.

The dates that a person worked at each of the several jobs he held in his life, when related to the person's advancing age, portray an aspect of work in which we have only recently become interested—namely, the lengths of time a person stays on a particular job. Presumably, this length of time increases as the person grows older. However, technological change is said to be having considerable effect on this fact at the present time. Technological change is also said to be having effect on the number of jobs which future persons would record in their chronologies.

A work vita. If we programmed the machine to record the name of the job an individual held in each work setting as well as the company in which the job was discharged, other matters of interest to vocational psychologists appear. We think of jobs in terms of their kinds, their responsibilities, and of the companies in which they are practiced. Jobs thought of in terms of their kinds are frequently called *occupations.* Therefore, occupation is considered to be a more general term than job. By making reference to codes of the *Dictionary of Occupational Titles* (U.S. Department of Labor, 1965) in its core storage, our machines can indicate the *occupations* at which an individual has worked.

Our machine memory will also contain the occupational level codes of Holland (1966) and/or Roe (1956), and can therefore write a work vita which incorporates inferences about the level of responsibilities an individual has held and now holds. By including Super's (1957) code of enterprise, the program can incorporate in the work vita inferential data about the kinds of work organizations in which the work has been and is performed.

In addition, the memory of the machine will include Roe's (1956) group categorization of occupations. A program will be written based on these group classifications which imply the vocation a person is pursuing. This program will be based on the consistencies of the groups in which the person's occupation falls as he changes work, and will compare the levels of an individual's several jobs as well as their groups. A vocation associated with progress in advancement level will be called a career. This is, of course, only an external meaning of career. I shall later introduce internal meanings of career that are just as important.

Persistent advances in level accompanied by changes in groups and/or enterprises will be referred to a new table which will contain career names different from vocation names based on Roe groups.

Records of uniform level with variability in Roe groups will be referred to still another career table to find appropriate names. Separate types of career tables will exist for records with *vacillating levels and groups* and for those with employment in the same group at vacillating levels from which career names will be obtained. The machine will also contain a table permitting the inference of interests from the work organizations in which an individual has been employed. This table will particularly differentiate self from company types of employment and in the latter case differentiate work style based on inference about work groups. Inferences about vocation, career, and work style will then be referred to tables from which personality characteristics will be inferred.

Personality organization[1] *in the work chronology and vita.* An individual's categorization of his job and his company can also be compared to the stored *Dictionary of Occupational Titles* regarding its duties and prerogatives, the interpersonal, material, and ideational relationships, and the experiencing style it requires and permits in relation to the experiencing style effected in the nonwork environment. Suppose we consider as structure the three elements in each kind of description, namely (a) requirements and prerogatives, (b) interpersonal, material, and ideational relationships required and permitted, and (c) the experiencing style required and permitted. Furthermore, let us consider the function of aspiration in growth, or effective curiosity as we might better conceive growth. Then we can consider the change from one structure to another: as personality organization and reorganization. Although I cannot specify details at the moment, let us suppose that we can write programs that infer organization when structures are compared, pair by pair and in sequence.

When the vocational history has been programmed sufficiently for organization to appear, it becomes possible to conceive development. What develops in vocation is the organization of occupational structures in service of the aspiration function. What develops in our program of vocational development is the linguistic context within which we explain the vocational aspects of the life history.

Education and the work chronology and vita. Suppose that the machine is further programmed to record an educational chronology and vita as well as the work chronology and vita. When the work history is

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[1] I am primarily indebted to Gordon Dudley and Eileen Morley for teaching me about the terms and concepts of organization as used here.

joined with an educational chronology and an accompanied naming of the educational experiences associated with each of several discrete periods, it must be recognized that education is no longer necessarily all concentrated before work. Therefore, two relationships of interest in vocational psychology must be programmed: the *interspersing* of education and work, and the *interdependence* of education and work. At the present time this interdependence can be either *preparatory,* as it has traditionally been, or *synergetic,* as it may well more frequently become. In the synergetic condition a job might be conceived as causing a person to know that he must expand his knowledge from education, and to act upon both what knowledge he has and that prior fact while continuing in his job.

Some of the aspects of the named educational experience which must be programmed because of their interest in vocational psychology are those associated with (a) the kind of school a person is in during a period—elementary, secondary, tertiary, for instance, and (b) the subjects he studied. The kinds of schools a person attends are programmed to relate with the conception of level in occupation. The Cooley and Lohnes (1968) career tree will be helpful in the preparation of this program. However, in broader outline, the subjects a person pursues are programmed to bear both on level in one sense but on kind of occupation in a more important sense. It is the relationship of subject and occupation in the preparatory relationship of education which gives rise to entry into an occupation. It is the relationship of subject and occupation in the synergetic relationship of education which gives rise to satisfaction, success, and possibly progress in career.

Personality organization in the education and work chronologies and vitae. Suppose that we can do for education what we have suggested can be done for occupation, namely, to expand by way of some dictionary or school catalogue an individual's naming of the schools and subjects in his educational history. We could then program into our machine the requirements and prerogatives, the interpersonal, material, and ideational relationships, and the experiencing style required and permitted for each school and subject. If we then again consider organization in personality to be the change in one structure to another which a person attempts and effects as he responds vocationally to aspiration in growth, we can again imagine a machine program written so that various characteristics of the person's educational organization may be inferred from comparison of these structures in sequenced pairs. The details of this machine program will be mentioned more

specifically later. They remain as necessary tasks to be undertaken, not as completed studies, for not much is known about how epistemological understanding grows.

The existence of educational as well as occupational organization introduces another problem in career which our machine program must handle. I have previously noted the essentially preparatory and synergetic relationships that education may have with occupation in the career. I note here that this relationship may in addition vacillate from time to time in the career. Therefore, our programs that write the interrelationship of education and occupation from chronologies and vitae in the dual realms must pay particular attention to the relationship which one organization is, from time to time, given opportunity to have with its counterpart organization.

Gribbons' (1959) conception of vocational readiness planning will provide one of the frameworks for programming the intersection of educational and occupational realms in the career. Crites' (1965) and Super's conceptions of vocational maturity (Super & Overstreet, 1960), will provide a still higher order conception for programming of that intersection. Finally, Super's metadimensions of self-concept (cf. Super, Starishevsky, Matlin, & Jordaan, 1963) as expanded by O'Mahoney's (1968) theory of vocational self-concept will provide the programming guides for the intersection of vocation and career.

Personality organization in expanded chronologies and vitae. I have so far described my imitation career first in terms of a chronology, next in terms of a vita, and finally in terms of a personality organization for each of two realms of activity, educational and vocational. As I did so, I noted that the issues in machine program involved the existence of a dictionary from which structure can be inferred in each realm. Organization can then in turn be inferred by conceiving the problem of expanded linguistic meaning which arises from sequentially juxtaposing the structures of pairs in a single realm, presuming that structure is changing in service of the function of growth. Finally, I noted that the existence of two organizations added to the problem of inference the difficulty of causing the organization in one realm to be programmed in interaction with the organization in the other. In the interaction I proposed that a critical factor should be the programming of the dominating or coordinating effect of one structure on another as organization changed in the function of growth. In this regard, Super's theory of vocational development (1957) might serve as a first order approximation of the needed programming. However, in all

likelihood we will need many more studies on the order of O'Hara's (1958) which dealt developmentally with the dominating and coordinating effects of awareness in several realms of vocational self-concept over each of several years.

The programming which I have so far described can therefore first be considered as a general description. Chronologies, vitae, and organizations in additional realms can then also be programmed to the extent that dictionaries of structure and developmental theories of organization are available. The addition of each new realm must, of course, be programmed so that its effects will be written independently of other effects in pair-wise interactions with all other effects, in triad-wise interactions with all other effects, and so on up to the final single interaction equal to the total number of realms included in the momentary definition of career in personality.

Since working with Matthews (1960), I have been personally convinced that personal and family living is an effect of great importance in personality as it relates to career. I therefore ask you to conceive the programs in the imitation career to include the structures of marriage and family. It is not yet possible to write machine programs for the development in personality which includes marriage and family structures. However, Jeannette Friend and Matthews have case material from which fair approximations will be possible, at least for women's careers. Furthermore, Super's Career Pattern Study (Super, Crites, Hummel, Moser, Overstreet, & Warnath, 1957) can be counted on for information of this nature.

Dynamic personality organization in expanded chronologies and vitae. I have so far deliberately spoken of structures that are defined just in terms of *our* knowledge. I shall call this knowledge public knowledge (Landy, 1968).

The machine I envisage is to be one in which the individual may enter *his* programs so that they may also control inferences from chronologies, vitae, and organizations just as our programs control those inferences. In fact, it will be apparent that I will also speak of a machine which permits the individual to substitute his program for parts of ours as he grows in his understanding both of how to do so and of why doing so is advantageous to him.

In terms of the machine I have just described, I trust it is not too great a jump in imagination to consider a career machine which so far contains the dictionaries and inferential programs of the individual just as they contain our dictionaries and inferential programs. Let us

refer to such knowledge as private (Landy, 1968), or experiential, knowledge. Just as was done with public knowledge, private knowledge pertaining to educational, job, and personal and family living events can be fed into the machine. The same can be done for an individual's naming of a school and a subject in his educational history or for events in marriage and family formation. For instance, an individual's naming of his job and the company in which it is practiced can very well be expanded by his description of its duties and prerogatives, the interpersonal, material, and ideational relationships it requires and permits, and the experiencing style it requires and permits in relation to the experiencing style effected in a nonwork environment. These descriptions can be daily or can cover longer periods of time. Normally they are the latter. The descriptions can also include what is hoped and planned for as well as what is taking place. Finally, the description can provide for continuous revision of past impression based on new experience and thought.

By the same token, an individual's naming of a school and a subject in his educational history can be expanded by his descriptions of its requirements and prerogatives, the interpersonal, material, and ideational relationships each has required and permitted, and the experiencing style it requires and permits. Again descriptions can be recorded in minute or large periods of time. Normally, they are recorded for larger, not smaller, periods. These descriptions can also include what is hoped and planned for as well as what is taking place. Furthermore, each new recording can include revision of former recordings as new experience and impressions expand the meaning of prior events for the individuals.

Finally, as has been noted when we spoke about the public organization of personality which could be conceived in one realm, then in two, and finally in any number of realms, similar conceptions of the programs for our machine are possible in the realm of private knowledge. One realm of considerable import is that of personal and family living. Events in marriage and family formation and growth can for each such event be expanded by the individual's descriptions of its requirements and prerogatives, the interpersonal, material, and ideational relationships each has required and permitted, and the experiencing style it requires and permits. Again, descriptions can be recorded in minute or large periods of time, but for the moment we will imagine programs in which the period is larger, not smaller. Finally, these private descriptions can include what is hoped and planned for as well as what is taking place because our machine permits the direct

entry of such personal information without needed recourse to dictionaries and inferences, even though such formal machine entails could be made personal in the case of private information. Furthermore, each new recording can include a revision of former recordings as new experience and impressions expand the meaning of prior events for the individual.

Suppose, as we did with public knowledge, we define structure in terms of the three elements: (a) requirements and prerogatives; (b) interpersonal, material, and ideational relationships required and permitted; and (c) the experiencing style required and permitted. Furthermore, suppose that in the case of private knowledge, we consider the procedures of (a) review and (b) planning. Then the machine programs of career in the realm of private knowledge must deal with *both* structures and procedures as they produce personality organization for the function of aspiration in growth. However, the necessary machine programs cannot be expressed in the linguistic structures of *our* public analysis of personality organization. When we let the individual program his own descriptions of events giving rise to private structures, we allowed the association of our public linguistic framework of organization with the private procedures of review and planning. We can, of course, simulate some of this planning as Boocock (1967) has done in the case of the Life Career Game.

The machine will be programmed to use the data from the Bureau of Labor Statistics to incorporate localized and continually updated projections about opportunity in *occupations* and *education*. This program will be available in connection either with the simulation of the game or with the individual's interactive career describing when he is engaged in the procedure of planning, as well as another program which allows him to find out what educational and/or occupational opportunities are available for his *placement* in the near future.

As indicated, the machine program for dynamic personality organization will make explicit the union of the private knowledge of review and planning procedures and knowledge of psychological processes which can themselves only be private. I shall soon say more of these important processes, but I want first to enunciate a seeming difficulty I have bought in my imitation of career at the expense of introducing another's terms into our analysis.

When the individual has placed his own organization of educational, occupational, and generational events into the machine, his organization of each may be compared with our organization of them. This comparison is the central dynamic of personality development. We

program the machine so that the comparison is made. However, we must also program the machine with care at this point because we do not want unexamined acceptance of our terms. Instead, we want a condition in which the individual comes to realize a harmony in the structures of form and of his experience.[2] The structures of form are both the public and private structures in his personality organization. The structures of experience are both those unsimulated by the imitation career which is being constructed for him with the machine and those simulated by the machine, including simulation of planning and practice in valuing [3] and in relating self-concept and occupation.[4]

The judging of harmony in the structures of form and experience occurs in the processes of exploration and commitment [5] in career development. Hence, public developmental programs, vocational or career, must also be first programmed so as publicly to monitor these processes *in the interaction of machine and individual.* Remember that this interaction has now been programmed in our imitation career because the individual descriptions of events in chronologies, vitae, and organizations are programmed for comparison with our public descriptions of them. In the review procedure, the comparison program should foster bisociation (Koestler, 1967) between and among pairs of structures, public and private, in the several realms written into the machine program of the imitation career. The bisociation experience is a part of the exploratory process which the machine program will foster. In the planning procedure, new alternatives and

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[2] As far as I know John Wideman is responsible for this concept, although Myra Gannaway and Esther Wiedman have given the concept centrality in my concept of the imitation career.

[3] Martin Katz taught me the importance of the conception of valuing. He is in turn developing a machine (1968) to relate the concept to educational and vocational development. Hutchinson (1967) has a procedure that makes exploration of the consequences of values possible in the predictive realm of abilities and educational or occupational rewards.

[4] Terrence J. O'Mahoney, a doctoral student at the University of Leeds, is developing this procedure based on the principle of comparing and indicating preferences for vaguely defined occupational pictures judged in pairs (see O'Mahoney, 1968).

[5] O'Hara and I first dealt with exploration and commitment at an implicit level in 1963. In *Career Development: Choice and Adjustment* (Tiedeman & O'Hara, 1963), we implicitly used these conceptions in our analysis of the procedures associated with decision-making in career development. Field (1964) and Kehas (1964) subsequently helped me to put them implicitly into the context first of self-concept and then of purpose. However, it was Dudley (1966) who brought them explicitly to my attention in relation to the choice process. It was Segal who helped me bring them into explicit use in the definition of predicaments, problems, and psychology (1967).

their associated structures are to arise from machine programs arranged so that alternatives and structures can be under private consideration in a condition both of exploration and of tentative commitment. The difference is that in the exploration process fixation of alternative is likely to be only fleeting, while in the tentative commitment process, it is likely to be more enduring and also likely to lead to expansion in private structuring of one or more alternatives because of the condition of bisociation. The process of commitment is associated with the stabilization of fixation on alternatives for a sufficiently long period of time to permit implementation to occur in relation to plan for personality reorganization in career.

Obviously, the programs monitoring the processes delineated cannot now be written with any precision. You will find that their writing remains a task I set for myself and our field in the near future. However, this should not prevent us at the moment of conceiving their existence and in turn their revision and use on a personal basis on the part of the individual himself. The existence of our monitor creates the structure within which the development of agency in the personality has possibility of forming. Agency exists in the development of initiative by observing harmony in the structures of form and experience and by working within these limits. In the development of agency, therefore, the chance exists for the incorporation of the structure of our monitor of that harmonization into the personality itself. The substitution of a personal monitor for our monitor constitutes a recurrence phenomenon which is the ultimate form of the imitation career, namely, the developed capacity for harmonization of the public and private forms of harmonies of form and experience. It is in this instrumental sense in the imitation career that I speak of bringing into awareness the harmony of form and experience within the linguistics of career.

The harmonization of the public and private forms of harmonies of form and experience represents a phenomenon whose shape has been given by Landy (1968), who proposes that knowledge is public and private, tacit and explicit. Tacit and explicit understanding have been further explicated by Polanyi (1966). Public and private knowledge has been defined in the imitation career. If these two dimensions are conceived, as Landy conceives them, as spanning a two-dimensional Cartesian space, then awareness of the phenomenon of agency constitutes the personal movement of knowledge from the private and tacit quadrant across into the public and explicit quadrant. Tarule (1968) indicates how this philosophy can be realized in the context

of interest, aptitude, and achievement testing. Her structure must therefore be a part of the machine programs creating the imitation career in the linguistic contexts of education, occupation, and generation.

Finally, machine programs in our imitation career which produce the effect of awareness in the individual cause choosing to have explicit form. In the context of choosing, educational, vocational, and generational choices themselves can have explicit existence in the mind of the individual. The patterning of the actual linguistic structure of harmony in form and experience of the individual is his identity. Erikson's schema (1959) of ego identity therefore becomes the final framework within which agency development must be programmed in the imitation career. This is another of the requirements for the imitation career in need of a great deal more work before the imitating of career will become much of a reality.

A Machine[6]

In examining the question, "Can a machine develop a career?," we frequently erroneously conceive a machine as having the properties of a person who is himself developing the career. I have no intention of conceiving my question this way. Instead, consider a very simple machine, a so-called Turing machine.

According to Turing (1964), a digital computer consists of only three parts: (a) a store, (b) an executive unit, and (c) a control. The store part of the computer is usually associated with the common conception of *memory*. For instance, it is in the store of a computer that we could save the facts/data of our occupational descriptions and the programs which we have previously written to associate occupations with jobs. The store can thus contain *both* the facts/data which are to be processed and, in Turing's terms, "the table of instructions" for their processing. I have in the section on the imitation career called Turing's "table of instructions" a computer program.

The executive unit is the part which actually carries out the various individual operations involved in following a program contained in the store. For instance, the actual operations required to transform a new fact into a processed datum would be carried out in the executive unit under control of a program which I have specified.

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[6] I am particularly indebted to Allan Ellis for putting me on to the form of discussion of a machine which is presented in this section.

According to Turing, "It is the duty of the control to see that these instructions [or programs in the store] are obeyed correctly and in the right order. The control is so constructed that this necessarily happens" (Turing, 1964, p. 8).

I trust it is apparent that I have not used the term "compute" in defining the Turing machine. Although a computer is a Turing machine, not all Turing machines need be computers. A Turing machine merely performs explicit operations in definite sequences.

Later I shall describe a career machine, the Information System for Vocational Decisions, which will operate as a Turing machine in an actual computer. However, now I want to emphasize that computers don't *merely* compute. They do, of course, have the capacity to evaluate with great rapidity mathematical functions of great complexity. However, they are also merely Turing machines which undertake explicitly denoted functions in explicitly known ways. In this way what they do has the appearance of being logical. However, the logic is that which we have programmed into the machines, not what the machines originally had built into them.

Finally, I trust that one other fact about computing machines has also become apparent from this short description of a Turing machine. The store of a machine can contain "books of instructions," in Turing's terms—or programs, in my language—of the imitation career. Therefore the executive unit of the machine can be programmed so as to call on stored subsidiary programs at will. Furthermore, these stored subsidiary programs can in turn operate on facts which are momentarily coming into the machine in the definite form that the subsidiary program requires for their recognition and processing. A stored subsidiary program can therefore put the machine into a particular state which we may want it to have at any instant in which the data appropriate to that state are expected. Thus the modern computer is not *a* machine; instead it is a *set* of machines that can be made either at a programmer's will or at direction of his previously stored programs.

Can a Machine Develop a Career?

Return to thesis. This chapter addresses the question, "Can a machine develop a career?" I indicated in the beginning that I considered this question to be powerful, not facetious. I also indicated that I would first need to specify both an imitation career and a machine before I could address the question itself. Since I have now indicated both what an imitation career is and what a machine is, I now return to

the major question, which I would like to respond to in terms of three subsidiary questions:

1. Can a machine develop a career *for* an individual?
2. Can a machine develop a career *with* an individual?
3. Can a machine develop a career *for itself*?

I owe the third question to Allan Ellis who is collaborating with me in preparing a paper on what is to us the ultimate question in guidance, namely, "Can a machine counsel?" My treatment of the career question for the machine will not be like our joint treatment of the counseling question for the machine. I leave full treatment of that question for the future. However, I do here attempt partial consideration of it as a fourth in my series of questions.

Several meanings of "imitation" in literature on the human uses of machines. Ellis has called my attention to several meanings which authors have given to the conception of "imitation" as they address the possibility that machines can perform such psychological functions as developing careers. One of the senses in which imitation has been used is that of simulation. In simulation, the machine is programmed to engage as much as possible in human-like functions. Therefore, in using a machine for simulation purposes, one is essentially trying to duplicate human processes. Although my consideration of the question, "Can a machine develop a career *for* an individual?," may at first give the appearance of being based in the argument of imitation as simulation, this is not actually the case. My reasoning with the question will be based on a third and so far little used sense of imitation, namely, that of an instrumentality, the examination of which enlightens human reasoning.

A second sense of imitation in the literature on machine usage is that of artificial intelligence. In this sense, the machine is programmed to do things that *seem* to be intelligent. The ultimate in exhibition of intelligence is, of course, the development of programs that give the appearance of learning from past events. This is the goal that creators of artificial intelligence strive to reach. Although my consideration of the question, "Can a machine develop a career *with* an individual?," may at first appear based in belief in artificial intelligence, this will again not be the actual case. As I indicated above, I shall examine the question from the third or instrumentality sense of imitation.

As I have so far twice indicated, there is still a third sense in which

one can conceive imitation in relation to the potential power of humans with machines. In this third sense, which I owe to Ellis, the imitated is an instrument. In this usage, the instrument is actually known as an imitation and the person is therefore not deluded into confusing his own processes with those of the machine. An instrument of this sort can be a powerful aid to understanding. A person may reason *with* it. A person can learn from reasoning with it and without danger of confusing what he can do with what the instrument can do. Richards (1955) has pointed out the value of such instruments in the study of the humanities. For me, career is a human product which must be treated in human ways. Hence, as I examine the general question, "Can a machine develop a career?," I shall always be doing so while conceiving the imitation career which I specify in the second general section of this chapter as an instrument *with* which a person may reason, not as a substitute for either his actual career or his intelligence in that actual career.

Can a machine develop a career for an individual? It will be remembered that I specified my imitation career in terms of machine programs which will printout: (a) a chronology of a work history; (b) a work vita; (c) the personality organization in the work chronology and vita; (d) the union of education and the work chronology and vita; (e) the personality organization in the education and work chronologies and vitae; and (f) the personality organization in expanded chronologies and vitae.

As I proceeded to specify the imitation career in this, its instrumentality, sense, I noted places in which our existing knowledge of vocational development makes it difficult to provide programs for the enlargement of a vocation into a career. However, I also noted that the *Dictionary of Occupational Titles* and supporting work by the Bureaus of Employment Security and Labor Statistics make it possible even now to infer occupation from job titles. I also indicated that the work of Holland and Roe made it possible to infer vocation and at least advancement as an aspect of career. Furthermore, their work and that of Bordin, Nachman, and Segal (1963) and Cooley (Cooley & Lohnes, 1968) also make it possible to unite some of the childhood and educational history with the vocational history. Finally, I indicated that Super's work on vocational development makes it somewhat possible to program development in personality organization.

This accumulation of what we know about programming in imitating a career in the simulation sense is not impressive. It is for this reason

that I will later propose a set of studies designed to bring us to an enlarged condition of being able to approximate better the actual career through programming of an imitation career. However, my main point here is that there is nothing inherently impossible, from the standpoint of a machine, in developing careers *for* individuals, at least in the sense of being able to imitate a career in the instrumentality sense of "imitation." It is quite true that in our present state of knowledge, the imitation will fall far short of the actual career. However, the noncorrespondence of reality and imitation is our fault, not the machine's.

Can a machine develop a career with an individual? The final subsection of the imitation career specified the programs which would be required to imitate the *dynamic* personality organization in expanded chronologies and vitae. That subsection was developed on the assumption that a career is not just something that is written; it is something that takes place. In having a career an individual comes into interaction with the part of the machine instrumentality that can write a career *for* the individual. The imitation career in its simulation sense in turn programmed this interaction so that balance in the structures of form and of experience was continually weighed by a monitoring function. However, the imitation career in its instrumentality sense lets the person substitute his monitoring function for ours as the person proved capable of writing his *own* machine which would possess the balancing effect in structures of form and of experience.

As I again proceeded to do what I could to specify the machine programs which will in simulation do the things I claimed for them, I indicated that Gribbons' vocational readiness planning, both Crites' and Super's conception of vocational maturity, Katz' conception of the valuing process, and Erikson's conception of identity offered the best approximations now available to the form a machine would be given in order to develop a career *with* an individual. However, I again want to stress that the present large gap in the correspondence of actual and imitated careers which persons are having is no reason to dissuade us. The problem is not to abandon attempts to create a simulation machine which will develop careers *with* individuals. The problem is to make simulation machines which do prove able to do a more effective job of it. As I shall next indicate, such good simulation machines will still not destroy their instrumentality effect.

Can a machine develop a career for itself? As I started this paper,

I thought that I had pushed my argument to its limit when I had examined the preceding two questions about what a machine can do in developing careers. However, Ellis, in his usual educative way, destroyed satisfaction with my understanding by asking in turn, "Can a machine develop a career *for itself?*" He also, the teacher that he is, aided my balancing of new form and of experience by teaching me about the distinctions in meaning of "imitation" as I have outlined those meanings.

The Ellis question confused me at first, but I came to grips with it by attempting to analyze it step by step. In the first place, I found that one of the meanings of the question is, "Can a machine develop a career *by* itself?" In the subsection entitled, "Can a Machine Develop a Career *for* an Individual?," I have therefore already examined a part of Ellis' unsettling question. Yes, a machine can develop a career *by* itself. The career, of course, is not that of the machine; the career is that of the individual which the machine imitates in an instrumentality sense.

A second phase of Ellis' question is, "Can a machine develop a dynamic personality organization in expanded chronologies and vitae?" This is, of course, the question which I examined when I spoke of a machine developing a career *with* an individual. However, in doing so, I admitted that the person was in actual interaction with the machine. Furthermore, I admitted that what was originally my monitoring by simulation of the individual's balance of structures in form and experience was gradually to be replaced by the individual's valuing of that balance. It would appear, then, that I was admitting that the machine could *not* develop a dynamic personality organization in expanded chronologies and vitae. But wait: Later I will advocate research in the interactive functions when an individual is actually engaged in personally determining his career. As such research progresses, I will become able to program the machine so that it in turn writes monitoring programs more closely approximating those evolved by individuals in the past. I am hopeful enough about the patterning in that activity to expect that I can get to predict personal monitoring functions reasonably well. When I can do so, I can then program a machine which will develop a career by itself, even in the dynamic sense of career as a process. This will be an imitation career in the artificial intelligence sense of "imitation" as well because it will then become a self-correcting program.

Before despairing for humans, however, I trust it is apparent that I argued by *recursion*, that is, by *repeated* application of my argument,

as I examined the second of my questions about whether or not a machine can by itself develop a dynamic career. The trouble with the recursion argument is that it collapses in its limit. There will *always* be some stage of the recursion in which more experience must be accumulated in the present in order to make the machine be more effective in the future; the programming depends upon and is prediction, not understanding or realization. Therefore, even though the form of argument I have adopted has gotten me far down the road toward believing that a machine can *write* a career for itself in the sense of artificial intelligence, I have not fully addressed the question, "Can a machine *develop* a career *for itself?*"

In its most general form, the question, "Can a machine develop a career *for itself?*" essentially asks, "Can programs be written for the machine which will have the effect of *giving* the machine a complete—though abstract—career?" Although this question may still prove slightly threatening, I contend that its examination can prove enlightening. If we can determine to what extent we can generalize the programs in which the machine develops dynamic careers *by* itself in the artificial intelligence sense of imitation, we can determine to a greater and greater extent what a machine does when it develops a career *for* itself. Doing so would, in my opinion, advance the language and ultimately the theory of career development a considerable way. However, it would not, of course, either substitute machine careers for human careers nor deny the sense in which the imitation career is an instrument, not a master. Please remember that I have argued by recursion, not by direct logic. The esoteric career will still exist. I merely hope that my imitation career will in turn make it better understood.

Can a machine counsel? Although I do not intend to examine this question fully here (I intend to do so with Ellis in a subsequent paper), there are a few observations which are important for my argument. In the preceding subsection I admitted that the recursion argument I had adopted was a weak and potentially deceiving argument; I then went on to address the question on different grounds from those of having machine programs written according to an imitation career. By the same token, I can examine the question, "Can a machine counsel?"

If Ellis and I examine the question, "Can a machine counsel?," from the identical standpoint of this paper, we will find ourselves limited by the same logical constraints that gave rise to recursion as ultimate

recourse in the question, "Can a machine develop a career for itself?" We would first specify imitation counseling, a machine, and then ask questions about whether imitation counseling in simulation and artificial intelligence senses approximated real counseling or not. For this reason, it is well to examine the question of "Can a machine counsel" from the instrumentality, not the simulation of artificial intelligence, sense of imitation. If we do so, we will address a different set of questions. Ellis and I are convinced that such a set of questions can help us tease from counseling those things which *have* to be done by humans because they are human things, from those things which can be done by machines in counseling because they are instrumentality things.

The value of the question. I trust that the value of the question, "Can a machine develop a career?," now has some balance of its form with your experience. If so, you will probably attribute value to the question. If not, I have not yet proved convincing. To those not yet convinced, I can merely list here the value which the question has had for me.

In examining the question, "Can a machine develop a career?," I first had to specify the imitation career as an instrumentality in career development. That accomplishment represents the culmination of some 20 years of thought. In specifying the instrumentality of career development, I therefore moved the Tiedeman and O'Hara (1963) language of career development into explicit form so that it may now be investigated by anyone. I have also indicated how I fit the vocational development work of Bordin, Nacham, and Segal and of Holland, Roe, and Super into that instrumental framework. I have also indicated that, with more research which I will specify later, we can provide machines that will do a pretty fair job of developing careers *for* individuals in the simulation sense of "imitation." Furthermore, I have indicated that with use of that research we can in turn start doing a reasonably good job of providing a machine that will develop careers *with* individuals in the instrumentality sense of "imitation." While doing that, I also succeeded in explicitly defining processes of exploration and commitment in career development. Finally, I have indicated that several years or so of doing the latter can in turn give us a machine that will do a fairly effective job of developing careers for itself in the artificial intelligence sense of "imitation." However, in conclusion, I had to admit that I should turn the whole argument into a new set of questions in order to address

more squarely the problem of generating a machine which will both develop careers for itself and counsel. Such an address really gains the admission that relaxes us all, even those really helped in their career development by machine. Machines don't actually develop an individual's career. Machines can only *help* individuals *understand* their career development. To this end machines are instruments, not masters, in career development.

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PART III/The Future

In forecasting the possible directions of vocational development theory, Donald Super has outlined four major areas in which he may work. The first is "the task of developing the career model, of devising its methods, and providing its data." Super discusses a number of new statistical methods which might create a means of conceptualizing the career model in order to better predict the sequence of positions a person may occupy as he pursues his career.

A second area is "the improvement of our understandings of exploratory behavior—its stimulation, evaluation, and relevance to vocational development." These areas have not been evaluated into ways that lead to the improvement of practice. Textbooks of vocational guidance provide only "impressionistic guidelines for those who would plan exploratory experience for students"; they do not construct, in any carefully planned program, such experiences.

The third area is "the construction of practical measures of vocational maturity, and the development of knowledge of its determinants and their use in education." Super sees the need for a more conceptually satisfying, empirically adequate, and practically usable set of measures of vocational maturity in order to assess the readiness of students for various kinds of exploratory and preparatory activities. By so doing, "the effectiveness of various types of

experiences for different kinds of pupils will be open to evaluation, as will the possibility of accelerating vocational development by means of different types of intervention."

The fourth area for further work is the refinement of self-concept theory, including the definitive identification of the important dimensions of self-concepts, the refining of methods for their measurement, and the improvement and testing of what Super calls "the translation model" of vocational choice. The refinement of self-concept theory is an important development to Super because he hopes that it may prove to be the overarching theory that binds the various other segments of his career model into a cohesive whole.

John L. Holland takes a view of where we stand now in vocational guidance theory and practice, where we should be in 20 years, and what we need to do in order to get there. He claims that a good share of our research is meaningless, and he feels that the test of relevancy needs to be applied to future research: How differently would we behave in our work after reading a piece of research than we behaved before? One of the possible ways of providing for more important research is to build a better connection between the researcher and the practitioner. A second direction for research would be to develop a better link between adolescent and adult behavior.

With regard to practice, Holland sees a number of areas in which there is a need for great improvement. For example, we need to reach more people per dollar spent. He sees a possible utility for programmed materials in planning, whereby an individual could work on his own and use the counselor for support when necessary. Related to this statement, Holland asserts that as a profession, we need to work for vocational adjustment for a larger population than we now reach.

Anne Roe, in discussing the future of vocational development theory, discusses the directions which she hopes the field will take. She sees the need for more organized research, longitudinal in nature, in order to actually trace an individual's life style. And, in this approach, the attempt would be made not to isolate occupational life history from the rest of a person's life. In viewing the range of occupational research, Roe notes a lack of research at the lower socioeconomic levels and into the problem of women and their careers. In order to understand better the occupational choices people make, Roe sees the need for more interaction among psychologists, sociologists, and economists, each specialty offers its own unique contribution which ought to be related to the other.

On the pragmatic level, Roe mentions that as the knowledge gained from research keeps accumulating, a better set of requirements for each job ought to be established. Hand in hand with this honest appraisal of requirements ought to come a better and more specific type of training which can meet these requirements, as well as a close examination of the market place to see why some people rather than others are selected for the positions for which they apply.

In his projection for the future, David Tiedeman examines the differential elements and functions of the Information System for Vocational Decisions (ISVD). He indicates how this "machine" helps the individual merge realizations of himself with new forms of knowledge that the ISVD can help provide. In this way the computer advances education from the point of simply being a teaching machine program that aids students in making career decisions. Tiedeman then discusses the different types of information to be stored in the machine so that a person would find it meaningful. For the future, Tiedeman sees computerized guidance support systems as both expanding and improving. For this to happen, however, educators must support this new approach and help individuals use it.
If the support is sufficient, Tiedeman envisions that ISVD will "foster self-development through practice and the mastery of decision-making applied in the realms of education, vocation, and personal and family living."

CHAPTER 6

Vocational Development Theory in 20 Years: How Will It Come About?

Donald E. Super

The role of forecaster is not a familiar one to me, nor one in which I am comfortable. Working on the task at hand or planning what to do next is much more congenial, although in back of the latter task is an implicit forecast as to what is most important and worthwhile to do. Attempting to predict what theory and practice will be like 20 years hence, and what needs to be done in order to bring about such a state of affairs, seems especially brash when one knows that retirement and tapering off will come before that time, and that others will bear all of the responsibility for putting on the finishing touches then! However, as I have some decisions to make and some work to do during the next 10 or 15 years, I shall attempt to describe what I consider to be the important aspects of vocational development theory on which I may work, or toward which I hope to direct others during the foreseeable future.

Four agenda areas stand out in my perception of the field, three of them still being those I identified in an earlier symposium (Super, 1961). (This consistency, let me note, is genuine: I looked them up only after outlining this paper!) One area involves the task of devel-

oping the career model, of devising its methods and providing its data. A second is the improvement of our understanding of exploratory behavior, its stimulation, evaluation, and relevance to vocational development. A third is the construction of practical measures of vocational maturity, and the development of knowledge of its determinants and their use in education. The fourth, but not the least important in this highly selective list, is the refinement of self-concept theory, including the definitive identification of the important dimensions and metadimensions of self-concepts, the refining of methods for their measurement, and the improvement and testing of the translation model of occupational choice. I shall elaborate upon each of these tasks.

The Career Model

In the career model we are interested in the prediction of the sequence of positions which a person will occupy as he pursues his career. The pathway which he follows begins with his family's socioeconomic status, goes through the grades of school and perhaps of college or technical or business institute, perhaps into some kind of training or entry job, on into a series of regular adult positions which may or may not be in the same occupation, and in due course, on into retirement. Many of the determinants of his progress through the life stages have been identified in differential psychological studies of occupations and in sociological studies of occupations and of careers. But, as I pointed out in my 1961 paper, statistical methods appropriate to handling data for the career model are lacking.

Lattice theory, I once hoped, would provide the methods needed for organizing and treating career data. This was because one can conceive of the world of work as a lattice—a series of adjacent occupational ladders. Two-dimensional classifications of occupations such as Anne Roe's book (1956) can be treated as lattices, in which the lines are pathways, rather than as beehives in which the open spaces are cells. So conceived, one can describe career development as progress along the horizontal and vertical lines of the two-dimensional table, and one can add the third dimension, enterprise or industry, as I did in my text (Super, 1957), and thus, take employer and industry changes into account as well as field and level changes. What can thus be described verbally and graphically can also be described numerically, given the mathematical and statistical knowledge. It seemed to me that lattice theory might provide the method, for it is a scaling method

designed to do something of that sort. It developed, however, that this theory is itself embryonic, that few statisticians really know much about it, and that those who were somewhat familiar with such methods considered it less likely than another to prove appropriate.

Markov chains theory was suggested by statistical consultants as more likely to be applicable to career prediction. I did nothing with it, but the suggestion was picked up by Paul Lohnes (1965) and applied to the data of the career development study (Gribbons & Lohnes, 1968). The fact that the subjects of that study had, at the last follow-up, progressed only as far as the second year of college or its equivalent led to the application of the method to plans rather than to positions, and the embryonic state of the art made it desirable to use only earlier plans as the predictor of later plans. Lohnes demonstrated that the method is applicable, and that plans do indeed constitute a chain in which one can predict from grade 8 to grade 10 to grade 12. Using career pattern study (CPS) data, Robert Steer has recently completed a similar analysis of another group of subjects over a longer period, with the not unexpected finding that plans at age 25 are not linked with plans made in high school in the way that junior and senior high school plans are linked.

I go into this much detail on work done in order to make clear how much still needs to be done. No one has yet applied Markov chain methodology to a series of career positions rather than to plans. Much more important, it is not clear (at least to me) that the method can be adapted to predicting a later sequence of positions from a combination of varied psychological and sociological data. If, as so far used, all Markov chains can do is to set up a series of expectancy tables based on one variable, whether that variable is plan or position, less complex methods have long been available for that task.

There remains, clearly, a sizable job to be done in adapting Markov chain methods to career data, and in ascertaining how well they help to organize the complex of variables that we know are relevant. Lohnes has shown the inclination and the ability to launch and pursue work of this kind, and we may look forward to progress as he and others stimulated by him pursued these questions further.

Path analysis is a third and still newer method which may prove useful in developing the career model. Recently introduced into sociological research (Duncan, 1966) and applied to CPS data only this year by Charles Werts (1968), it has been used only to predict occupational plans, not to predict careers in the technical sense of sequence of positions occupied. As described by Werts, the method

does nothing more than what is done by a multiple regression equation, although the graphic representation of the procedure looks alluringly like career prediction using initial college position, later college position, and "career choice" (nothing more than occupational plans) as the sequence studied. Until it is shown that the method can contribute more than multiple regression equations which also treat sequential events as though they were simultaneous, by indeed treating sequences as such, it is disappointing. But my disappointment may be due to my ignorance, for I have not yet read the biometric or other more highly developed literature on the method. Further work with the method is called for in order to test its applicability and its potential.

The career tree currently under development by William Cooley (Flanagan & Cooley, 1966), appears to me to be the most promising of the career prediction methods now being worked on, although statistical methods appropriate to the schema must be devised before its potential is clear. The career tree is a graphic organization of the career plans and of the status or position data of the Project TALENT subjects. Presently, in its simple form, it looks like an espalier tree growing symmetrically, like a family tree that shows all of the descendants of one ancestor. It begins with pupils in junior high school, all in one category—the trunk of the tree. The branches show those who made the various curricular choices, including eventual college and noncollege choices, occupationally related majors, etc. Although the tree design is kept simple by not showing crossover-routes or branches as boys and girls change both their majors and objectives, the fact of crossing over is shown by the numbers on each branch. For example, when one branch or group of 100 divides into two branches and these later branches have a total of only 75 subjects, it is clear that the other 25 crossed to some other branch elsewhere on the tree by a path which is not shown; it can be inferred that some other groups with numbers which add up to more than those shown at their own point of origin have absorbed them.

This tree arrangement of the data is supplemented by other diagrams which describe the people who move along the various branches. For example, the major occupational plans groups are shown on a diagram, the two axes of which are the two aptitude centroids that best explain the battery of tests used in Project TALENT—verbal and spatial-mechanical aptitudes. Each group—for example, the physical science students—is shown in this factor space, and those who changed plans—for example, to business organizations—are shown by arrows starting with the group from which they moved to and

ending at a point that shows where they stand on the two aptitudes. In this case, for example, the ex-physical science new-business-organization group is lower on both verbal and spatial factors than is the group that retained that major.

The career tree could thus be used to trace movement, and the role of various determinants could be shown by color-coded twigs budding from the branches and leading off in different directions. If this were done, it would be a crude and confusing graphic representation. Statistical methods still need to be adapted or devised which make it possible to predict the branches along which people will move or, rather, to make probability statements concerning the likelihood of a person making each possible series of moves. The data are available and the nature of the task is clear: Someone will find or devise the method.

Whether the method comes from lattice theory, from chain theory, from path theory, or from something else, is not yet clear. In 5 years we will no doubt have a better basis for judging; in 10 years the data and the method will be available for use, and perhaps 10 years later, in 1968, its application will be commonplace!

Exploratory Behavior

In an essay, published in 1963, my colleague Jean-Pierre Jordaan (Super, Starishevsky, Matlin, & Jordaan, 1963) examined the concept of vocational exploration. He drew on research in experimental psychology and on the pragmatic, atheoretical, and unscientific literature of vocational guidance that deals with the topic. This excursion was prompted by our finding, in the career pattern study, that adolescents are typically ready to explore their vocational potential, but far from ready to make vocational decisions, even the pre-vocational decisions of the high school curriculum.

Jordaan's essay, like the behavior it considered, was exploratory. At least two doctoral dissertations are under way as a result, but much still remains to be done if the conceptual advances represented by this work are to be developed into guidelines for practice and into instruments for assessment and evaluation.

Exploratory behavior can be, among other things, intentional or fortuitous, systematic or random, self-initiated or other-initiated. What are the causes and what are the outcomes of these different types of vocational exploratory behavior? If some kinds are superior to others in outcome, how do they originate, how can they be stimulated,

and how can school and college curricula exploit them for educational and for orientational purposes? The ideas are not novel, but they have not been made sufficiently precise; they have not been converted into methods of making observations; they have not been evaluated in ways that lead to the improvement of practice. As Jordaan pointed out, textbooks on vocational guidance now provide nothing but impressionistic guidelines for those who would plan exploratory experience for students.

Vocational Maturity

There are now in existence four types of measures of vocational maturity, the first three being represented by one exemplar each, the last by several. These are the semi-structured interview, the structured interview or oral questionnaire, the inventory, and combinations of more or less objective measures. None have as yet progressed even from the experimental to the developmental stage, and certainly none are yet ready for use in practice.

The semi-structured interview, used by the career pattern study (Super, Crites, Hummel, Moser, Overstreet, & Warnath, 1957; Super & Overstreet, 1960), along with combinations of objective measures, proved promising as a method of obtaining relevant and valid data on vocational maturity, as pointed out in my first paper. But it is a clumsy method, which even researchers have properly been reluctant to use: It is time-consuming for collecting data, and scoring requires a great deal of time from highly qualified personnel. Its use was justified in a first study of the subject when guidelines were lacking, but that foundation has been laid and better methods can now be devised.

The structured interview or oral questionnaire was developed by Gribbons and Lohnes (1968) on the basis of CPS work as a more economical method of getting at some of the same data. At the same time, they made certain substantive changes, and their measures cannot easily be compared with the CPS indices. Intended as an interview guide, it was used as a self-administering questionnaire in a few personally inaccessible cases. It showed some evidence of validity in the form of increasing scores with increasing age and experience, but the failure of 10th grade scores to predict as well as 8th grade scores raises serious and still unsettled questions.

Further analyses will no doubt help clarify these points, and the practicality of the method makes it attractive for further research. However, the fact that the Readiness for Vocational Planning Scales

based on it and on the questionnaire itself were devised before the career pattern study work had progressed very far means that they also should be viewed as part of an exploratory effort, as experimental. It seems quite likely that, in the light of more recent work on both projects, better questionnaires and better scoring scales can be developed.

The inventory method is that used by John Crites (1965) in his attempts to refine and study the concept of vocational maturity. His logical analysis of vocational maturity carried that of the career pattern study a little further, and like that of Gribbons and Lohnes, built on the CPS analysis of ninth grade data. But it did not, naturally, take advantage of the latter results of the other two projects, and it relied heavily on age norms for its scoring. In the Attitude Inventory this led to unexpected results, for vocational maturity appears empirically to consist of learning to say "no." But an increasingly consistent negative attitude hardly satisfies a logical or psychological definition of maturity, vocational or otherwise. The simple logic of chronology on which Crites counted heavily for early practical results appears, therefore, to have led into a blind alley. An inventory may eventually be developed, but the logic on which it is based needs to be carefully reworked, taking full advantage of the recent results of other studies.

The combined objective methods consist of a miscellaneous array of tests, inventories, and personal data questionnaires. Among these are the so-called wisdom measures used in the career pattern study, in which vocational preferences are compared with intelligence test or interest inventory scores, or with parental socioeconomic level, to ascertain the appropriateness or realism of the preference. Consistency measures were also used, in which the several preferences expressed by the subject are classified by field and level to ascertain the degree to which they are focused or scattered. The interest maturity scale of the Strong Vocational Interest Blank was also used as a possible measure of vocational maturity. Various other studies have used measures of the same type, but more often as an unvalidated criterion than as a trait needing to be studied. In the CPS research these measures generally proved invalid in 9th graders, while some of them showed some slight promise in 12th graders. By and large, they seem less valid than the measures which were derived from interviews and questionnaires to assess variables such as occupational information, planning, implementing behavior, and accepting responsibility for choice and planning.

New approaches to the measurement of vocational maturity are

being considered by a project directed by Bert Westbrook at North Carolina State University. He and his colleagues have reviewed all available work on vocational maturity and seek systematically to build on it in devising a practical and valid measure or set of measures. It is premature to evaluate their work, but their timing and their systematic approach augur well for it. In due course we will undoubtedly see, whether from this project or from others, a conceptually satisfying, empirically adequate, and practically usable set of measures of vocational maturity.

Their use has already been suggested in a number of places. With such measures, it will be possible to judge the readiness of boys and girls for various kinds of exploratory and preparatory activities. Their readiness to make vocational decisions of a tentative trial or more definitive type will be assessable. Furthermore, the effectiveness of various types of experiences for different kinds of pupils will be open to evaluation, as will the possibility of accelerating vocational development by means of different types of intervention.

This last question is one which is raised each time the concept of vocational maturity is discussed with psychologists, counselors, and teachers. Is vocational maturity essentially a biologically based trait? Is it much influenced by societal arrangements such as school organization and the age of first employment? Is it at all influenced by specific experiences such as those provided by schools, clubs, and parents interested in the development of their children? The construction of practical and valid measures of vocational maturity will make it possible to answer, at least enough for educational planning, questions such as these. And it will guide the implementation of such plans for appropriate pupils.

Self-Concept Theory

I have already suggested that self-concept theory may provide only a segmental theory of vocational development, or that it may prove to be the overarching theory which will bind various other segments into a cohesive whole. I cannot claim to have given these possibilities enough consideration to attempt an evaluation of them. I really do not care to, for in due course we will know anyhow. But I have given thought to next steps in making advances in this area.

The dimensions and metadimensions of concepts of self and of others need better empirical and theoretical definition. If the *dimensions* of persons are their traits, their attributes, this means the

establishment of a more definitive list of traits than any now in existence, and the devising of more valid and more reliable methods of assessing them. Since a person's concepts of himself and of others are best known to him, self-report methods seem to be essential, although some theorists maintain that self-concepts are best inferred from other data. This question itself needs to be resolved; for the present, my own position is that inferences by others are assessments or diagnoses and useful if well made, but they are not self-concepts. If this is so, then both inferred and self-reported concepts of self may be valid, but in different ways and for different purposes. To find out just what these differences are will be important.

Because self-reports are susceptible to distortion by social desirability and other extraneous variables, measurement methods must be refined. My own programmatic work suggests that for vocational research purposes, occupationally relevant adjective-rating scales, developed on appropriate subjects, are at least as valid and clearly much more economical than complex custom-built lists such as those provided by Kelly's Role Repertory Construct Tests (1955). But what adjectives are occupationally relevant, for what kinds of subjects and which of them have differentiating power? Most of the lists we now have were devised for evaluating psychotherapy or for studying personality structure. They appear to be less valid than lists developed for vocational purposes. Instruments, therefore, need to be developed along with methods of safeguarding them against distortion.

The *metadimensions* of self-concepts, that is, the characteristics of the attributes used in self-description, also need further study. I have attempted to construct an inclusive list, and some of the metadimensions on it have been independently studied by students of George Kelly, by my students, and by others in less programmatic endeavors. The questions of just which of these actually are metadimensions, how they should be measured, and their significance for vocational development need considerable further study. My empirico-logical list includes not only self-esteem, realism, and cognitive complexity or scope which had been studied but also clarity, abstraction, refinement, certainty, structure, and others which had not been studied. These have all been measured now in several ways, and the path is clear for the study of their importance in vocational development. The effects of self-esteem on occupational choice, the stability of the vocational preferences of people with poorly and with highly structured self-concepts, and other such issues can be investigated. Some beginnings have been made along these lines; in a few years substantial work in this area will,

I believe, do much to make personality data useful in vocational counseling.

The translation model of vocational choice, studied by Bingham (1966), Brophy (1959), Oppenheimer (1966), Healy (1967), and others, needs to be investigated with the better designs which we now know how to lay out, the better instruments for which we now have some of the specifications, and the better-selected occupational samples which we know we must draw. We now know how valuable it will be for us to complete these tasks.

Some people do, indeed, appear to choose occupations this way, that is, by seeing similarities between themselves and others. But we need better evidence. And, as I have pointed out elsewhere (Super et al., 1963), there are at least two other models of choice: the *identification* model, emulating a person, and the *role-cast* model, being placed in a training program or occupation by outside events. We know little about the determinants of the applicability of these models of choice. When we do know more about what kind of person chooses one way, and what kind another, vocational development theory will be far more adequate than it is now.

The capacity of self-concept theory to provide the cement needed for an overarching theory of vocational development will, by 1988, also be tested. I suspect that its ability to do this will be partly a function of how free a society we develop. Surely the importance of the individual as a decision-maker depends on his freedom to make decisions. Self-actualization depends upon social mobility, upon the fluidity of the social class system, upon the accessibility of educational and occupational resources to the individual. If such freedom exists, the effective use of opportunities for exploration may be expected to bring about clear, realistic, and harmonious self-concepts, and these should be translated into appropriate occupational preferences and implemented as choices. If the individual does the synthesizing and the choosing, he does indeed provide the overarching theory.

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CHAPTER 7

The Future of Vocational Development Theory and Its Practical Implications

John L. Holland

In this chapter, I am going to focus on three questions in the field of vocational guidance: Where are we now? Where should we be in 20 years? What is needed to get there?

Where are we now? What is our current situation? Unfortunately, we are presently faced with a number of difficult problems. We do not have enough professional counselors, and we lack efficient ways to get counselors and clients together. In general, our theories are of poor quality. They usually provide only weak predictions, and they rarely provide satisfying explanations. Most of our theories have a narrow scope; they tell us some things we want to know, but there are lots of things we wish they would tell us that they don't. They usually lack explicit definitions and calculi. And, most of all, they are frequently embarrassed by the empirical evidence.

In addition to these theoretical problems, we counselors have some destructive attitudes. We have an aversion to group methods. We love inefficiency and have come to accept it, and we pass it on to graduate students. We have a great love for professionalism. We are much concerned about getting organized, certified, and professionalized, but we are insufficiently concerned about why we have arrived at that level.

We have a great interest in what I call indiscriminate research. Anything is an interesting problem, so we spend as much effort on peripheral, technical problems, as we do on important human problems.

We have a lot of what I call misguided humanism. This problem was dramatically brought home to me only a couple of years ago when the American College Testing Program introduced something called the Student Profile Section in the ACT test battery. It was just a simple biographical blank asking relatively ordinary questions. (It's obvious why I'm not in ACT's sales division.) At any rate, a counselor wrote and said that he thought this section was unethical. An example of the terrible things asked in that section was: "Have you ever been president of your class?" Yes or no? The most personal question was something about family income, but to that an alternative was presented that said, "I consider this confidential and privileged." We revere diagnostic devices. I must confess I've been one of the most guilty. We are too concerned with showing that our diagnostic devices, no matter what kinds of instruments they are, are wonderful. When they fail, we find it very hard to believe.

Keeping these problems in mind, let us turn to the second question: Where should we be in 20 years? First, we must see to it that help in vocational development and subsequent vocational adjustment and attainment is available to a much larger proportion of our population. Second, more people should be prepared for groups of occupations rather than just one, and for a recreational life. Third, we need to make a more active effort to integrate the "have nots" of our society into vocational life. I refer here not just to the low income population, but to our psychiatric population whom we still neglect, to the blind, and to other handicapped groups. Fourth, we need theories of vocational behavior which are more comprehensive, more predictive, and have more explanatory power. Or, more ideally, our theories of vocational development should be assimilated by theories of personality development, achievement, and happiness. Fifth, student personnel people should be concerned primarily with the development of the fully functioning personality, the effective person, the constructive person, the original person. Finally, constructive personal experiences should replace interviewing and other one-to-one methods of influencing others.

What, then, must we do to accomplish these things in 20 years? First, let me present a couple of general notions. We need to develop a clearer picture of which vocational problems are most important and really worth solving. In addition, we need to foster a more constructive

interaction between practitioners and researchers. People who do research have become somewhat alienated from the practice of counseling, and this alienation is unfortunate. Researchers need the constructive criticism and the suggestions of practitioners.

In the field of research, there is much that needs to be accomplished in the next 20 years. First of all, we need to look into how we might go about developing some useful theories. I think we must foster more openness to methods, techniques, ideas, and philosophies of science. We need to pay less attention to the little scientific niceties we have come to demand, and more to understanding and developing creative, useful ideas. We need less of the little careful experiment, repeated many times very carefully, followed by a book. Look at a contrast. Who is probably one of our greatest geniuses? Freud. Freud couldn't publish in any journal today that I know of, because he would not comply with all the niceties we now demand. I am not saying that the careful study is the wrong way to go about acquiring new knowledge. What I want to say is that there are many ways of understanding problems. The little careful experiment is one way. We need to keep the ways of doing things open, and not pass along to students the notion that the only way to do research is the way people do it in experimental psychology.

We need to make more of an attempt in research to link adolescent and adult vocation behavior. Third, we should encourage more thought and less publishing, talking, and experimentation. We need to develop sound ideas first, and experiment later to confirm and support our ideas. As a nation, we are concerned with action. We think action will do everything. Yet, in studying some of the most important advances in science, we see that they are advances in thought, not advances in experimentation. Experimentation comes later to support, or to make sense of, some idea.

Occasionally there is no idea. We need to ask more critical questions. What do you know now that you didn't know before, now that you've read this? Does anybody care? Would you do anything different? Let's look at it another way. Go through a recent journal. Pretend that all correlations are .90, or assume that all analyses of variance have F's significant at the .001 level. You will find that there's a tremendous amount that we do that is not worth knowing.

We need to search more actively for promising ideas, not for just a different idea. For example, one of the questions that comes up again and again is why so many good things come from high socioeconomic status and background, and so many things which we do

not value come from low socioeconomic backgrounds? So far, we have not really done much with this question; we have just used the crude variables: father's occupation, income, and so on. But this is the sort of question to which we need to pay more attention. In other studies, we are finding that we can create dramatic effects by rearranging living groups, by attendance at one college as opposed to another. Then, too, we need to explore the potentials of occupational classifications and patterns of expressed choice more intensively. Similarly, we might explore the behavioral counseling of Krumboltz which suggests that for the first time we seem to be able to manipulate the client. My comments are meant only to illustrate some promising areas of research; other areas can easily come to mind.

With respect to the practice of vocational guidance, I have several suggestions. First of all, we need to develop more efficient strategies; by this I mean that we must reach and affect more people per dollar spent. One way to cope with this problem is to establish what I would call levels of treatment. I can presently conceive of five such levels. At the lowest level is the ordinary vocational guidance system, which literally consists of a simple inventory placed on a wall, six wall charts, of course, and a file. This system could be operated by anyone, and could, I think, provide a relatively superficial kind of help that would be beneficial to a large number of people.

A system similar to one at the University of Illinois might comprise the next level of treatment. There a programmed counseling book has been developed for doing certain kinds of common college guidance work such as test interpretation in relation to curriculum plans, a student's probable level of achievement. If the first sort of treatment were unsuccessful, the client could move to level 2.

A third level might be Magoon's system at the University of Maryland, in which a counselor works as a consultant for four or five people. Students use a standard series of study forms to work through their educational and vocational planning problems, but their counselor acts more like a consultant than teacher. He helps the student upon request rather than playing a leading role. The student spends most of his time working alone with a special set of structured forms developed to elicit rational and constructive planning.

On the fourth level could be the inexperienced counselor. He has more flexibility than the person who is working with five clients, and can decide which people he can work with and which should be referred on to the top level—the experienced, professional counselor. I visualize the professional counselor as the manager of all of this, and

because he has all these screening treatment processes in front of him, he sees only the people for whom his training is most useful. He does not waste his time working with people who could be helped by cheaper or more practical means. I am not saying that this is precisely the way it ought to be done. I'm saying only that I see this as a potentially useful idea, and that people in the field might consider developing something like it if they thought it could be helpful.

A second orientation to practice would be to explore group and ecological methods more actively. We need to find ways to restructure school experience so that it will incorporate the guidance process. We need to find a way to insure part-time working experience, perhaps for all people. We have to devise workable vocational guidance systems. So far, many have been proposed but none appear to be operational or to have undergone any evaluation.

We need to structure groups to see what effects they create. For example, Brown, who was a student at Iowa, did a simple experiment in which he rearranged a dormitory so that three-fourths of the residents on one floor were in humanities and one-fourth were in science. Then he took another floor and reversed the proportions. He found in both cases that a large number of the minority group tended to switch over to the field of the majority group and that those who didn't switch felt uneasy.

We should either teach vocational behavior as a school subject or tell the client what we know in book form. In addition, I think we need to restructure counseling agencies so that they can perform more and better research. One way to do this would be to revise counseling agencies to see if clients could be served more effectively. Also, we need to explore much more actively any noninterviewing method. Interviewing people to get them to change is an expensive process. We ought to adopt a public health orientation and invest in constructive personal development. Invariably this will involve some withdrawal from serving clients to put some additional money, time, and personnel into a program of research to prevent some of the problems we encounter most frequently. And finally, we need to improve the training of professionals (for example, teach people that what we're training them for won't be very useful very long). We ought to try to incorporate some of the ideas we have in a liberal education, such as trying to make people lifelong learners, giving them a real zest for learning, so that we don't have a large army of people who can only perform one professional activity and feel demeaned or uncomfortable if asked to perform any other.

To summarize, we must alleviate many practical and theoretical problems if we wish to increase the quality of what is called "vocational development," and we must find more efficient ways to reach a large proportion of our population seeking help. I am optimistic that we can approach these goals, and I have pointed out some ideas and practices that appear especially promising.

CHAPTER 8

Prospectus

Anne Roe

Much of what I have to say about my hopes and expectations for the future is implicit in any discussion of the past and present. With the rapidly developing statistical techniques of this computer age, one can plan kinds of research that we could not even have thought of doing only a few years ago. But we must still ask appropriate questions and assemble the raw data which are relevant. I think the major difference one can expect in the future lies in the interactions of data, in our increasing ability to deal with more and more variables at one time. This will require an even higher level of intelligence and sophistication than has been needed for competent research in the past. I shall not go further into this aspect; computer technology is well outside my field of competence.

I want to discuss possible advances under a number of different headings, but the order in which I shall take them up is in itself of no significance.

1. My first hope is for more research that is *organized,* that has explicit relations with the rest of the field. It is true that with most of us, one piece of research leads naturally to another, and in the course of time perhaps a pattern may appear. But my plea would be that at least some glimmering of a pattern should be in mind from the

beginning, that new research approaches should be fitted into a more general scheme, not just the scheme of the individual researcher but into the state of knowledge in the field at the time. It happens that the three other members of this group, Holland, Super, and Tiedeman, are effective practitioners of research of this sort, and are among the relatively few in the vocational field of whom this is so. The work of Bordin and his students is another example although of a very different approach.

A large number of the research papers that fill our journals are, of course, dissertation research. Students working with professors who have themselves a general and organized program are in a favorable position here, because it is usually the case that individual dissertations can be pieces of a larger program. But this can also be the case for students of professors who do not have an organized research program, since there are glaring gaps wherever one looks.

2. I hope also that there will be an increasing amount of longitudinal research. We can accumulate innumerable tables showing that at successive periods, such and such numbers of persons were engaged in this or that. But this tells us nothing about which, if any, persons engaged in the earlier period in *this* are those engaged in the same thing in a later period. We need a vast accumulation of individual life histories.

Study of even a few such histories can be extraordinarily enlightening. One of the first assignments I gave in a course of vocational development was for each student to interview someone, man or woman, at or beyond retirement age, and to record the vocational history, with particular attention to understanding what motivated choices when they occurred, and with every effort to place the individual history in relation to external events along the way. For most of my students this experience was an eye-opener. We read many of the histories in class, there was always a wide range of subjects, from a well-known judge to a bum picked up in a bar, for example. Discussions of these interviews raised directly almost every question that was to come up for consideration in the course.

These histories were, of course, retrospective, and in some ways were all the richer for it. There are other approaches that may bring out other kinds of information. Study of lives in process, exemplified by Super's work, or by the studies of Jean MacFarlane and her associates, by those at the Fels Foundation, and the earlier studies of the gifted by Terman and his associates are enormously valuable. They

TABLE 1. Grades Covered and Size of the Five Groups

Sample Group	*No. of Students*	*Grades Covered*
Grade 5	143	5 6 7 8 9
Grade 8	167	8 9 10 11 12
Grade 11	192	11 12 13 14 15
Grade 14	105	14 15 16 17 18
Grade 16	93	16 17 18 19 20
Total	700	

require most careful planning, large sums of money, and a stable institutional situation, but the pay-off is great.

A partial substitute for the lifetime study of groups of individuals is an overlapping design. The great advantage when the data are of particular measurable sorts is that general patterns can be detected more rapidly. Cooley's design for a five-year study of scientific careers is a particularly good example of this (1963). Table 1 shows the school grades covered and the size of his five groups. Each group was followed for five years, and the two years of overlap allowed comparisons among adjacent groups. Cooley's report explains:

> It was not our desire or expectation to be able to predict which fifth graders would become PhD's in theoretical physics, but rather to identify factors which are related to educational and career decisions made at the various stages of development, and to be able to predict from one stage to another. Thus, trends found in one age group could be cross-validated using similar information obtained from the following age group as they moved into the same school situation.
>
> The goal of the Scientific Career Study was not toward a static description of how scientists as a group differ from other professionals or the general population, but rather toward an explanation of movement into, within and possibly out of scientific careers. The main question explored has been: What are the types of decisions one had to make in moving into a scientific career and what factors are associated with the possible outcomes of those decisions? "Factors" here included dimensions of individual personality, and also dimensions of the environment (family, school, community, etc.). However, the emphasis on the choice process necessitated a concentration of personality assessment, where personality, as used here, includes ability.
>
> There are two general types of dependent variables in this investigation, (1) educational decisions and (2) career plans. The first category is based upon the various types of decisions each age group is being forced to make during the five years of follow-up as they move through the schools. The other criterion is derived from the student's stated career plans and includes the stability of those career goals over

a five year period. Also, the relationships between educational decisions and career plans are important, since, for example, a student may choose a course of study which would make a scientific career highly unlikely.

3. In all these studies of lives, I would hope not only that the individual life not be taken out of the social context, but also that the occupational life not be isolated from the rest of life. I have been insistent that the occupational life history can be taken as a meaningful theme around which the story of a life can be structured, but I want also to insist that the relation between the occupation and the rest of the life must be understood. One of my students, Natalie Goodman (1967), has been exploring the issues involved in leisure-work relations. It seems to be the general opinion that the amount of free time available to all of us will increase steadily, but her analysis indicates that in fact whether or not this is the case will depend upon the occupational level being considered, sex, the date taken as a baseline for the past, and the choices that will be possible in terms of free time or more income. She finds that the highly skilled professional has less free time now than he did in the past, and the chances are great that he will have even less in the future; however, the reverse is true of an unskilled laborer. Between those extremes predictions are less certain, but it is probable that there will be a continuum of more free time available as on goes down the occupational scale. There is a trend for women, particularly married women, to exchange more of their free time for employment time. Using 1900 as a baseline, free time has increased considerably, but in the perspective of several centuries, the increase is not as much as might have been supposed. The choice of moonlighting over free time is probably linked inversely to base income level.

A point of somewhat more relevance here is that "meaningful activity" was more apt to be found in free time by respondents at the lower end of the occupational scale, and in employment time by those at the upper end. The moral is that the meaningfulness of any activity can be estimated both for the individual and for society; these estimates need not coincide; both are relevant to occupational studies.

4. This suggests my next point: We have too few studies of occupations at the lower levels. Clark's (1961) development of interest scales for lower level occupations should be of considerable use here, but it is still the case that much less research interest has gone into study of lower level occupations than of professional and managerial ones. There is also a particular glaring lack of studies of Group V (Outdoor) occupations at any level. The few studies available have been sociological or economic. In part, I suppose this reflects the

immediate environment of most researchers outside of industry. There may be more difficulties in assembling a sample, but I would not expect them to be insuperable. Questionnaire techniques also may not serve so easily for those for whom reading and writing are not routine activities.

My study of members of the Society of Vertebrate Paleontology (Roe, 1946) included subjects at both technician and scientific levels; the groups were similar in personality structure (Rorschach), differing chiefly in intellectual and educational level. I would expect this to hold for other groups, at least at the four upper levels in my classification, that is, that occupations within one group would attract similar personality types across different levels. Again, there is little evidence available. Our pilot study of job changes in the later years (Roe & Baruch, 1967) did not suggest that upper level workers were in general more thoughtful and decisive in this situation, or had greater feelings of self-direction.

5. In these well-organized and long-term studies I would hope also to see increasing interaction among sociologists and psychologists. I pointed out earlier that it was some time before I came to realize the enormous importance of the socioeconomic background of the family and other aspects of occupational studies that are usually subsumed under sociology. I might add that sociologists of occupations have also had less acquaintance with the psychological literature than one could wish. There are further aspects studied by economists on occasion which could add materially to our understanding. We need to study individuals as individuals, but not as individuals in a vacuum. They are products of their experience as well as of their genes, and the setting in which they live impinges upon them in many ways. They cannot be understood out of context. Nor can the context be understood without some understanding of the individuals within it, for all of them modify that context to some extent, and some of them to a great extent.

6. Whether or not it will ever be possible to make some attempt to assign weights to the different elements in the formula I presented earlier I do not know. It is apparent that I hope it will be possible, in at least some approximate form, because it would certainly make the formula much more useful, particularly in terms of research applications.

However, there is one approach that might be followed up fairly readily, although it could not yet be used to apply to decisions or actions of individuals. In the formula that expresses my perception

of the variables that enter into vocational behavior, the parenthesis, which includes the complex of personal characteristics, can be segregated from the rest and developed in terms of requirements for a specific job. The relative weighting of different items could be worked out very much in the manner in which the new DOT code has been developed. The Structure of Worker Functions includes the three hierarchies of Things, Data, and People, each hierarchy involving up to eight unique functions, from the simple to the complex. The level of complexity was determined by analysis of the activities required for each job, the presumption being that most jobs involve all three functions but in differing degrees. The general principle is not essentially different from that followed in the Minnesota Occupational Rating Scales (Patterson, Gerken, & Hahn, 1953) which gave ratings for seven abilities for each of a number of occupations.

7. Mention of the requirements for different jobs leads me to quite a different approach. At the present time, there is great emphasis on providing increasing levels of education for all citizens, and particularly those for whom further education has not been available or, more importantly, for many who have not considered it as desirable or even useful. In many instances this attitude has been grounded in a thoroughly realistic appraisal of the situation: that additional education, particularly of the traditional sort, would not have openend up additional job opportunities. Many of the new manpower training programs are not fully successful, and in many of them dropouts are numerous. I do not decry this approach of more training for more people to make more of them acceptable to employers. I would, however, like to suggest another approach that might open up more jobs more rapidly.

The approach of which I speak starts with making a thorough and *honest* reappraisal of job requirements. Obviously I am not talking about jobs that require specific skills, such as are needed for auto mechanics or typists, but I wonder how many jobs, for which a high school education is a fixed requirement, can be performed adequately by persons who have not achieved this educational level. The degree of literacy actually required for job performance is very poorly specified by number of school grades attended, and even now there are still many jobs for which only minimal levels of literacy are adequate, as far as the work itself is concerned. The level of literacy desirable for any member of a democratic citizenry is quite another matter.

The same question can reasonably be asked at higher and lower levels. The large increase in the college-going population may mean

that a college education becomes increasingly a requirement for jobs for which it is really quite irrelevant as far as the actual tasks themselves are concerned. There is, however, the additional factor of general behavior and attitudes which may play a less obvious but no less important role. For example, one large firm which had been unable to recruit enough college graduates for its minor executive jobs began to try to move foremen into them. To do so, a training course was instituted, but the major problem centered around differing styles of life of the former foremen, not around learning to handle the work.

8. I am increasingly troubled by the extent to which many people seem to feel that they are unable to direct their activities personally but are at the mercy of forces beyond their control. This, of course, applies to nonvocational as well as to vocational actions. There are a number of persons now involved in setting up systems which will promote decision-making in the occupational field. Tiedeman's (1972) project for developing an information system for vocational decisions is, of course, a major one, and has been detailed elsewhere in this book. There is another computerized system that Jo Ann Harris (1968) has developed at the Willowbrook High School in Villa Park, Illinois, and there are others. To me, the most important thing about all of these systems is that although they provide information of appropriate sorts at appropriate times, their use depends on the person using the system. He must make choices, must ask for further information he thinks is relevant, and must decide what use to put it to, or at least *try* to put it to. (Appropriate decisions about vocational planning do not insure that an appropriate job will be open when and where one wants it, or can this be computerized, too?)

There are some further and perhaps more basic questions here. To what extent do different people desire a feeling of being in control? And is this need for autonomy of approximately equal strength in any one person for different kinds of decisions, for example, with regard to work, to social activities, to family participation, and so on? Rhoda Baruch has been working on this problem, and I hope it will also be considered by others. One is immediately curious about what the kinds of experiences or backgrounds are that may lead to various degrees of need for autonomy and in different areas. I know of no finished research on this point.

9. Let me refer just briefly to another problem brought to mind by the remark that appropriate decision and action on any individual's part will not ensure that the people who do the hiring will accept his decision. We have really very little information about the reasons

(other than the obviously prejudiced ones) why one individual is accepted instead of another who is apparently equally well qualified. Why, for example, do campus recruiters pick the persons they do for further interviews? In any hiring situation where decisions are not largely automatized, what actually is the basis for selection?

10. Women, women, women. It is not that there has been a scarcity of words written about women and jobs, but just that so many of them have been ax-grinding. Recently, however, there has been considerably more attention given to genuine inquiry into the particular problems surrounding the issues of women and work. Part of the difficulty has been that women's life histories are often more complex than men's and therefore harder to see in patterns, although we now have some reasonably well-delineated ones (another Super contribution). At the same time there are many fewer studies of women in specific occupations, except in nursing and education, and particularly in comparison with men in the same occupations. Even very experienced workers in this field have sometimes been surprised that, for example, questionnaires applicable to men just don't work for women (Roe, 1966). It is well known that vocational interest scales have been much more difficult to develop for women than for men, because so much of the variance among women can be accounted for by a single factor. In my own studies comparing engineers and social workers, differences between the men in these two groups were more numerous and much greater than between the two groups of women (Roe & Siegelman, 1964).

I am not at all sure that we should not have a separate occupational classification for women, but I have not given this endeavor the attention it deserves. In part, I think, I am just shying away from what will surely be difficult.

In my studies of scientists and of artists I did not look for any female subjects. The reason was very simple: At the level at which I wanted to work there were so few women that there was no point in complicating the design by including them. This raises the very interesting question of why there are so few women who have made names for themselves in these fields, particularly in science. There are two general sets of factors that seem relevant to me (apart from social acceptance of women in these occupations).

One factor has to do with style of life and the differing social roles of men and women. No one attains great distinction in any creative field without having had long periods of *uninterrupted* working time. This is very nearly an impossibility for most women with a husband

and children who are, after all, highly desirable elements in a rich life. This factor hardly needs elaboration, for women at least.

In 1947, Bryan and Boring (1947) reported a study of 440 women PhD psychologists and a matched group of men psychologists. Among many other interesting comparisons, they reported the data shown in Table 2 on the percentages of the married men and women psychologists who considered marriage and children to be an asset or hindrance in their careers. It would be very interesting to know whether there would be any change in these percentages now, a quarter of a century later.

I know of no study investigating women who are directly involved with their husbands' work in one way or another. There are, for example, the wives who act as office helpers, message takers, bill writers, etc., for husbands with their own small businesses, such as contractors or electricians. There are also many wives of scientists who act as scientific assistants. Although there are obvious pitfalls, the satisfactions derived from this sort of working relationship may be very great. Such activities are certainly careers in any sensible meaning of the word and deserve study as such.

The other, and as yet not much considered, aspect of the matter has to do with the personal characteristics of the creative individual. If one looks through any list of categories of these characteristics (for example, category #12) he will note that, as far as evidence is available, most of these characteristics have a decidedly more masculine than feminine flavor. (I have discussed these in some detail elsewhere [Roe, in press]). We know little, if anything, about the relative importance of genetic and experiential factors in developing these traits. There are many indications that adult personality traits are related to early experiences, particularly in the home, and there are also indications that these relationships may be different for the two sexes. There is all too little information here, and yet it could be of extreme importance. It does seem clear that many talents are

TABLE 2. Effect of Marriage and Children on Careers

	Marriage		*Children*	
	% Seeing It as		*% Seeing It as*	
	Asset	*Hindrance*	*Asset*	*Hindrance*
Men	72	5	40	5
Women	28	34	25	60

going unutilized, and particularly so for women (as well as for minority groups, of course). I am not suggesting that women be treated like men, or girls like boys. I do suggest that we should know more about the sex differences which we have and find ways to exploit them—the differences, not the women.

11. Finally, let me make a plea for a kind of study I think is desperately needed but in which no one else seems to be interested. I am speaking of a study which tries to isolate the minimal factors that make for a good life for all the members of any group. These factors would include the obvious ones of physical comfort and well-being and the often not-so-obvious ones of individual and social comfort and well-being. I believe that well-being in any of these realms depends in large part upon the extent to which individual potentialities are realized, and hence meaningful activity, whether in occupational terms as we know them now or in other terms, would be an essential element in the analysis. I want to know, then, what are the fewest public utilities, industries, communications, educational and governmental structures that are needed for this base level, and, finally, the fewest number of people that could sustain them.

I suspect that such groups would be smaller than one might think offhand, especially if there could be some (but limited) interchanges among them. Of course, they need not all have the same structure, and, in fact should not because different cultures structure the good life in different terms. It would certainly not be desirable to reduce the full range of genetic potential of mankind, but appropriate selection would ensure that all of the variant genes of man could be included in a population many, many times smaller than that living today.

Yes, you see, I am talking about Utopia. But I think we are not really investigating what it would mean or could mean. Populations are getting so out of hand that efforts are devoted only to stemming the tide, and very ineffectively at that. We need to know how far we could and should go, but as it is we have no idea. I hardly suppose that we could implement such understandings if we were ever able to draft such a plan for the life of man on earth. But I would prefer that we went down trying.

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CHAPTER 9

A Machine for the Epigenesis of Self-Realization in Career Development: Description, Subsequent Development, and Implications

David V. Tiedeman

Previously I analyzed the question, "Can a machine develop a career?" In so doing, I specifically presented my language of career development in the form of an instrumental imitation career. I also specified in the imitation career the structure of self-realization in career development. I then explored the major question in terms of three subsidiary questions, namely, "Can a machine develop a career (a) *for* an individual, (b) *with* an individual, and (c) *for itself?*" I concluded that a machine can develop a career in all three ways but there were weaknesses in the argument. I therefore stated that the machine can develop a career in only an instrumental sense, not in a simulation or artificial intelligence sense.

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My analysis of careers and machines provides a context for this paper, as well as (a) for specifying my language of career development and (b) for illustrating the power in treating my subject of structure for the epigenesis of self-realization in career development as if it were a machine. I shall first describe the specific machine which several colleagues [1] and I are assembling at Harvard University, for trial in the Newton (Massachusetts) School System and its environs, and with the assistance and equipment of the New England Education Data System.

I have noted several deficiencies in our knowledge. Now I shall more specifically focus on those deficiencies after describing what will be our "machine," i.e., the Information System for Vocational Decisions (ISVD). This description will lead to a proposal for 7 to 10 years of research which Allan Ellis, Robert O'Hara, and I hope to undertake with the assistance of the ever-evolving ISVD machine.

I have indicated that this research constitutes an intention several of us have for developing the theory of careers, which then will make the fields of guidance and counseling grow in a certain direction. I shall specify this direction in the form of the economic, educational, and theoretical implications for a well-developed ISVD machine. My account may not delineate very well the potential condition of research in careers for 1988. However, I think it will provide fair guidelines for what research and practice may be like in at least the early 1980's.

The Information System for Vocational Decisions

Primary data files of the ISVD. The Information System for Vocational Decisions is to be a system in which facts/data [2] about educational, military, and vocational opportunities are turned by each of its inquirers into the information of a personally determined career. The basic aim of the ISVD is to help an inquirer create a language structure in harmony with his evolving vocational development. In

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[1] Principal investigators are Russell Davis, Richard Durstine, Allan Ellis, Wallace Fletcher, Edward Landy, Robert O'Hara (Executive Director), David Tiedeman (Chairman), and Michael Wilson. Research Associates include: Duncan Circle (1967-68), David Clemens (1966-67), Lawrence Lerer (1966-69), and Eugene Wilson (1966-69).

[2] Facts/data come in two conditions, fixed and modifiable. I therefore elect to adopt the cumbersome term facts/data to indicate this throughout the paper. Facts are directly recoverable without mediation except for storage and later recovery. On the other hand, data must be additionally processed by the numeric and/or linguistic routines of a mediational system.

the ISVD, the computer is to assist in the processes of both his vocational development and of its harmonization with personal career development. These data files will be much like the files of abstracts created by the Educational Research Information Centers (ERIC) system which several universities are creating with initiative and support from the U.S. Office of Education. I shall return to this point at a later juncture.

Each of these three primary data files in the ISVD will be partitioned in several ways. One of these partitions will serve to distinguish between the stages of exploration or clarification in decision-making. The facts/data available for an educational, military, and occupational alternative will be fewer and at a more general level for the exploratory mode than for the clarificatory mode. When exploring, an inquirer will not be expected to maintain preference for an alternative, but to be forming his personal bases for preference among a set of alternatives. When clarifying, he then will be expected either to maintain his preference for an alternative or to return to exploration. In this phase of decision-making, the inquirer is expected to bring the perspectives of doubt to a previously crystallized choice and to bear the anxiety of ignorance in the face of new facts about the chosen alternative.

A second partition of each of the primary data files will be applied *within* its exploratory and clarificatory sections. With the education data file, this partition will specialize according to choice of: (a) high school curriculum, (b) post-secondary institutions, (c) post-secondary specialty, (d) graduate institutions, and (e) graduate specialty. In the case of the military data file, the partition will be directed toward promotion within the enlisted and officer ranks of each of the three major U.S. Armed Services. In the case of the occupation data file, it will include these choices: (a) occupation, (b) placement, (c) promotion, and (d) career. The occupation data file will have an adjunctive file incorporating forecasts by industry according to national and regional conditions. The primary purpose of facts/data on forecasting will be described shortly.

Purpose and self-development through the ISVD. The ISVD will offer access to the three primary data files within the context of achieving purposeful activity during self-development. Two pedagogical modes will be provided for this context. One mode will be teaching *about* concepts relevant to purpose in self-development and will include: (a) the psychology of becoming purposeful; (b) self and decision-making; (c) psychological attributes and educational, military,

and occupational decisions; and (d) any needed instructions for use of the three primary data files.

The second mode will be that of decision-making applied to the data both of another's life and of one's own life. The basic mode with the data of another's life will be that of a game. An inquirer will either cooperate or compete with others in playing rounds in a game context that requires time planning in relation to future possibilities and consequences. The context of time planning will be in terms of education, work, leisure, and family. Future possibilities and consequences will be retrieved in part from the forecasting data file mentioned earlier. The playing of rounds of the game will provide rudimentary simulation of career development. However, the ISVD will also let inquirers substitute their *own* data in the game structure and will then use this simulated career development structure *in personal decision-making,* i.e., in decision-making in which the person is himself both player and object of the game. In personal decision-making, the basic pedagogic mode will be that of guidance in counseling. In this mode the internalizing of the game structure into personality is expected and facilitated so that the game structure can become a guiding or feedforward (Richards, 1968) mechanism in the anticipatory activity of the inquirer.

Secondary data files and routines in the ISVD. The substitution of oneself for the life circumstance of another will create need for two kinds of secondary files. A file of the individual's own education and psychological characteristics will be created and maintained both to permit counselors to call for cumulative records and to permit individual inquirers to generate alternate possibilities for themselves by using the predictive framework in relation to anonymous psychological characteristics, choices, and later accomplishments as based on histories of other similar inquirers which will be stored in this file. In the ISVD this technique will be augmented by a procedure attributed to Thomas Hutchinson (1967). This procedure allows the inquirer to specify both the alternatives he is considering and the levels of reward which he seeks from each specified alternative; and the procedure will then provide indication of whether the inquirer's psychological data are like those of others who before him chose the alternative, and whether or not they achieved the designated rewards.

The other secondary file will store important elements of the person's own tentative decisions in working out his life plans. It will consist of summary statements which the person generates at the

conclusion of each use of the routines of the ISVD in relation so that he addresses his future and while learning from his past. The inquirer will thus *himself* be engaged in abstracting his life circumstances while creating these data for his life.

Inherent in this file on the person's own decisional framework will be a procedure attributed to Terence J. O'Mahoney (1968). This procedure will be a paired comparison of vaguely *pictured* occupational activities presented to reveal the person's self-concept in the context of occupational activity, which will give an inquirer a clearer linguistic understanding of himself. The understanding will then be an *explicit* basis upon which the inquirer can deepen his knowledge of his union of personality and occupation. Use of the procedure will be available for the mode of exploration, not clarification. In short, the O'Mahoney procedure as expanded from its present context of just occupational pictures will permit decision in an educational, military, occupational, or family context to aid in discovering harmonies and disharmonies in personal psychologies and activities.

The primary goal of an ISVD will be to provide an information-generating function which is specific to educational, vocational, and personal decision-making. The basic attitude required for cultivation of this information-generating function is that of inquiry. The computer support library of facts/data must be seen as a needed partial illumination but not as sufficient for completion of an internally organized guiding system. Completion or integration of an internally organized guiding system requires that the person as inquirer must be brought to invest what are originally another's facts/data with his own meanings, activities, and responsibilities, thereby additionally making them understood and useful for his own decision-making.

The personal career development which the ISVD attempts to cultivate presumes the existence of discontinuities in the person's vocational development. A discontinuity has both external and internal referents. The external referents are those aspects of the societal structure which precipitate discontinuity of personality development by virtue of forcing choice in order not to have a prescribed set of experiences and requirements for all citizens. In the ISVD, these external references are keyed to the educational, occupational, military, and personal and family living decisions which are available in the United States.

The internal referents of discontinuities are those aspects of ego processes which give rise to and/or support the emergence of self-awareness in career development. The internal referents emphasize the

continuities of personality during the meeting of a discontinuity of society. As such they tend to stress the integrative aspects of personality in career development in relation to the differentiating aspects of society in vocational development. These internal referents are thus the potentially harmonizing conditions in the growing linguistic differentiation of vocational development which the ISVD seeks to cultivate during career development.

The ISVD assumes that there exists a discernible and explicable process during any meeting of the externals and internals associated with a societally generated discontinuity in life. It further assumes that this process is eventually analyzable by the person experiencing the discontinuity into anticipatory and accommodating phases. The Tiedeman and O'Hara (1963) theory of decision-making on which this assumption is predicated further assumes that the phase of anticipation is both publicly and personally analyzable in terms of the steps of exploration, crystallization, choice, and clarification, and that the phase of accommodation is likewise analyzable in terms of induction, reformation, and integration.

The focus which the ISVD will bring upon the processes of vocational development will be sought both in a machine and in a personal context. In the machine context, the person interacting with the System will be treated as if he is an inquirer, a person who is himself in search of answers for problems which he is generating and who is also willing and able to assume responsibility for the actions predicated upon such inquiries. For this reason, the machine context of the ISVD will include primary data files for educational, military, and vocational opportunities.

The inquirer's searches of primary data files will also have to be mediated by the computer. This mediation in the ISVD requires the career machine to understand the inquirer's English. This stance is necessary in the ISVD in order to keep the subject's interaction as that of inquiry. This stance is important because the role of the System is to facilitate the incorporation of the terms of the guidance machine into the language of the inquirer. Thus through teaching, practice, and interpersonal relations, the ISVD expects the incorporation of the English understanding of the System into linguistic structures of the person. MONITOR will be a central concept for this incorporation. It will be a System control for checking the inquirer's understanding of the linguistic framework of his vocational and career developments. It will also consist of the rules and processes that went into our creation of that control. Through this means, the ISVD

expects that a person will permit himself to be guided from our control to his own by the internal operation of his intelligence as he grows in wisdom about his career development. "MONITOR" is our way of expressing this control as it is taken over by the person in his machine interaction. Supervision by counselors and instructors is our way of further generalizing "MONITOR" in order to complete its internalization and operation in everyday practice by the individual.

The teaching of the career machine to understand English and the incorporation of that process because of interaction with an inquirer gives rise to the machine operations which I have previously referred to as those of the secondary data files. It is obvious that secondary data files must be planned to operate in two ways. One of these is subsidiary to primary data files when matters of accuracy in inquiry of those files are involved. The other is superordinate to the primary data files when the teaching and practice of decision-making is in focal attention. It is in this superordinate operation that the hard design puzzles of relating MONITOR and "MONITOR" to English actually rest.

This sketch of the ISVD is neither easy to construct nor understand. However, I trust that I have now created both enough of a review of the prior section and of an overview of terms and later discussion so that I am justified in proceeding with more of the detail of how ISVD will actually be structured so that some of its aims can be realized.

From Facts/Data to Information

Information from facts/data. The details of the primary and secondary data files noted in the prior section are an inherent part only of the ISVD. However, the information processes inherent in them have more general applicability extending to all library data processed with the help of a computer. A particularly significant library project of this nature is that of the several ERIC (Educational Research Information Center) projects. Each ERIC center has a particular subject. The researchers in each center are responsible for assembling and abstracting published literature in their subject and for servicing requests for references in that literature. The subject of guidance and counseling is handled at the University of Michigan under direction of Garry Walz. I particularly want to refer to Walz' contributions to the

within expectation, learning, and practice of personal decision-making. Facts/data are turned into information by the inquirer within the context of decision-making *when* decision-making is subject to MONITOR, a concept I now specify.

ISVD and MONITOR. As has been indicated, the basic scheme of ISVD is based upon data files in which previously known facts/data are stored. The System will then guide personal interaction with the data files. Personal interaction is both to be taught and to be used in the System. The System can first be used as a game and then within the reality of one's own life.

MONITOR refers to the computer control functions associated with the creation of self-awareness during the decision-making practiced while using the primary data files. It will be fashioned to operate at three levels of awareness. At the rudimentary level, vocational development, vocational maturity, and agency development theories will be used within the paradigm of decision-making which I have outlined above. At this level, the System will itself be programmed just to assess the *quality* of decision-making as dictated by the concepts of the several theories. This will provide a first-order and mechanistic way of guarding against failures to exercise personal responsibility during the decision-making uses of the ISVD.

The second level of operation of MONITOR will be that of giving the inquirer access to the rules and procedures of the first level MONITOR. Each time the inquirer enters the System to interact in relation to a discontinuity in his future, he will be encouraged to summarize his experience in relation to prior discontinuities which he has considered in the System. This process, which is named that of REVIEW, will include a routine which will create a juxtaposition of current statements about past experiences with past statements about what were then expectations about future events. This process of comparing the formerly anticipated with the presently actual is one of the important processes of the ISVD. It allows the individual to understand the process of his thinking over time. These comparisons will be processed in the ISVD by the secondary data files having to do with the generalization of decision-making into career development within the context of vocational development. This processing will require all the procedures of appropriately labeling different meanings which is inherent in the ERIC system, i.e., (a) provision of an original product (in the ISVD this is the summary of past experience which the person first supplies), (b) the abstracting of that product (in

the ISVD this is the turning of the summary into form permitting comparison), and (c) the creation both of primary and coordinate index terms and of a thesaurus of synonyms for them.

In the second level of operation of MONITOR the inquirers using ISVD will first be instructed in our *System* use of this data reduction process, and to the procedures by which a primary and coordinate index and a thesaurus of synonyms operate in the ISVD computing system. The inquirer will then be permitted to use his own primary and coordinate index terms and thesaurus to process the summary data collected during REVIEW of his career development both at the moment and in past uses, the product being a small esoteric information system, confidential to the individual, which, in turn, forms the rudiments of the cognitive structure upon which the inquirer premises his personality in the realms of educational, military, vocational, and family decisions. ISVD will thus encourage the existence and applaud the formation of smaller esoteric information systems. These personal guidance systems constitute the compromises with totality which the individual must make while being accurate, detailed, and honest with himself in an ever-maintained effort to perfect his understanding of his actions and his experience.

ISVD and meaning through thought, counseling, and supervision. Although the substitution of this second level personal "MONITOR" information system for the original System MONITOR represents a giant step toward understanding in individuality, it does not represent the completion of the process. Completion of the process further requires the machine-*free* use of "MONITOR" in the practiced use of thought in experience and action. This condition is never fully attained; it is only ever more closely approximated.

It requires generalization of two phases of "MONITOR." One is that of the language of "MONITOR" itself. MONITOR will necessarily be linguistic. As Dudley and I (Tiedeman & Dudley, 1967a) indicate, language can never be fully co-extensive with experience. Therefore, the inquirer must be encouraged to see "MONITOR" as only a stage in understanding his harmonization of language and experience, not the end result itself. The end is more akin to his realization of language and experience as a paradox (Tiedeman, 1967), a predicament capable of being understood and appreciated but incapable of full formal construal in co-extensive fashion.

The second part of "MONITOR" which must be generalized in reaching for a practiced ease with thought, choice, and action is the

inquirer's use of the condition in a social, not just a machine, context. In short, the person must generalize his personal "MONITOR" from machine context to interpersonal context. The counselor who supervises the inquirer's discovery of his personal "MONITOR" within the interactive computer processes of the ISVD must be the first agent of this generalization. The counselor must use his own interaction with the inquirer as laboratory for that generalization and focus his skill in the assessment and cultivation of creative processes upon the attainment of that generalization *itself*. The supervisor of a person at school, Armed Service, or work in turn has opportunity to be the second-line agent of generalization of "MONITOR" from machine to interpersonal context. The vocational educator or supervisor who accepts this opportunity must also use his own interaction with the inquirer as laboratory for the generalization, but must focus his skills on the *substance* of the inquirer's role obligations in the *particular* situation under supervision. Finally, the inquirer is himself the ultimate agent for generalization of "MONITOR" from machine to interpersonal context. He must experience the weakness of the machine MONITOR within the context of his fantasy about control over his circumstances, and, with practice in machine and interpersonal contexts, gain confidence in his capacity to know some *but not all* of his anticipatory guiding system and its consequences in his life space.

I trust it is clear that the ISVD with its expected ramifications for nonmachine and personal collaborative activity offers potential through MONITOR, "MONITOR," counseling, and supervision of turning the reduction, retrieval, and use of facts/data into an information-*generating* function which in turn is used, understood, and appreciated. In this sense I believe that what Walz and Rich suspect only *can* happen within ERIC *will* happen within ISVD.

Despite the strength of my assertion for the information generation potential of ISVD, let none of us suffer the delusion that information generalization will actually occur *universally*. The ISVD will *expect* information generation to happen. The ISVD will consistently *attempt to make* information generation occur. The ISVD will be *diagnostic* about failures of information generation to appear. However, the ISVD will *only actually accomplish* information generation with those inquirers who catch on to its theory and who themselves come to use that theory without defense toward the System's part in its origin. An educator, vocational or otherwise, can do no more, even with a computer-based guidance system. Each man lives his own life. All I can hope is that he becomes the architect of his future as he lives it.

A Proposed Splitting of Goals and Organizations of the ISVD

The U.S. Office of Education is providing support to the President and Fellows of Harvard College from June 1, 1966, through June 30, 1969, for the construction and provision (in second generation but still only prototypic form) of the Harvard-NEEDS-Newton Information System for Vocational Decisions which I have just described. As indicated, the ISVD is a computer-based guidance system in which decision-making is used for information *generation* as well as for information application. Facts/data about education, military service, occupation, and family living can be turned into tacit information for career navigation. This occurs through the interactional mediation of inquirer and system on a repetitive and long-term basis.

Allan Ellis, Robert O'Hara, and I are presently proposing that the future goals and organizations of ISVD be split as of July 1, 1969. On the one hand, both the operable data files on education, military service, occupation, and family living can be brought into more general practice, and pioneering in the moderation of computer software to make the computer more educational can be undertaken simultaneously. The New England Education Data Systems is preparing and submitting a proposal along both lines.

On the other hand, the second generation ISVD provides a guidance system in which choice processes can be studied operationally; this also needs to be emphasized and encouraged free from the press for immediate service. This is the direction which this proposal takes in seeking additional support from the U.S. Office of Education.

The ISVD and Choice Processes

The original U.S. Office of Education grant which is creating the present ISVD will achieve two major advances in the educational use of computers. On the one hand, computer programs will be turned from teaching programs into career-deciding programs. The computer thereby becomes an environment not just for teaching but for education as well. On the other hand, the career guidance software and supporting curriculum are being developed in a form required to make information *generation* possible. The system thereby becomes an environment not just for the accumulation, storage, and retrieval of facts/data but for information birth as well.

The turning of the computer from a teaching machine into a career

machine on its way to becoming an education machine was a feat of no mean proportion. Hardware had to be assessed, ordered, and assembled. Basic time-sharing systems had to be modified. Intermediate languages which could be used, first by counselors unfamiliar with computers and later by inquirers similarly unfamiliar with computers, had to be developed and implemented in the newly modified time-sharing systems. Hardware modifications also had to be developed and provided to control the mediation of the career materials in the manner prescribed by the decision-making theory on which the project developed. The result, however, will be a system capability in which "ends-determination" will be available to inquirers themselves, not just "means-prescriptions" on the basis of *another's* goals as is now the case. Thus the ISVD moves the computer one step away from a teaching machine and one step toward an education machine. We hope that the system will thereby help the world out of a confusion which was evident to Einstein even as early as 1941, namely, "Perfections of means and confusion of goals seem—in my opinion—to characterize our age" (Einstein, 1941).

The turning of guidance books and career research into guidance materials capable of generating information was not an easy task. A theory of data files had to be developed (Durstine, 1968). Guidance materials and career research had first to be "cannibalized" and then "regenerated" in forms basic to the mediational processes which the system offers in its forms of interaction. As indicated in the previous section, the mediation is that in which the system serves as model and library, but the individual serves as decider and controller. The particular theory which had to be developed in machine-operable form is that also mentioned in conjunction with the Access Routines, EXPLORATION, CLARIFICATION, and REVIEW, and the information generation functions, MONITOR, the individualized "MONITOR," and supervision. The result, however, will be a system which will in theory provide a laboratory for the study of choice processes in cognitive development, a laboratory not available before now. We note that the laboratory availability is only theoretical at the moment because the mode of resource investment in the ISVD required that the prior accomplishment of a career machine had to precede the provision of a choice process laboratory, and the mode of delivery of a prototype, not a complete system, permitted us to furnish only all the needed models, not a complete set of needed materials.

Piaget (*c.f.* Flavell, 1963) and Bruner (1962) have been instrumental during recent years in bringing cognitive development into the fore

of psychological interest. Existentialists among humanistic psychologists have in turn focused upon processes in the evolution of responsibility and identity.

Parallel but not connected with the evolution of knowledge about choice processes in cognitive development has been the provision and study of self-theory largely stemming from the original work of Rogers (1951). Super (Super & Crites, 1963), O'Hara (1967), and O'Mahoney (1968) have helped incorporate vocational development into self-development. The ISVD has in turn been instrumental in incorporating Gribbons' vocational readiness planning (1959) and Crites' vocational maturity (1965) conceptions into operable frameworks in which their realization may accompany expansion in awareness of choice processes and cognitive development. Finally, the ISVD itself generates and reacts to the possibility structures which Tyler and McQueen (1968) are now studying.

The developmental plan of ISVD called for the provision of primary data files for choice activity in the realms of education, military service, occupation, and family living. Data files which are subsidiary to the categories of the primary data files in relation to the accuracy of their use but superordinate to the primary data files in relation to their effect upon vocational readiness planning, vocational maturation, vocational development, and agency development then had to be constructed. The subordinate character of the secondary data files led to processing for accuracy inherent in MONITOR. The superordinate character of the secondary data files led to the processing of agency development through accuracy in decision-making. This superordinate character gives rise first to "MONITOR," the individually constructed and used machine context of responsible activity in choice and later to supervision, the individually demonstrated responsible and accurate implementation of choice in social context with authority as the central relationship which has to be understood and hopefully appreciated.

The placement of the choosing problem into the computer context of a career machine as we have done above emphasizes the main theoretical problem in agency development through the understanding of choice processes in cognitive development, which is that of laying out the development of understanding and appreciation of the fact that language and experience are not co-extensive, even though man is inclined to make them so and even though his society supports and acclaims such efforts. Tiedeman and Dudley (1967b) have laid out the rudiments of the needed theory. Since that time, the work of Polanyi on the tacit dimension (1966) has come to be much more the core of

theoretical interest in the ISVD. At the present time, the particular interest in choice processes in development which is sought, expected, and facilitated by ISVD is that of tacit dimension as recently stated so succinctly by Polanyi (1968), namely:

> The structure of tacit knowing includes a conjoint pair of constituents. Subsidiaries exist as such by bearing the focus to which we are attending from them. In other words, the functional structure of from-to knowing includes jointly a subsidiary "from" and a focal "to" (or "at"). But this pair is not linked together of its own accord. The relation of a subsidiary to a focus is formed by the act of a person who integrates one to the other. And so the from-to relation lasts only so long as a person, the knower, sustains this integration [p. 30].

In a nutshell this is the theory and the structure of the ISVD. The development we wish to study is that of the ISVD's realization and application in the realms of career.

The time, financial, and research resources existing in ISVD through June 1969 will provide (a) the primary data files, (b) models of the subsidiary operations of the secondary data file, and (c) at least one model of the superordinate operations of the secondary data files. However, neither the subsidiary nor the superordinate operations of the secondary data files will be advanced sufficiently to make possible immediate longitudinal study of choice processes in cognitive development. Therefore, Ellis, O'Hara, and I propose to do additional research which should take place in two stages. Stage I should be planned as a three-year field study in which the linguistic material necessary for completing the operation of subsidiary and superordinate functions in the secondary data files will be collected and turned into programs which operate the interactive career machine. Stage II should be planned as a three-year overlapping longitudinal study of the development of choice processes in cognitive development. The particular choice processes under study will, of course, be limited to those associated with the cultivated evolution of personal responsibility in career development. Stage II will also need a fourth year to complete analyses and reporting.

Proposal

Stage I. An important reason why more work could not be done in ISVD itself on providing the superordinate functions in the secondary data files is the present relative absence of case materials stretching over life. What was needed was talk with potential users about discontinuities associated with education, military service, work, and

marriage and family. We were unable to locate or generate these protocols in the detail and volume necessary for creation of applicable dictionaries, thesauruses, and processing routines.

In Stage I of this proposed research, we therefore hope to remedy the defect of detail and volume of talk about life's discontinuities in which the ISVD encourages reflection and in turn cultivates understanding of reflexive activity in man's humanness. We propose to interview about 100 people in each of the following discontinuities or transitions:

Education:

1. Kindergarten to primary grades
2. Primary to intermediate grades
3. Intermediate to junior high school grades
4. Junior high school to senior high school grades
5. Senior high school to post-secondary grades
6. Post-secondary to graduate school grades
7. Graduate school to advanced management grades (?)

Military service:

1. School to military service
2. Work to military service
3. Within service promotional opportunities
4. Military service to school
5. Military service to work

Occupation and career:

1. School to work
2. College to work
3. Graduate school to work
4. Work to continuing education
5. Promotion with selected occupational and job categories

Marriage and family:

1. Marriage
2. Work to family (for women only)
3. Family
4. Household purchase
5. Family to work (for women only)
6. Work to retirement
7. Career during retirement

Care will be taken while sampling at each of these discontinuities to stratify the sample according to:

1. Sex

2. Ethnic background
3. Socioeconomic status
4. Scholastic aptitude (if still needed)

The interview data will be used in the preparation of an ISVD-like computer-based interactive interviewing system which will emphasize the development of responsibility in relation to the meeting of discontinuities in life. The primary analyses will be in terms of:

1. Crisis intervention as propounded by Caplan (1961)
2. Possibility structures as propounded by Tyler and McQueen (1968)
3. Planning ahead after 40 as propounded by Hahn (1966)
4. Vocational readiness planning as propounded by Gribbons (1959)
5. Vocational maturity as propounded by Crites (1965)
6. Vocational development as propounded by Super (1957)
7. Agency development as propounded by Field (1964), Tiedeman and Dudley (1967a), and O'Mahoney (1967)
8. Character development as propounded by Kohlberg (1964)
9. Self-development as propounded by Hershenson (1968)

The outcomes of the analyses are to be dictionaries and thesauruses of terms which would provide interviewing capability when inserted into (a) the access routines of *review, exploration,* and *clarification* as needed, and (b) the superordinate procedures required in MONITOR, "MONITOR," and supervision. These dictionaries would consist of classifications of the words and phrases actually used by subjects in discussing various discontinuities in terms of the nine theoretical orientations just outlined. They would therefore provide the consensual link between theory and verbal data which would allow the system to conduct similar interviewing in Stage II.

It is estimated that three years will be required to complete this phase of the work. The first year will be given to the planning and conducting of the interviewing; the second to the preparation of the computer system, which will be required to round out the delivered Prototype II of the ISVD into a fully operating system available for service from kindergarten through retirement; the third to field-testing and additional modification of the system as well as planning for the overlapping longitudinal study which would follow as Stage II of the work.

Review. The research which Ellis, O'Hara, and I envisage is planned for a seven-year period. The intention is to conduct a project that will require three years as Stage I to complete the needed laboratory system for basic research in choice processes described in Stage II. Stage II will be planned in terms of three years of data collection and one year of data analysis and reporting.

We propose that an agency such as the U.S. Office of Education which might subsidize this plan should consider the third year of Stage I as a year, during the fall term of which a review of the project will take place by site visitors and organizational personnel in order to determine if the overlapping longitudinal study is appropriately ready in terms of: (a) its technology, namely a probably completed ISVD; (b) adequate administrative arrangements for the three-year longitudinal study which would then be in the immediate offing; and (c) adequate design and theory on which the overlapping longitudinal study will then be conducted.

Stage II. During the fourth year of the intended seven-year grant, Ellis, O'Hara, and I plan to conduct an overlapping longitudinal study designed like that of Cooley (1963). In this study, subjects will be started in the system at kindergarten age. The age at entry of the next group of subjects who will also be started in the same year, namely fall 1972, will be two years greater than the age of the kindergarten group. This cascade-like pattern will be repeated throughout the desired age range. The one-year overlap at the beginning and end of each group will therefore permit bites of two years each to be taken in the age span in the overlapping design. Thus, in order to cover the ages from 5–6 to perhaps 75–76, 35 groups will be needed. It is planned that groups consist of from 200 to 250 persons. Groups are to be stratified according to: (a) sex, (b) ethnic background of family, (c) socioeconomic background of family (or of person if he is then living independent from his original family), and (d) scholastic aptitude if such a control seems necessary.

The subjects should theoretically be permitted to use the system as frequently as they wish during the course of their presence in the study. We would budget on the assumption that such use might average about eight times per year. In doing so, however, we have also determined that we will contact subjects each quarter if they have not themselves reported for interaction with the system. This will insure four observations per year and a minimum of 12 observations per subject if we are able to keep them in the system for duration of the

study. We will, of course, keep track of and attempt to see the effect of subjects' required use of the system as opposed to their voluntary use of it. We will also try to assess what effects, if any, may have been created in the data because subjects move away during the study or later refuse to participate.

The primary data of the analysis will be collected in the access routines of *review, exploration,* and *clarification.* It is in conjunction with these access routines that MONITOR and "MONITOR" primarily function. Thus the storage of responses and self-initiated activity in the access routines constitute the prime record of personality assembled in the laboratory which the ISVD will then be.

The chief focus of the analysis will be on the steps of exploration, crystallization, choice, and clarification of the anticipatory phase of decision-making as these steps and phases are defined in the Tiedeman and O'Hara (1963) paradigm of decision-making. The secondary focus of the analysis will be on the steps of induction, reformation, and integration of the accommodation phase of the paradigm. This secondary phase will examine the development of awareness of anticipatory behavior in the setting of personality structuring. The steps of both phases will be identified and examined in relation with each discontinuity which the person reported and/or faced while participating in the study. The harmonization of these steps and phases in the course of career development represents the self-development which will be exposed by the data of this study.

In addition, the data will be examined in terms of: Caplan's theory of crisis intervention, Tyler's theory of possibility structures, Hahn's theory of planning, Gribbons' vocational readiness planning, Crites' vocational maturity, Super's vocational development, Tiedeman's agency development, Kohlberg's character development, and Hershenson's self-development.

Although it is possible to promise at this time that developmental sequences in relation to each of the above nine concepts will be a part of the outcome of this study because the primary concepts of these theories will be part of the then completed ISVD, it is not possible to portray at this time what the structure of development of choice processes themselves will actually be. It is our present inability to do just this which causes me to propose the research which Ellis, O'Hara, and I have described here. We believe that the natural history procedure which the ISVD generates will provide the best data yet available, or planned, to lay out the development of choice processes in self-development.

A Well-Developed Career Machine

The theory of this symposium is to give people the opportunity to hear several of us who are intimately at work in the theory of career development. The theory of the symposium is therefore itself set in the context of the tacit dimension which the ISVD is designed to bring into the realm of explicit and public knowledge for each person. In this case, however, the tacit dimension called for was that of the subsidiary current status of our work which was to be focused on the point of our future work. In the ISVD case, the tacit dimension called for is that associated with personally developed careers.

I have attempted to write my papers in implicit conformity with those on personally developed careers in order to share an experience of mine which exemplifies the integration of a person's past and future. I did so by giving you a context within which my past work received explicit statement and my future work could be explained as plans. In doing so, I have demonstrated the integration of the past and the planned future which is in my own mind.

In this chapter, I have taken off from the usual understanding of the imitation career which I took here as the theory of my career machine. I then explained what my colleagues and I are developing as that career machine. I have just finished presenting what three of us who are engaged in the initial work on the career machine will attempt to develop so that the study of the choice process will be more explicit than it is now. In conclusion, I shall state the implications which I can anticipate for the existence of the ISVD career machine and the study of choice processes with its improved version. I do so by discussing the economic, educational, and theoretical implications of both of these conditions.

Economic and Personal Changes Needed To Sustain Emerging Systems

Potential costs, benefits, and operating economics. I predict that computerized guidance support systems will continue, expand, and improve. However, in order for my prediction to become a self-fulfilling prophecy, the economy of guidance is one of four conditions which will have to undergo radical change. The outlines of the needed economic changes are at best only vaguely discernible in the present developmental condition of computerized guidance support systems as a whole. Therefore, I elect to continue my analysis of the needed

economic changes in relation to an ISVD, a type of system I know best and the system which will require the most radical change in both educational organization and practice and in their financing.

The potential costs of an ISVD will depend primarily on the cost of time-shared computing connections and on what parts of an ISVD an inquirer elects to use and with what frequency he operates within an ISVD during a year. If an ISVD is used in its entirety about 25 hours a year by each inquirer, it is likely that the annual direct operational cost per inquirer can be on the order of $20 to $30. Continual maintenance and updating of discs and files at a computing center with which remote console stations connect will probably add up to 1/10 of the operating cost.

An ISVD-type of system can of course be subdivided, and its parts can be marketed at lower annual expenditures per inquirer than those I have just mentioned. I deliberately noted expenditures as high as $20 to $30 more per inquirer per year just to let you know the size of the league in which I think we are playing with computerized guidance support systems. However, the benefits to individuality which can be expected from ISVD-like guidance support systems are great enough for us to recognize that they cannot be gotten for peanuts.

How can we expect that an ISVD will be financed? In the past several years I have become aware of the dual role that government plays in providing guidance services. If we remember that government operates in three conditions—local, state, and federal—then the government in its entirety practically single-handedly provides support *both* for the education and for the employment of counselors (see Tiedeman & Field, 1965). Except for some private support of tuition in education and for some small quantity of fees paid privately for service, guidance functions governmentally. This is a fact to which we counselors should attend more carefully. It has a profound influence on how far and how fast we and U.S. citizens can and will advance guidance in our civilization.

The fact that guidance is almost completely a governmental function means that its goals are predominantly set on the basis of economy, not primarily on the basis of quality and/or desirability. This fact retards the change of goals for guidance and the expansion of service for the citizens of this country.

Although I suspect that the majority of support for guidance must remain governmental, I think that the quality and quantity of our services might change more rapidly if the purchase of services were put in the control of individuals, not governmental institutions such as

schools and employment services. Marvin Adelson, System Development Corporation, implanted this idea in me (see Tiedeman & Dudley, 1967a). For me, the idea finds potential implementation in the form of a career insurance system which I contend that private companies and the government should begin to develop. We have developed a Federal Old Age Assurance Program over the past several decades. However, at the present time, a citizen's career planning and its implementation is suffering as much as his retirement planning and implementation. I have therefore speculated on the possibility and desirability of a Federal Career Satisfaction Assurance Program. Such a program should include annual payments to a citizen for career review such as would be possible in an ISVD and, when needed, tuition payments for career regeneration perhaps as many as seven times during a life, without specific charge. Income for the program would be provided by premiums collected periodically during the actual work life just as social security contributions are now collected.

If private insurance companies and/or the federal government were to spawn programs such as this proposed Career Satisfaction Assurance Program, we could place money directly into the hands of citizens for their repetitive guidance and frequently continuing education. The existence of a large market of this kind could then markedly change the participation of the so-called education industry in the fortunes of guidance. Such a generating function in the economy of guidance would probably bring about a giant step in private investment in computerized guidance support systems which are like the ISVD. In the offing would then be individually rented computer discs, the equivalent of the safety deposit box, but in this case for personal autobiographies which, because of potential interactions with ISVD-like systems, would advance to the status of personally guiding mechanisms. Guidance would spring from the personal analysis of one's history as well as from the externally framed "view" of the future.

Investment. As I said, I predict that computerized guidance support systems will continue, grow, and improve. However, my statements about the economic hurdles standing before that eventuality should reveal that my prediction is by no means a certainty. My prediction can only become somewhat more likely if counselors begin to sense the potential inherent in such support systems. I believe that the potential is there. However, we face a period in which we must today undertake a somewhat uneconomical form of support systems for the sake of

nourishing what is only now infantile. On the other hand, if the use of the now developing computerized guidance support systems actually forms a sufficiently critical mass, I am convinced that private investment will be attracted by these support systems, thus insuring their continuation. Nevertheless, the issue is in present doubt. It can be resolved both by counselors who must get their constituents to risk slightly higher cost today in the uncertain but likely hope of improved service and civilization tomorrow, and by system purveyors who must market parts of an ISVD-like system in ways such that potential users can move gradually, but still definitely, toward use of the full system.

Educational and Personal Changes Needed To Sustain Emerging Systems

I have just argued that developmental computerized guidance systems can become operational if counselors take them into their hearts and tolerate some slight uneconomical procedures today, in return for some large likely gains tomorrow. However, if counselors decide to take on the task of cultivating the growth of this new infant now among us, there are also changes in their organization, themselves, and their future colleagues that they will have to countenance and effect.

Because the goal of the ISVD is to provide an information-generalizing function which is specific to educational, vocational, and personal decision-making, its intent will be realized best in a school climate in which inquiry is the pedagogy primarily used by educators (see Tiedeman, 1966). When the entire school climate favors inquiry, the inquiry required for operation of an ISVD will be consistent and mutually reinforcing. This is not to imply that an ISVD cannot operate in a neutral climate. The inquiry that will be required in an ISVD undoubtedly will be self-generating and self-supporting. However, the effect of an ISVD is not likely to be so pervasive and enduring if it does not occur in mutually supporting atmosphere in the *entire* endeavor of education. Thus counselors who believe in an ISVD enough to use it should also try to see that its inquiring atmosphere has *generality* in their schools.

An ISVD will foster self-development through practice and mastery of decision-making applied in the realms of education, vocation, and personal and family living. The theory of ISVD basically assumes both the differentiation of self in the three realms and the integration of the discontinuities thereby experienced because of widening personal awareness of one's own agency in one's development. A counselor will basically have to appreciate the ISVD theory if it is to work.

Otherwise he will not *expect* the ISVD outcome which he must do in order to help it appear. I think that counselors can find the theory of an ISVD quite compatible with their present overall philosophies and theories. However, an ISVD will certainly mean that a specific interest in educational and vocational decision-making must become an expected part of the counselor's functions. Unless the counselor believes this, he and an ISVD will be incompatible.

An ISVD will elaborate the presence of the guidance program in a library-like arrangement. Thus an ISVD will require that books, films, and computer console arrangements be coordinated effectively. This requirement will again bear upon the counselor's belief in his functions and place of operation.

An ISVD will elaborate occupational placement as a context in which choosing behavior is momentarily surfaced in consciousness and becomes quite available for modification. This requirement will also influence counseling functions in an ISVD-type system.

Finally, an ISVD can be made available to people in places other than schools. This requirement will mean that counselors have to recognize their community through their aims rather than through their work locations. An ISVD should be exploited as a resource in schools, employment centers, industries, libraries, and, eventually, in homes as technology and economies permit. In sum then, counselors are going to have to reexamine many attitudes about their organizations, their philosophy and theory, and their functions if an ISVD-type system is to have opportunity for implementation.

Counselor changes implied in an ISVD. I found it impossible to separate the counselor from his setting as I described the educational reorganization implied in an ISVD. Hence I have already made several comments on changes in counselor attitudes which might be required of some counselors if an ISVD is to work and will suggest several changes in the next section which would have profound consequences for the practice of counseling. These consequences will be felt by today's practicing counselor as well as by those yet to arrive on the scene of counseling. Therefore, I limit my remarks in this subsection merely to two attitudes which counselors will have to adopt if the computerized guidance support potential I favor is to arise.

One of the two attitudes counselors will have to adopt is that of accepting the computer's demands that data input be accurate and complete in terms of previously specified programs. Unfortunately, counselors will suffer this demand in a time when computer operation

is itself far from mechanical and technically perfect. Therefore, the demand may occasionally seem intolerable.

The second of the two attitudes is that of not telling an inquirer a fact of educational or vocational opportunity but of attending to his *process* of information generation itself. I personally believe that counselors will find this process challenging and fulfilling so I do not anticipate difficulty on this score.

Counselor education changes implied in an ISVD. As I write of potential changes in counselor attitudes and theories which a system such as ISVD requires, I am acutely aware that the chief source of difficulty in acceptance may rest as much, if not more, with the counselor educators as well as with practicing counselors. We counselor educators must take heed of an ISVD in *our* future as well as in the counselor's future.

An ISVD has numerous implications for the preparation of counselors. I consider but a few of them here.

Inherent in an ISVD will be the concept of a personally determined guidance system. This reference to "guidance" is far different from that of our texts on principles of guidance and from ordinary meanings of guidance. Hence, one of the requirements for change in counselor education which an espousal of an ISVD will bring is the superordination of the meaning of guidance to the *technique* of counseling (see Tiedeman & Field [1965] for expansion of this argument). Counseling as a technique must be conceived as a means for the achievement of the goal of a personally determined and understood guidance system, not as itself conveying that goal, as now presumed.

Inherent in an ISVD are the concepts of both a guidance testing support system and a guidance teaching support system. The computerization of the testing and test interpretation system as well as the designing of a guidance teaching system create the following new conditions in testing: (a) the reduction in time between the receipt of an answer and the provision of an interpretive response; (b) the provision of capacity to know what has *not* been answered as well as what *has* been answered; and (c) the provision of testing in direct relationship to the design of the learning exercise itself. All of these conditions have existed since programmed instruction started; however, there has not been a subsequent revision of test theory to accommodate them. The new conditions really have profound effect upon test theory and practice, and these effects must find their way into our preparation of counselors for the future if we are to prepare persons to work with computerized guidance information systems.

The existence of an information-generating system such as the ISVD places an additional burden on existing testing theory which also has implications for the manner in which counseling and personality theory should be taught. The information-generating function is that of creating awareness, not simply of the procedures for choosing but also both of the choice process and of the self in the choice process. Consideration of this relationship among choosing procedures and choice and self-processes requires reexamination of the relationship between the known and the measured as that relationship is now conceived in testing theory. In a revised theory, the knower as thinker must be brought into central focus in the relationship between the known and the measured (see Tiedeman & Field, 1968). The known and the person reciprocally act upon each other. As the knower comes to understand that interaction, he comes to understand himself and to appreciate his avenues for independent action in the interdependent human condition. Instructing counselors so that these realizations emerge will require revision in our courses on tests and measurements as well as in our courses on counseling and personality theory and assessment.

Finally, an ISVD will be embedded in computer technology. An ISVD will itself be designed so that the counselor does not need to know the computational side of that technology. However, an ISVD will allow counselors as well as inquirers to create their own control systems for data processing, management, and retrieval. Therefore, our instruction of future counselors must incorporate at least that much preparation in computer technology into the education of the counselor. Actually more education of this kind could be beneficial although not necessary. The benefits will be those which accrue from understanding *why* something happens as well as from understanding *that* something happens. If counselors know the why of computer technology they will be in better position to improve an ISVD so that it functions more harmoniously with its theory than it undoubtedly will in its earliest field phases.

Theoretical Changes Needed To Sustain Emerging Systems

A theory of career implied by an ISVD. My major effort has been to convince the reader that the theory of vocational development has so far largely been devoid of a theory of career. This may seem like a harsh assertion, particularly in relation to the work of Super who has emphasized the necessity for study of career *patterns*. My thought would not today be in the shape it takes without Super's prior work

and conversations with me, but I do want to emphasize this new aspect of career, namely the personally determined career.

The personally determined career must be conceived as a career in being, not as a career in existence. This stance brings attention on the capacity of man to honor the tacit dimension in himself. The honoring of the tacit dimension has a deep tradition in liberal education. The search for understanding of that dimension through universal studies has long been undertaken by persons such as Richards (1955). Richards, who searches for meaning in liberal arts, strives to write the more explicit operations involved in bringing the possibility for accumulated gain into the humanities and thus to write of a science of the humanities. Richards' conceptions bring him to desire a United Studies. My conceptions parallel those of Richards; however, where he has used dialogue and criticism as his major conceptions, I have used interaction and effective curiosity as mine. Thus, instead of seeking the United Studies as does Richards, I seek the United Self, a self in which vocational development is a part of a larger and personally determined career, only some parts of which will be vocational in nature.

In seeking a science of the humanities, Richards found it necessary to turn his attention from the traditions of the humanities to their programs. The switch in attention is significant. A tradition is something merely to be respected; a program something to be done. It was in conceiving the humanities as something to be done that Richards proved able to focus on criticism and use as major functions which ought to be associated with humanistic studies. This focus brought him to realize that it is the feedforward of an internally organized patterning of thought and action which is the goal of one who teaches the student in the humanities as well as of the scholar in the humanities who studies his subject. "The humanities, they are me," not "The humanities, I am them," became the principal organization for Richards' thought.

In seeking a science of career, I went through a parallel development. By putting facts/data of vocation into the context of individually guided use, I also discovered with Frank Field the necessity for the feedforward mechanism in career development. In fact, I am presently reasonably well convinced that this feedforward mechanism *is* the career. It is true that the career's effectiveness depends on a simultaneously developing feedback mechanism. However, the two are not identical, and feedback is nonexistent in the absence of feedforward.

I have attempted here to give explicit expression to my theory of

career. However, the changes in vocational theory which this theory entails are not well understood at the moment. Hence I suffer no illusions that I shall achieve a revolution overnight. I will be satisfied if I can merely contribute to the evolution of theory in career development.

A revised philosophy implied by an ISVD. We psychologists tend to pride ourselves on our sceptical natures. "Show me!" has been our shibboleth. This attitude is potentially detrimental to psychology. The "Show me!" game has a disadvantage which psychologists frequently permit themselves to be deceived by. If you ask someone who is himself in doubt to show you, you risk having him back off from his intuition. When this tendency is combined, as psychologists do combine it, with the demand that what is to be shown must also be explicitly delineated *prior* to its study, the tautology is completed. What psychologists study then becomes only what psychologists are interested in, *not* what individuals are living. Thus, we psychologists unconsciously permit ourselves to stray from the proper object of our regard, psychology, into the improper motive of ourselves, power *over* another.

I have myself faced this paradox and have tried in recent years to do something constructive about it. I have particularly focused my regard on the problem of letting another form *his* goals, not on another's acquisition of *my* goals. This shift of attention permitted me to deal with the integration of thought and action which a person achieves as he engages in the from-to kind of knowing that Polanyi (1968) describes. There are three elements of from-to knowing, according to Polanyi, namely: (a) the subsidiaries from which attention is focused, and (b) the object on which attention is actually focused. The person as the third part of tacit knowing integrates the subsidiaries and their foci. This integration is also the feedforward of which Richards speaks.

The change in attention from explicit behavior to tacitly based action brings a considerable change in attitude toward psychology. The important object of study is not behavior; it is the *basis* for behavior. The study of the bases for behavior means that reports by individuals must become the basic data from which explicit study originates. In the career realm, these requirements additionally move the criterion of psychology from success (a goal in *my* terms) to satisfaction (an action formed, justified, and lived in my *subject's* terms).

The needed changes in psychology are again profound. Because they are profound, I expect that they will occur only gradually if they occur at all. I can only hope, therefore, that my capacity to make them slightly more explicit and the reader's capacity not to dismiss me as either facetious or confused will in some small way contribute to these changes becoming more understood, accepted, and practiced.

Will Computerized Guidance Information Systems Become an Operational Reality?

I first stated that computerized guidance information systems are today a reality among us. I then indicated that this fact of existence could become a present reality of expanded and higher level service in guidance if the economy of guidance, the educational organization for guidance, the theories of guidance, career, and psychology, and we were to change. A change in one without any of the others will not be enough to put us into the new era I envision.

It is not presently possible for me to assess adequately the likelihood that the four conditions simultaneously needed for bringing the computerized guidance information systems into an expanded and improved operational reality will exist simultaneously. In the economic realm, it is likely that a number of the subordinate functions in a computerized guidance information system are sufficiently profitable in our present economy for them to come into being as separate entities. In addition, many computer technologists stand ready at any moment to consult with counselors and to construct individually tailored computerized guidance information systems. For these reasons I tend to think that the potential technological and economic barriers are probably less formidable than counselors, psychologists, and counselor educators will prove to be.

In the human realm, the barriers to my hope may exist for several reasons. First, counselors must familiarize themselves with computerized guidance information systems and with the possibilities for improved guidance service which they offer to students and other inquirers. Then they must form and advance the resolve necessary to generate the increased financial support which is required to augment present guidance services by the improved level of goal-seeking which computerized guidance information systems will make possible.

However, before counselors are likely to do all this, they must rid themselves of their somewhat ostensible fear of the computer. The computer is *not* a monster that will determine the lives of inquirers and

put counselors out of work. Instead it is a potential slave that can bring the best of facts/data and their scientific processing directly to inquirers, so that counselors can have as immediate an educational context as a teacher now does, one in which the process of reasoning can be brought to issue with the students counseled. However, *our* use of the reasoning process contrary to the teacher's use of that process will be particularly directed toward its import for self-, not subject, understanding and appreciation. It will also be for the generation of knowledge about a sensible area in one's life space in which one can make a difference if one but acts in that area as if one were an agent of one's destiny. A belief in such a magnificent possibility requires that the counselor first make the computerized guidance information system his slave so that he can in turn be the professional who helps other inquirers make the computer *their* slaves. In order to do this job one will have to reeducate himself as I have previously mentioned, and so will his mentors. A considerable portion of their programs which are now preparatory for counseling will have to be revised, but they are not alone among those in the academic community who will have to change. Psychologists, as well, will have to make room for career in vocational psychology and for individuality in psychology. These things can only be accomplished by simultaneous revision of the philosophy of science in which the study of psychology rests.

I outline a difficult task. However, I am an optimist and am persuaded that, for a change, we counselors and psychologists need the challenge of a difficult task. I think the computerized guidance information system offers us a big opportunity to bring an important innovation into the endeavor of education. We have not done well at innovating during the past decade. Let's do a much better job in the two decades now before us in order to see a truly new advance in our civilization.

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PART IV/Special Applications

In the first article of this section, Frank J. Minor, Roger A. Myers, and Donald E. Super discuss an experimental computer-based educational and career exploration system designed to be used by students as part of the total guidance services offered in schools. The authors state, "A major objective of the student guidance and counseling center of high schools, junior colleges, and universities is to provide individualized aid to each student and to help him to reduce the uncertainty of his educational and vocational plans."

The authors feel that this objective is not fully satisfied because of information-handling problems. Two such problems are: (1) the fallibility of both counselor and student in memorizing, associating, selecting, and recalling educational and vocational facts; and (2) the inability of the counselor and the student to devote sufficient time, patience, and energy to performing the enormous number of clerical steps involved in relating educational and occupational facts to pertinent information about the student." Minor, Meyers, and Super see the possibility that computer-based information systems may be able to reduce these deficiencies considerably.

John L. Holland, with Douglas R. Whitney, Nancy S. Cole, and James M. Richards, Jr., presents the origin, development, verification, and revision of an occupational classification system. This revised classification "organizes occupations according to their

degree of psychological 'relatedness' following Holland's theory of personality." Through a number of research studies, the authors have demonstrated the relationships of Holland's six major types and have showed the importance of these relationships in the prediction of later occupational choices. According to the authors, "Because of its theoretical simplicity and empirical base, the classification has many potential practical applications for vocational guidance, industrial personnel work, and research in education, psychology, and sociology." These applications, as well as a table of the coded occupations themselves, are presented in this chapter.

One of Anne Roe's most important contributions to the field was her construction of one of the first usable occupational classification systems. The "two-dimensional classification of occupations," as it is called, broke the world of work into two divisions: eight categories of groups concerned with the primary focus of the activity, and the six categories of levels which indicate the degrees of personal autonomy, skill, and training. Because they feel the need for a more adequate definition of occupational role, the authors of the third article in this section—Anne Roe and Dennis Klos—discuss their review of the research literature and propose a third classification dimension that seems to provide for a more detailed schema. This third dimension is a classification of employers. This modification is useful because while the occupational title of a person tells the nature of his daily endeavor, the name of the person's employer tells the context in which the role is performed.

Allan B. Ellis and David V. Tiedeman address themselves to an interesting question, as indicated by the title of their article in this section, "Can a Machine Counsel?" Because human beings and machines are obviously different, the approach is not to "copy what human beings do when they counsel," but rather to achieve an identity of goals between a counselor and a machine so that the machine might be even more useful than a counselor in effecting the outcome of helping people make career decisions.

The authors point out that the quality of any choice depends upon the quality of the data. One of the fundamental tasks of guidance "is to identify, evaluate, and classify needed data and to make them readily available to students in usable forms and at needed times and places." Ellis and Tiedeman explicate the unique interaction of man and machine and the various stages of decision-making in which both of them are engaged in different processes—exploration, clarification, and review. The authors present an actual exchange between an individual and a computer, demonstrating the quality and direction of that interaction.

CHAPTER 10

An Experimental Computer-Based Educational and Career Exploration System

Frank J. Minor, Roger A. Myers, Donald E. Super[1]

The emerging interest in computer assistance for counseling and guidance suggests the need for a review of such experimental systems as they are postulated and developed. Cooley (1964), Ellis and Wetherell (1966), and Helm (1967) presented some challenging ideas about the possibilities of computer-based systems. Eber (1966), Loughary, Friesen, and Hurst (1966), and Pilato (1968) reported results of research on the experimental use of systems of this type. Campbell (1966) and Minor and others (1967) have summarized current efforts in this area. The purpose of this paper is to describe the objectives and design philosophy of an experimental system for the support of educational and vocational guidance services. The system is intended to be used as a research tool.

Parts of the educational and vocational counseling process can be described in terms of the variety of human information-processing

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functions performed by two agents, a counselor and a client. A close review of these functions reveals a potential third agent—the digital computer. The computer's ability to accept, store, analyze, and display information rapidly can bring new qualities to the client's role and aid the counselor.

It is therefore proposed that the client or student be provided with a computer-based information system which he would use to help him in the exploration and clarification of his educational and vocational plans. The concept of computer time-sharing schemes, which allow several users at various locations to share the computer simultaneously, makes the concept economically practical. Recent developments that provide the user with information entry and display devices and that allow him to communicate with the computer in a natural language make the concept even more attractive.

Before designing an experimental system, it was necessary to define the age group which the information system would service. To do this, we viewed vocational development as a continuing process that could be classified into an orderly arrangement of life stages. The vocational life stages have been defined by Super (1957) as growth, exploration, establishment, maintenance, and decline.

It was our judgment that a computer-based information system could do the greatest service for the individual in the latter phases of the growth stage and throughout the entire exploratory stage.

For this project, we focused our attention on the student's exploratory efforts which take place in the school environment between the ages of 12 and 19. The school is the ideal setting for student exploratory behavior. In fact, the first year or two of each level of education in junior high school, high school, and college may be viewed properly as a period of formal exploration of educational and vocational paths.

Why There Is a Need for Information Systems

In reviewing the activities of counselors in the schools, it becomes apparent that the function of educational and vocational orientation is frequently neglected. This neglect might be accounted for partly by the difficulty of managing numerous complex categories of information about the world of work, the educational avenues to this work, and the vocationally relevant personal facts. Furthermore, at a stage in the student's life when exploration of many alternatives is essential, the counselor is forced to admit that counseling conversation—even

supplemented by static printed matter—is a limited vehicle for exploratory purposes. Also, there is not enough counselor time to devote to planning and evaluating the exploration process.

The proposed computer-based man-machine system is intended to remedy these deficiencies. The system functions are designed to be in keeping with the counselor's objectives and activities. The experimental system is designed to be one element of the total vocational guidance service offered by the counselor; it is called an Educational and Career Exploration System (ECES).

Objectives of the System

The objective was to design an experimental computer-based learning environment which might be used as part of the educational and vocational guidance services in schools. The system would be designed to benefit both the student and the counselor. It was postulated that the system should benefit the student as follows:

1. Broaden his knowledge of occupational alternatives and of his own multipotentiality by an exploratory process so that he could understand how his alternative tentative goals relate to his personal attributes. His use of the system's stored information would aid him to become educationally and vocationally mobile.
2. Provide the student who is interested in post-high school education with a means of exploring educational or curriculum preferences exclusive of occupational goals, but with the ability of relating these preferences to occupational potential.
3. Provide the student with a means of narrowing the search for educational or training institutions which satisfy his career or curriculum preferences, his learning abilities, and his personal preferences.

It was further postulated that the system should benefit the counselor as follows:

1. The counselor could perform at a higher level of problem-solving with the student since the student would be in a condition of readiness for purposeful decision-making. The counselor would be able to play a more diagnostic role by drawing information from the system about the student.
2. The counselor should be relieved of maintaining and operating a general occupational information library.

System Model

The model of ECES was developed within the framework of several assumptions to which we felt the exploratory system should adhere:

1. The system should be equally usable for students from grades 8 (or 9) to 12, across a wide range of socioeconomic levels. This means that the system should be as useful to students who leave high school because of need for immediate employment, as well as for students who plan a professional career requiring a college education.
2. Although ECES should contain a set of decision logic rules to aid the students in the sequencing of their activities, the system should adapt to and be under the control of the student. The importance of an appropriate psychological climate for the student in the use of such a system has been defined by Tiedeman (1967, 1968).
3. The student should be able to communciate with the system by means of a computer-based terminal which would allow him to receive and enter information in a conversational manner.
4. The counselor should determine the readiness of the student to use the system and enter him at a starting point appropriate to his (the student's) needs and maturity.

The functions of the system were divided into three general phases. Associated with each phase is a computer-based information bank. Phase I provides the student with an occupational information bank that he uses for vocational browsing, exploring, and clarification. Phase II provides the student with an educational information bank that he uses for exploring training programs and educational areas of study and learning how they relate to vocational goals. Phase III provides the student with a technical, vocational junior-college and senior-college information bank that he uses for isolating the names of post-high school institutions that best satisfy his educational and vocational goals and his personal preferences.

The flexibility of the system allows the counselor to help the student enter initially at any one of the three phases, depending upon the student's immediate needs and his apparent level of vocational and educational maturity. There are linkages by which the student can migrate freely among the phases as best fits his current exploratory mood, the changes in his educational and vocational maturity level, and his need to clear up issues that did not concern him earlier.

For each student, a personalized school data profile and a self-concept profile are stored in the computer. The school data profile consists of a record of the student's grades in high school courses, a gross prediction of his highest level of educational attainment, and measures of his inventoried interests in eight vocational fields. The self-concept profile consists of the student's estimate of his learning ability and his areas of interest. The system will, under the control of the student, relate his profiles to the educational and occupational information that resides in the system's information banks. In this way, each student's conversational experience on the system is fitted to his individual needs.

Phase I: Vocational Orientation

The world of work. With the aid of the system, the student learns that the world of work can be partitioned into levels of educational requirements and vocational fields. A two-dimensional classification scheme is used which consists of four levels of educational requirements and eight fields of vocational activities. The scheme is patterned after Roe's (1956) work so that occupations falling at the same level and field are clustered in a common cell. The occupations in the taxonomy range from entry occupations that require no formal education to those that require graduate study. The student is taught that although this two-dimensional matrix is not the only way in which he can classify occupations, it is a helpful starting point. So that he is not discouraged from considering occupations in the upper educational levels, the student at this point does not deal with specific definitions of different levels of education, but rather with the concept of a gradient of education that ranges from "some" to "more."

Exploring tentative career preferences. Once the student understands the concept of level and field, he uses the taxonomy to browse and explore occupations in order to formulate tentative career preferences. In the browsing activity, the system allows the student to describe the kinds of activities and work conditions that appeal to him. From a browsing data base the system retrieves for the student the names and definitions of occupations that are compatible with his preferences. The student can perform this browsing routine several times in order to expand or reduce the number of occupations retrieved. When the student wishes to stop the browsing he indicates to the system which occupations currently appeal to him. The system then provides the student with:

1. Statements of the relationship between these occupations and his school data profile and his self-concept profile.
2. The names of occupational fields not mentioned by the student but which are compatible with his school data and self-concept interest profiles.

This feedback to the student from the system is intended to alert him to the inconsistencies he may have to reconcile and to broaden his horizons by introducing him to new occupational alternatives.

Clarification by detailed analysis of specific occupations. Following the exploration phases, the student, with the aid of the system, can seek further clarification about his tentative vocational preferences. He does this by choosing specific occupations for analysis in greater depth. The basic assumption in this analysis is that he should be able to ascertain whether the values and requirements for that occupation are in keeping with his self-concept, learning ability, grade point average, and interests. The kinds of topics covered in the analysis are duties performed, training requirements, employment environment, competition, career growth potential, salary, and methods of entry.

The student becomes acquainted with the "nature of the work" through a work sample, a games-playing task in which he is confronted with brief problem-solving situations for that occupation. Since the student is not actually being tested, he experiences success no matter what his initial responses are to the problems.

As the student proceeds from one topic to the next, the system relates his current responses to that topic, to his previous responses to similar occupations, and to his personalized data stored in the system. In this way, the information presented under any given topic is adapted to the needs of the individual. This adaptation to the individual can be best described with an example. Assume that the student is analyzing information on training requirements for a specific occupation; then

1. He is required to indicate whether he would be willing and able to satisfy any special training requirements; if he cannot, the system asks for the reason.
2. If his reason can be related to previously stored data about the student, such as "poor high school grades," then the system helps him to check the validity of his reasons.

The student's responses throughout the entire analysis of an occupation are saved by the system to prepare several types of computer-

generated reports for him. One is a summary of his responses throughout the analysis of an occupation. Another report helps the student understand the relationships between his school and self-estimate data and the level of education and the field of activities associated with the occupation. Still another report shows the frequency with which specific high school courses were recommended for the occupations he stated he would like to consider as goals. If the student chooses, he can review these reports with the counselor and his parents in planning his occupational goals and educational program.

Phase II: Educational Orientation

This phase is most appropriate for students who plan to go on to post-high school training. Assume that we have a student who is not able to express himself in terms of vocational goals but finds it more comfortable to express himself in terms of curriculum preferences for post-high school education, or a student who has worked through the vocational orientation phase and now wishes to follow through into the educational orientation phase.

The student may name the kinds of major areas of study that appeal to him. He does this by exploring with the aid of the system the curriculum programs and the kinds of courses that are offered in vocational schools, junior colleges, technical schools, and four-year universities. Having expressed his areas of curriculum interest, the system shows the student other related areas of study which could be of interest to him. The system also makes relationships between his vocational explorations and educational explorations so that he may estimate how well his preferred major areas of study support his vocational preferences.

Phase III: Post-High School Educational Search

Whether the student expresses his tentative goals in vocational terms or in educational terms, he can use the system to narrow the search for a post-high school educational institution. The search is conducted to satisfy his curriculum objectives and to fulfill personal preferences.

The types of personal preference variables used by the student to conduct the search include geographical location of the educational institution; size of the school; and type of school in terms of whether it is a state or private school, all male, all female, or coeducational. The system provides him with worksheets listing educational institutions

that satisfy his career or curriculum objectives and his personal preferences, along with other data such as degree of selectivity of the college which he relates to his college acceptance examinations and his grade point average, availability of ROTC, residence facilities, religious affiliations, living and tuition costs. The student, the parent, and the counselor can review the worksheet systematically in order to narrow the search. The student can have included in this list the names and data for any schools that are of special interest to him.

Conclusion

Most computer-based systems for guidance services are experimental vehicles for research purposes, as is this one. By field-testing such experimental systems in schools and then modifying the systems based upon findings, it is expected that they can eventually provide advantages to the student, the counselor, and the school.

The student should be able to sharpen his focus on goals, thereby making his high school course selection and curriculum more meaningful to him. His educational and vocational planning generally should be more efficient, thereby reducing the number of time-consuming and costly false starts. Culturally disadvantaged students may become more educationally and vocationally mobile.

The system could enable the counselor to work at a higher level of individualized and diagnostic problem-solving with each student since the students would be aware of and be more prepared to deal with personal problems of educational and vocational planning. The counselor should be able to devote more of his time to professional counseling activities and less time to maintaining and operating a general educational-occupational information library.

The same system could also be of service to the school administrator who must plan the curriculum. By reviewing students' plans recorded in the system, the administrator should be able to gain new insights into how well the curriculum being offered meets their needs.

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CHAPTER 11

An Empirical Occupational Classification Derived from a Theory of Personality and Intended for Practice and Research

John L. Holland, Douglas R. Whitney, Nancy S. Cole, James M. Richards, Jr.

This is a revision of the occupational classification scheme first proposed and tested in an earlier study (Holland, 1966b). The many desirable features of this revised classification enhance its potential value both for research and for vocational guidance and personnel work.

The Original Classification

In 1959, Holland proposed an *a priori* occupational classification of six categories. From 1959 to 1965, this classification was used in several theoretical studies, but it was neither *directly* tested for its value as a classification system nor explicitly defined for clear and easy use.

The authors are indebted to the following people for their constructive assistance: Linda R. Shevel, Leonard L. Baird, Charles F. Elton, Evelyn A. Bollinger, and Janis S. Walton.

Later Holland (1966b) defined the major categories of the classification —Realistic, Intellectual, Artistic, Social, Enterprising, and Conventional —in terms of the six Vocational Preference Inventory (VPI) scales having the same names. The assumption that occupational titles in the VPI scales define comparable categories in the classification made an explicit reconstruction of the classification possible.

To obtain the first empirical version of the classification (Holland, 1966a), a profile of VPI means was calculated for students planning to enter each occupation. An occupation's coded profile (highest scale mean first, next highest scale second, etc.) defined an occupation's place in the classification. For example, an occupation with a code of RIES was placed in the major category—Realistic. The remainder of the code indicated that occupation's particular subgroup within its major category. The application of this procedure to the VPI data for 12,432 college freshmen in 31 institutions (Abe, Holland, Lutz, & Richards, 1965) produced separate classifications for men and women. The classification for men included all six major VPI categories (Realistic, Intellectual, Artistic, Social, Enterprising, and Conventional), each with one or more subgroups. The VPI data for women yielded only four major groups (Intellectual, Artistic, Social, Conventional) with a number of subgroups within each of the major categories.

This first classification was tested for its usefulness in a series of studies. In the first study, Holland (1966a) obtained several favorable results: The classification developed from one sample (N = 12,432 college students) produced expected results when applied to another sample (N = 10,646 college students). When students were grouped into six categories according to their occupational choice, their highest mean score occurred on the corresponding VPI scale; that is, students who chose occupations previously classified as "Realistic" had the Realistic scale of the VPI as their highest mean score. Also, their mean on that scale was higher than the Realistic mean of any other occupational group. Without exception, similar findings held for the remaining occupational groups of men and women.

In a second study, Holland (1968b) demonstrated that individual profiles using one, two, and three scales could be interpreted according to his theory of personality types. For example, Realistic peaks were associated with technical competencies and mechanical ability; Intellectual peaks were associated with scientific competencies, mathematical ability, etc. Students with the same high point scale can still be distinguished by their second highest VPI scale. And students whose first two highest scales were the same, can still be distinguished by

their third highest scale. For these three levels of predictive difficulty, 64–84 percent of the theoretical predictions of peaks for students with different characteristics were correct for large samples of men and women.

In a third study, Holland and Whitney (1968) applied the classification to longitudinal data and obtained unusually efficient predictions of vocational aspirations over an 8- to 12-month interval. For example, 79 percent of the men and 93 percent of the women indicate successive vocational choices that were described as related or lawful rather than random. In this later study, a comparison of Holland's (1966a) and Roe's (1956) classification systems suggested that the original Holland classification appeared to be somewhat more efficient for prediction. (At the same time, Holland's scheme may have enjoyed some advantages because it was developed from earlier data using the same sample of college students.)

In an unpublished reanalysis of four-year longitudinal data from a national sample of college students (Astin & Panos, 1968), we applied the classification scheme and obtained closer relationships between successive vocational choices than had the original authors. In several other unpublished analyses, we again found higher relationships between successive occupational choices (Davis, 1965; Sharp, & Krasnegor, 1966; and others). Generally, these gains in predictive efficiency were large because most informal classifications create categories consisting of occupations known to be psychologically diverse.

Finally, Richards (in Holland, 1968a) performed diagonal factor analyses to determine whether or not each VPI scale measures a dimension independent of what the scales have in common. The results of separate analyses for large samples (3,771 men and 3,492 women) clearly demonstrate that each scale does measure something different from the others, or there are at least six kinds of people. There may be more, but not fewer.

In short, the original classification produces efficient predictions, contains a set of concepts each with some unique variance, and provides explicit interpretations of class membership.

The Revised Classification

The following is the latest revision of Holland's (1966a) classification. For this revision, Vocational Preference Inventory (VPI) data for a large sample of two-year college students (12,345 men and

7,968 women) were added to the data obtained in 1966 for four-year college students. Data from some samples of employed adults were also added to the classification. These additions made the classification more comprehensive and reliable.

In this revision, occupations were assigned to classes exactly as before; that is, coded mean VPI scores of all students aspiring to an occupation indicated an occupation's place in the classification.

In the first classification, the arrangement of subgroups within a major class had no special meaning. In the revision, however, the major classes and subclasses were arranged according to the following hexagonal model (see Figure 1). The hexagonal model was discovered somewhat accidentally when we noticed that an intercorrelational matrix for the VPI scales used in the classification could be approximated by the distances within the hexagon. Subsequent examination of correlation matrices for nine different samples revealed that the hexagonal model provided satisfactory approximations.

The Revised Occupational Classification

In Tables 1 through 11 on the following pages, note these abbreviations. Under the heading Sample, 2 indicates two-year college students and 4 indicates four-year college students, and E indicates a sample of employed adults. Italic type indicates tied codes or identical average scores on the Vocational Preference Inventory.

If two- and four-year samples were obtained for an occupation they

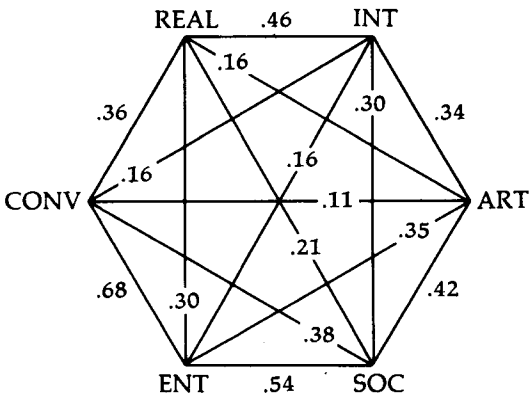

FIGURE 1. A Hexagonal Model for Interpretating Inter- and Intra-Class Relationships

are placed together. Note that the codes obtained from different samples are usually similar. The placement of occupations with different codes (two-year vs. four-year) was sometimes an ambiguous decision.

TABLE 1. Realistic Class (Men)

Sample	*Occupation*	*Code*	*N*	*Sample*	*Occupation*	*Code*	*N*
4	Architect	RIAE	83	2	Electronic Eng. Technician	RIEC	163
2	Architectural Draftsman	RIAE	237	2	Engineer	RIEC	246
2	Forester	RISE	151	2	Industrial Eng. Technician	RIEC	106
4	Forester	RISE	105	4	Industrial Engineer	RIEC	37
4	Geographer	RISE	12	2	Mechanical Eng. Technician	RIEC	398
4	Industrial Arts Teacher	RISE	50	4	Mechanical Engineer	RIEC	152
2	Industrial Arts Teacher	(RSIE)	39	2	Metal/Machine Worker	RIEC	102
4	Trades & Industrial Teacher	RISE	27	4	Agronomist	REIS	166
2	Draftsman	RIEA	256	2	Construction Worker	REIS	103
2	Aviation Worker	RIES	149	2	Air Conditioning Eng. Technician	REIC	55
2	Farmer	RIES	190	2	Mechanics Worker	REIC	248
4	Farmer	RIES	61	2	Printer	RESI	66
2	Architectural & Civil Eng. Tech.	RIEC	265				
4	Civil Engineering	RIEC	185				
2	Electrical Worker	RIEC	604				

TABLE 2. Intellectual Class (Men)

Sample	*Occupation*	*Code*	*N*	*Sample*	*Occupation*	*Code*	*N*
4	Anthropologist	IASR	12	2	Biological Scientist	IRSA	136
4	Physicial Therapist	IASR	9	4	Botanist	IRSA	12
4	Physician	ISAE	354	2	Medical Technologist	IRSA	53
2	Physician	(ISAR)	101	4	Medical Technologist	IRSA	9
4	Biological Scientist	ISRA	36	4	Oceanographer	IRSA	9
4	Biologist	ISRE	55	2	Physical Scientist	IRSA	54
4	Natural Science Teacher	ISRE	86	4	Zoologist	IRSA	33
4	Physical Scientist	ISRE	5	2	Optometrist	IRSE	20
4	Mathematics Teacher	ISRC	138	4	Veterinarian	IRSE	120
4	Home Economist	IESA	5	2	Veterinarian	IRSE	76

(Continued)

(TABLE 2, *Continued*)

Sample	*Occupation*	*Code*	*N*	*Sample*	*Occupation*	*Code*	*N*
4	Physiologist	IESA	12	2	X-Ray Technician	IRSE	39
	Pharmacist [a]	IESR	374	4	Chemical Engineer	IREA	94
4	Pharmacist	IESR	51	4	Electrical Engineer	IREA	259
2	Pharmacist	(IERS)	48	2	Metal Eng. Tech.	IREA	19
4	Dentist	IERS	120	2	Aerospace Eng.		
2	Dentist	(ISER)	67		Tech.	IRES	188
4	Astronomer	IRAS	14	2	Chemical Eng.		
4	Chemist	IRAS	87		Tech.	IRES	80
4	Geologist	IRA*S*E	19	4	Military Officer	IRES	80
4	Physicist	IRAS	61	4	Aeronautical Eng.	IREC	77
E	Engineer/			4	Metallurgical Eng.	IR*E*C	14
	Technician	IRAS	58	4	Mathematician/		
4	Engineering				Stat.	IR*C*E	80
	Scientist	IRAC	44	2	Mathematician	(IRSE)	74
4	Biochemist	IRSA	15				

[a] Students and faculty from three schools of pharmacy.

TABLE 3. Artistic Class (Men)

Sample	*Occupation*	*Code*	*N*	*Sample*	*Occupation*	*Code*	*N*
4	Speech Teacher	ASER	10	4	Philosopher	ASIE	10
4	Actor-Drama			4	Writer	ASIE	42
	Coach	ASEI	19	E	Advertising Man	AESI	46
2	Cosmetologist	ASEI	5	4	Journalist	AESI	58
4	English Teacher	ASEI	67	2	Journalist	(ASEI)	62
2	Speech/Drama			2	Photographer	A*R*IS	100
	Teacher	ASEI	40	4	Foreign Language		
4	Art Teacher	ASIE	29		Interpreter	AISE	6
4	Music Teacher	ASIE	63	4	Literature Teacher	AISE	10
2	Musician	ASIE	86	2	Artist	AIRS	179
4	Musician	(ASEI)	41	4	Artist	(AISE)	45

TABLE 4. Social Class (Men)

Sample	*Occupation*	*Code*	*N*	*Sample*	*Occupation*	*Code*	*N*
2	Physical Ed.			2	Dental		
	Teacher	SERI	274		Technologist	SIER	8
4	Physical Ed.			4	Elementary		
	Teacher	(SRIE)	272		Teacher	SIER	117
E	Counselor	SEIA	58	2	Social Scientist	SIER	50

(Continued)

(TABLE 4, *Continued*)

Sample	*Occupation*	*Code*	*N*	*Sample*	*Occupation*	*Code*	*N*
4	Counselor	(SEAI)	36	4	Experimental Psychol.	SIEA	23
4	Educational Psychology	SEIA	9	2	Foreign Language Inter.	SI*E*A	21
4	Historian	SEIA	57	4	Social Worker	SIEA	19
2	Historian	SEIA	123	2	Mortician	SIRE	13
4	History Teacher	SEIA	202	2	Therapist	SIRA	23
E	Jr. Col. Administrator	SEIA	16	2	Nurse	SIAE	34
4	Foreign Service Officer	SEAI	35	2	English Teacher	SAER	39
4	Industrial Psychologist	SEAI	17	4	Foreign Lang. Teacher	SAER	17
2	Sociologist	SEAI	57	2	Social Service Worker	SAEI	76
4	Sociologist	SE*A*I	15	E	Clergyman	SAIE	32
2	Teacher	SEAI	739	4	Clergyman	SAIE	77
2	Policeman	SREI	318	2	Clergyman	(SAER)	47
4	Librarian	SR*I*A	6	4	Clinical Psychologist	SAIE	42
2	Librarian	(SIAR)	5	2	Psychologist	SAIE	137
4	Special Ed. Teacher	SRIA	8				

TABLE 5. Enterprising Class (Men)

Sample	*Occupation*	*Code*	*N*	*Sample*	*Occupation*	*Code*	*N*
4	Buyer	ECRI	16	4	Public Relations & Advertising	EACS	40
2	Clothing Technologist	ECRS	9	4	Lawyer	EASI	288
2	Real Estate Agent	ECRS	43	2	Lawyer	(ESAI)	244
2	Economist	ECSR	45	4	Government Officer	ESCA	19
4	Economist	(ECIS)	14	2	Secretary	ESCA	15
4	Manager/ Administrator	ECSR	360	2	Food & Hotel Technologist	ESRC	137
2	Manager/ Administrator	ECSR	1178	4	Educational Administrator	ES*A*I	8
2	Salesman	ECSR	309	4	Political Scientist	ESAI	76
4	Salesman	(ECRS)	64	2	Political Scientist	(SEIA)	54
4	Marketing Man	ECSI	45	E	Security Salesman	ESAI	37
2	Radio/TV Announcer	ERAS	157				

TABLE 6. Conventional Class (Men)

Sample	*Occupation*	*Code*	*N*	*Sample*	*Occupation*	*Code*	*N*
4	Clerk	CRES	6	4	Finance Expert	CEIS	91
4	Business (Commercial) Teacher	CSER	23	2	Accountant	CESR	605
2	Data Processing Worker	CERI	502	4	Accountant	(CERS)	279

TABLE 7. Intellectual Class (Women)

Sample	*Occupation*	*Code*	*N*	*Sample*	*Occupation*	*Code*	*N*
4	Architect	IASE	8	2	Physical Scientist	ISAE	6
4	Agronomist	IASR	15	4	Physician	ISAE	79
2	Veterinarian	IASR	28	2	Physician	ISAE	38
4	Veterinarian	(ISAR)	16	4	Zoologist	ISAE	13
2	Farmer	IACSR	8	4	Biochemist	ISAR	12
4	Physicist	IARS	7	2	Biological Scientist	ISAR	42
4	Biologist	ISAE	40	4	Biological Scientist	ISAR	21
2	Chemical Eng. Technician	ISAE	10	4	Chemist	ISAR	25
2	Medical Technologist	ISAE	127	4	Mathematician/ Statistician	ISCA	54
4	Medical Technologist	(SIAE)	111	2	Mathematician	(SCIA)	36
4	Natural Science Teacher	ISAE	45	4	Pharmacist [a]	ISEA	46
				2	Pharmacist	(ISCE)	7
				4	Pharmacist	(SIAE)	15

[a] Students and faculty from three schools of pharmacy.

TABLE 8. Artistic Class (Women)

Sample	*Occupation*	*Code*	*N*	*Sample*	*Occupation*	*Code*	*N*
4	Actress/Drama Coach	ASEI	18	2	Printer	ASEIC	5
4	Foreign Language Interpreter	ASEI	42	2	Radio/TV Announcer	ASEI	15
4	Foreign Service Worker	ASEI	36	2	Speech/Drama Teacher	ASEI	38
2	Industrial Arts Teacher	ASEI	5	2	Draftsman	ASRE	8
4	Industrial Psychologist	ASEI	8	4	Art Teacher	ASIE	93
4	Journalist	ASEI	57	2	Artist	ASIE	217
				4	Artist	ASIE	92
				4	Literature Teacher	ASIE	22
				4	Writer	ASIE	52

(Continued)

(TABLE 8, *Continued*)

Sample	*Occupation*	*Code*	*N*	*Sample*	*Occupation*	*Code*	*N*
2	Journalist	(ASIE)	54	4	Civil Engineering	ASIC	6
4	Music Teacher	ASEI	74	2	Architectural		
2	Musician	ASEI	50		Draftsman	ASIR	14
4	Musician	(ASIE)	43	2	Photographer	AIES	17

TABLE 9. Social Class (Women)

Sample	*Occupation*	*Code*	*N*	*Sample*	*Occupation*	*Code*	*N*
4	Psychologist	SEIA	6	2	Foreign Language		
4	Buyer	SEAC	55		Teach.	SAEI	50
4	Educational			4	Historian	SAEI	24
	Psychologist	SEAC	15	2	Historian	(SAIE)	50
2	Food & Hotel			4	History Teacher	SAEI	154
	Technician	SEAC	53	4	Home Ec. Teacher	SAEI	153
2	Saleswoman	SEAC	95	4	Home Economist	SAEI	184
4	Saleswoman	SEAC	25	2	Home Economist	(SEAI)	72
4	Business Teacher	SCEA	89	4	Phys. Ed. Teacher	SAEI	239
4	Clerk	SCEA	94	2	Phys. Ed. Teacher	SAEI	163
2	Industrial Eng.			2	Policewoman	SAEI	12
	Tech.	SCEA	6	4	Social Worker	SAEI	140
2	Manager	SCEA	77	4	Speech Teacher	SAEI	22
4	Manager	(SEAC)	22	4	Special Ed.		
2	Secretary	SCAE	1024		Teacher	SAEI	145
4	Secretary	SCAE	267	2	Cosmetologist	SACE	30
2	Dental			2	Medical Secretary	SACI	201
	Technologist	SIAE	6	4	Aeronautical		
2	Nurse				Engineer	SAIE	9
	(Professional)	SIAE	952	4	Astronomer	SAIE	6
4	Nurse			4	Church Worker	SAIE	34
	(Professional)	(SAIE)	301	2	Church Worker	(SAEI)	11
2	Nurse (L.P.N.)	SIAE	75	4	Clinical		
4	Physical Therapist	SIAE	32		Psychologist	SAIE	48
2	X-Ray Technician	SIAE	62	4	Dentist	SAIE	32
4	Mathematics			2	Dental Hygienist	SAIE	209
	Teacher	SIAC	114	4	Experimental		
2	Optometrist	SIAC	5		Psych.	SAIE	12
2	Housewife	SAEC	166	2	Librarian	SAIE	33
4	Housewife	(SAEI)	122	4	Librarian	(SAEI)	32
2	Lawyer	SAEC	48	4	Political Scientist	SAIE	32
4	Lawyer	(SAEI)	32	2	Political Scientist	(SAEI)	16
4	Public Relations			2	Psychologist	SAIE	98
	& Adv.	SAEC	13	2	Social Service		
2	Clothing				Worker	SAIE	190
	Technologist	SAEI	43	2	Social Scientist	SAIE	30

(Continued)

(TABLE 9, *Continued*)

Sample	*Occupation*	*Code*	*N*	*Sample*	*Occupation*	*Code*	*N*
E	Counselor	SAEI	28	2	Sociologist	SAIE	55
4	Counselor	SAEI	76	4	Sociologist	(SAEI)	34
4	Elementary Teacher	SAEI	1497	2	Teacher	SAIE	1477
4	English Teacher	SAEI	306	2	Therapist	SAIE	84
2	English Teacher	SAEI	78	2	Aviation Worker	SAIC	10
4	Foreign Language Teach.	SAEI	117	2	Dental Assistant	SAIC	110

TABLE 10. Enterprising Class (Women)

Sample	*Occupation*	*Code*	*N*	*Sample*	*Occupation*	*Code*	*N*
4	Marketing Woman	ECSA	5	2	Real Estate Agent	ESAC	13

TABLE 11. Conventional Class (Women)

Sample	*Occupation*	*Code*	*N*	*Sample*	*Occupation*	*Code*	*N*
2	Accountant	CSEA	174	2	Data Processing Worker	CSEA	251
4	Accountant	CSEA	42	4	Finance Expert	CESI	7

A mathematical verification of the hexagonal configuration was obtained by using factor analysis to locate the six VPI scales in a three dimensional space. From the correlation matrix of the six scale scores given in the *Guidance Profile Manual* (Holland, 1968a, pp. 35–36) principal component analyses were computed separately for men and women. The first three dimensions or factors accounted for 78 percent and 76 percent of the trace respectively, and the succeeding steps used only these three dimensions.

All six scales had large positive loadings on the first factor. Thus, in the three-space defined by the three factors, the six points fell very nearly in a plane. By using the (6 x 3) factor loading matrix to locate the six points in this three-space, the smallest characteristic vector of the covariance matrix of the three factors is in the direction which minimizes the deviation from a plane fitting the six points. The two largest characteristic vectors correspondingly define this "best-fitting"

plane. When the points in three-space (the six VPI scales) are projected onto this plane, the result is a two-dimensional representation of the six points which is given in Figure 2 for men and Figure 3 for women.

The excellent fit of the points in the three-space to the plane is clear from the fact that the third characteristic root (showing deviation from the plane) accounted for only .2 percent and 1.1 percent of the trace for men and women, respectively. Thus the principal variation ignored in these analyses is that involved in the fourth, fifth, and sixth factors of the original correlation matrix, and even this, as noted, is a minor source of variation.

Since all six variables had high positive loadings on the first factor, which represents an overall checking rate on the VPI (one kind of response set), they lay very nearly in a plane approximately perpendicular to the first factor. Fitting a plane to minimize the deviation of the points from it and projecting the six points onto this "best-fitting" plane resulted in the configurations for men in Figure 2 and for women in Figure 3.

The data in the illustrative hexagon is for a 10 percent sample of 1,234 out of 12,345 male two-year college students in 65 colleges. A sample of 796 out of 7,968 females in the same colleges produces similar results. This simple geometric model arranges student occupa-

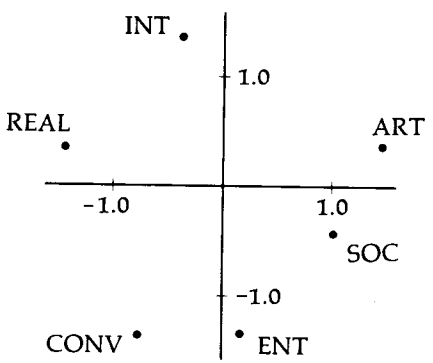

FIGURE 2. Configuration of Six VPI Scales in a "Best-Fitting" Plane from Analysis of the Correlation Matrix for Men

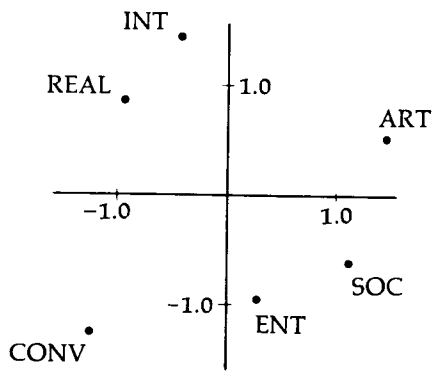

FIGURE 3. Configuration of Six VPI Scales in a "Best-Fitting" Plane from Analysis of the Correlation Matrix for Women

tional aspirations according to their psychological relatedness, thereby making the classification more useful for vocational guidance and research in careers. The hexagonal model arranges the main categories in the following order—Realistic, Intellectual, Artistic, Social, Enterprising, and Conventional (proceeding around the hexagon in a clockwise direction)—so that adjacent main categories are most closely related (see the hexagon in Figure 1). In general, close relationships are represented by short distances on the hexagon.

We can apply the same principle of arrangement to the subgroups within a major category by observing the following rules. Within a major category, arrange the subgroups so that the second code letters follow in clockwise order starting from the major category's first code. In the same manner, arrange subgroups whose first two letters are identical by the third (and finally, fourth) letter. For example, in the Realistic category, RI (Realistic-Intellectual) subgroups precede RA (Realistic-Artistic) subgroups, RAE (Realistic-Artistic-Enterprising) precede RAC (Realistic-Artistic-Conventional), and RIAS (Realistic-Intellectual-Artistic-Social) precede RIAC (Realistic-Intellectual-Artistic-Conventional). The application of this simple rule places the first subgroup in a main category close to the major category on the right, places the middle subgroups at a neutral or distant point, and places the last subgroup closest to the major category on the left.

The practical outcomes of rearranging the main categories and subcategories following the hexagonal model are largely unclear and untested at this time. A review of this arrangement does suggest that the hexagonal model provides a more psychologically based arrangement; that is, subgroups of occupations that seem to go together—because of their codes and therefore their assumed psychological similarity—appear to be placed close to each other more frequently than in the original classification. The value of the hexagonal arrangement for the main classes is clearly supported by an earlier longitudinal study (Holland & Whitney, 1968). In that study, if students changed their occupational preference, the majority of such changes were accomplished by movement to an adjacent major category where "adjacent" is defined by the hexagonal model. Concretely, a change from a Realistic choice to an Intellectual or Conventional choice is a change to an adjacent category. More investigation will determine the value of the hexagonal arrangement for subclasses although the arrangement implies some interesting hypotheses about the nature of relationships among similar occupations.

To summarize, we now assume that the revised classification has

the following desirable characteristics: (a) an explicit theory for interpreting class membership, for organizing information about occupations, and for revising the classification; (b) mutually exclusive classes; (c) efficient forecasting ability for several purposes; and (d) provision for explicit extension to unclassified occupations by the application of a single, empirical technique. Since the VPI scales are measures of personality as well as interests, and since people with similar interests have similar personalities, we assume that the occupational classification organizes similar personalities in some practical and scientific ways.

At the same time, the revised classification still has some deficiencies, including (a) a lack of comprehensiveness, despite classifying all the common occupations aspired to by two- and four-year college students; and (b) unstable definitions, because different samples of occupational aspirants and employed adults for the same occupation produce similar but not always identical VPI profiles; consequently, the precise place of an occupation in the classification is sometimes unclear; (c) the value of the hexagonal arrangement is only partially explored so that it should be termed promising rather than substantiated; and finally, (d) employed adult samples may provide different VPI profiles, although a few adult samples in the present classification imply that this occurrence is a remote possibility.

Some Practical Uses

The potential uses of the classification are most promising for vocational guidance, personnel work, and research. In vocational guidance, the classification can be used to organize vocational information files and readings. Because the classes and subclasses arrange materials according to their "relatedness"—how psychologically distant one occupation is from another, or how far one occupational group is from another—students can use the classification for occupational exploration with little help. For example, counselors can use a student's current occupational choice, history of choices, or interest inventory scores to direct a student to appropriate occupational materials and to encourage him to look also at closely related materials.

The classification should also help interpret interest inventories, student occupational choices, and other student data in terms of a single theory. To illustrate, a boy's choice of mechanical engineering would be coded RIEC. And, if his Kuder code were Mechanical-Scientific-Persuasive-Computational, his profile would be equivalent to the classification code of RIEC. A student's Kuder profile can be trans-

lated into the Holland categories (see Holland, 1966b, p. 37). The counselor could also assess a student for his resemblance to a person with a personality pattern of RIEC. The counselor might use the classification to show the student other RIEC occupations such as civil engineering or industrial engineering.

If he is unsure about his initial choice, the student can be directed to occupations in such related subgroups as aviation (RIES), farming, (RIES), or drafting (RIEA). "Undecided" students or students unable to make choices can first explore the entire classification and then use occupational files organized by the same classification to obtain specific information.

A person's conflicting occupational choices can also be classified and examined for their special character and psychological distance from one another. Using the theory, a counselor can explicitly and theoretically define a student's occupational conflict—a process which might aid both the student and his counselor. For example, a boy trying to decide between engineering (RIEC) and farming (RIES) should experience little conflict. A discussion of "C" and "S" or "Conventional" and "Social" types might simplify his decision. In contrast, a boy who is trying to decide between chemistry (IRAS) and law (ESAI) has a much more difficult task because his interest in such diverse occupations mirrors diverse personal opinions about himself.

The classification may aid industrial personnel work; subgroups of similar occupations could be used in recruitment to center attention on potentially profitable recruitment areas. For instance, if recruiters need trainees for a specific occupation and cannot find enough prospects, the classification specifies related occupations which might yield interested candidates. Because most organizations find that some types of people are more successful than others, the classification provides a systematic nomenclature for interpreting this common occurrence and using the information accordingly. For example, employees with long and short tenure can be compared in terms of their VPI profiles.

Finally, and equally important, the classification creates some exciting research possibilities. The four-letter codes provide theoretical descriptions for the typical person in each occupation. These theoretical descriptions should be helpful for interpreting occupational data and occupational differences. For example, a male social worker (SIEA) should display the characteristics of Social-Intellectual-Enterprising-Artistic types and in that order (see Holland, 1966b for information about the types). The classification allows a researcher studying voca-

tional behavior to investigate a person's training, occupational aspirations, and work history within the framework of a single classification and theory. Literally, a person's life can be considered a series of coded choices which can be studied for their patterns, stability, and mathematical relationships. In other research, the classification can be used to organize and interpret occupational census information so that some educational and sociological studies which must now rely on crude, ambiguous classifications will have a more constructive alternative. Depending upon the variety of occupations studied and the size of the sample, a researcher can use the main six categories, the two-, the three-, or the four-letter subcategories. The earlier study (Holland, 1968b) demonstrated that categories become more homogeneous or clearly defined as one moves from single- to two- and three-letter codes. In short, a researcher can modify the classification to meet his particular needs.

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CHAPTER 12

Classification of Occupations

Anne Roe, Dennis Klos

This article will review experience with a two-dimensional classification of occupations in the form proposed in 1956.[1] In this presentation two sets of categories are involved. The eight categories of groups are concerned with the primary focus of the activity; the six categories of levels indicate degrees of personal autonomy, skill, and training. At that time only a small number of occupations were placed in the classification as examples. Although this was sufficient to allow for reasonable reliability (Lunneborg & Lunneborg, 1968), all the occupations listed in the 1966 *Occupational Outlook Handbook* have since been classified. (Copies are available on request.) Table 1 reproduces the classification.

I have felt that while two categories are better than one, a third dimension was needed to give more adequate definition of occupational role. Super (1957) has suggested the addition of another category of Enterprises, i.e., Mining, Construction, etc. We agree that two dimensions are not completely adequate, but for various reasons the suggested

[1] An earlier form was proposed in 1954, which had two sets of eight categories each. Following some checks on reliability as reported by Moser, Dubin, and Shelsky (1956), and a further consideration of internal relationships among the groups the 1956 arrangement was developed.

TABLE 1. Two-Way Classification of Occupations

	Group							
Level	*I Service*	*II Bus. Contact*	*III Organization*	*IV Technology*	*V Outdoor*	*VI Science*	*VII Gen. Cultural*	*VIII Arts & Entmt.*
1	Personal therapists. Soc. work supervisors. Counselors.	Promoters.	U.S. Pres. and Cabinet officer. Industr. tycoon. International bankers.	Inventive geniuses. Consulting or chief engineers. Ships' commanders.	Consulting specialists.	Res. scientist Univ., college faculties. Med. specialists. Museum curators.	Supreme Court Justices. Univ., college faculties. Prophets. Scholars.	Creative artists, Performers, great, Teachers (univ. equivalent). Museum curators.
2	Social wrkrs. Occupational therapists. Probation, truant officers (with training).	Promoters. Public relations counselors.	Cert. public accountants. Bus. & govt. execs. Union officials. Brokers, average.	Applied scientists. Factory managers. Ships' officers. Engineers.	Applied scientists. Landowners and operators (lg). Landscape architects.	Scientists, semi-independent. Nurses. Pharmacists. Veterinarians.	Editors. Teachers, high school and elementary.	Athletes. Art critics. Designers. Music arrangers.
3	YWCA official. Detectives, police sgts. Welfare wrkrs. City inspectors.	Salesmen: auto, bond, insur., etc. Dealers, retail and wholesale. Confidence men.	Accountants, average. Employment managers. Owners, catering, drycleaning, etc.	Aviators. Contractors. Foremen (DOT I). Radio operators.	County agents. Farm owners. Forest ranger. Fish, game wardens.	Technicians, med., X-ray museum. Weather observers. Chiropractors.	Justices of the Peace. Radio announcers. Reporter. Librarian.	Ad writers. Designers. Interior decorators. Showmen.

	Group							
Level	*I Service*	*II Bus. Contact*	*III Organization*	*IV Technology*	*V Outdoor*	*VI Science*	*VII Gen. Cultural*	*VIII Arts & Entmt.*
4	Barbers. Chefs. Practical nurses. Policemen.	Auctioneers. Buyers (DOT I). House canvassers. Interviewers, poll.	Cashiers. Clerks, credit express, etc. Foremen, warehouse. Salesclerk.	Blacksmiths. Electricians. Foremen (DOT II). Mechanics, average.	Laboratory. testers, dairy products, etc. Miners. Oil well drillers.	Technical assistants.	Law clerks.	Advertising artists. Decorators, window, etc. Photographers. Racing car drivers.
5	Taxi drivers. General house workers. Waiters. City firemen	Peddlers.	Clerks, file, stock, etc. Notaries. Runners. Typists.	Bulldozer operators. Deliverymen. Smelter workers. Truck drivers.	Gardeners. Farm tenants. Teamsters, cow-punchers. Miner's helpers.	Veterinary hospital attendants.		Illustrators, greeting cards. Showcard writers. Stagehands.
6	Chambermaids. Hospital attendants. Elevator operators. Watchmen.		Messenger boys.	Helpers. Laborers. Wrappers. Yardmen.	Dairy hands. Farm laborers. Lumberjacks.	Nontechnical helpers in scientific organization.		

solution does not seem effective and another solution will be proposed below.

Studies of Groups

Subdivision into groups is related to factorizations of interest, although not identical with any of them. These groups were then ordered along a continuum believed to express the intensity and nature of the interpersonal relationships involved in the occupational activities, so that contiguous groups are more alike in this respect than noncontiguous ones. The arrangement was thought of as round (cylindrical when levels are included), with Group 8 next to Group 1 as well as to Group 7. The groups are as follows:

1. *Service*—These occupations are primarily concerned with serving and attending to the personal tastes, needs, and welfare of other persons. Included are occupations such as social work and guidance, and domestic and protective services. The essential element is a situation in which one person is doing something for another.
2. *Business Contact*—These occupations are primarily concerned with the face-to-face scale of commodities, investments, real estate, and services. The person-to-person relation is again important, but it is focused on persuasion to a course of action rather than on helping. The persuader will profit if his advice is followed; the advisee is supposed to.
3. *Organization*—These are the managerial and white collar jobs in business, industry, and government—the occupations concerned primarily with the organization and efficient functioning of commercial enterprises and of government activities. The quality of person-to-person relations is largely formalized.
4. *Technology*—This group includes occupations concerned with the production, maintenance, and transportation of commodities and utilities. Here are occupations in engineering, crafts, and the machine trades, as well as in transportation and communication. Interpersonal relations are of relatively little importance, and the focus is on dealing with things.
5. *Outdoor*—This group includes the occupations primarily concerned with the cultivation, preservation, and gathering of crops, of marine or inland water resources or mineral resources, of

forest products and of other natural resources, and with animal husbandry. Because of the increasing mechanization of some of these occupations, perhaps particularly those concerned with the petroleum industry, a number of jobs previously classified in this group have been moved to Group 4. There still remain a great many persons, however, whose work is most appropriately classified here. Interpersonal relations are largely irrelevant.

6. *Science*—These are the occupations primarily concerned with scientific theory and its application under specified circumstances other than technology. Even in scientific research (as in physics) that is not at all person-oriented as well as in such fields as psychology and anthropology, it is clear that there is a relationship to the occupations in Group 7, with some return to more specific personal relations in the medical groups that belong here.
7. *General Culture*—These occupations are primarily concerned with the preservation and transmission of the general cultural heritage. Interest is in human activities rather than in individual persons. This group includes occupations in education, journalism, jurisprudence, the ministry, linguistics, and the subjects usually called the humanities. Most elementary and high school teachers are placed in this group. At higher levels teachers are placed in groups by subject matter—e.g., teachers of science in 6, or art in 8, or humanities in 7.
8. *Arts and Entertainment*—These occupations include those primarily concerned with the use of special skills in the creative arts and in the field of entertainment. For the most part, the focus is on a relationship between one person (or an organized group) and a more general public. The interpersonal relation is important but neither so direct nor of the same nature as that in Group 1.

Papers by Jones (1965) and by Crites (1962) have investigated the possibility of ordering occupations in terms of an interpersonal continuum. Both reports used students as subjects and their preferences or opinions as data, and both indicated that occupations can be ordered along a person-to-person continuum, although they differed somewhat in the exact ordering suggested. For Jones, in terms of the Roe groups, the ordering was 1, 8, 2, 3, 4, 5, 6, 7; for Crites it was 1, 7, 2, 3, 8, 5, 4, 6, with the suggestion that 4, 5, and 6 were hardly distinguishable.

Jones (1965) applied factor analysis to his data and found that about half of the total trace was explained in terms of two factors, the first of

which he interpreted (on the basis of Guilford-Zimmerman scores) as being along a person-oriented, nonperson-oriented dimension.[2]

Whatever the nature of the continuum, if the groups in the classification are ordered meaningfully, it would be expected that this order would predict relationships among occupational choices and the probability of different kinds of changes. That is, choices or changes should most often be within the same group, next most often within contiguous groups, and least often between the most widely separated groups. This has proved to be the case.

Doyle (1965) reported job changes of subjects who were 10 years out of school, finding that 68 percent of these changes were within the same group.

Roe, Hubbard, Hutchinson, and Bateman (1966) analyzed job changes using job histories of 804 men over periods ranging up to 22 years. The data are from questionnaires filled out by men who had taken the Strong Vocational Interest Blank (SVIB) between 1927 and 1933 and again in 1949. As in Doyle's study, 68 percent of the changes[3] were within the same group; of the rest, 19 percent of the changes were to contiguous groups; 6 percent were two-step changes; and three- and four-step changes were 4 percent each. There was some evidence that the arrangement represented a genuine circumplex. A further analysis by Hutchinson and Roe (1968) demonstrated that "when people are grouped according to this classification, their occupational behavior is not random and is associated in some way, direct or indirect, with the group to which they belong."

A study by Osipow (1966) reported that for 70 percent of 375 freshmen, first and second job choices fell into the same or adjacent categories, with the great majority in the same category.

Holland and Whitney (1968), in a study of changes in vocational plans of college students, found, using their own classification of occupations, that the majority of students gave occupational choices on a second occasion, which belonged to the same or related occupational classes as they had selected on the first occasion. Holland then classified their occupations according to the Roe scheme. Sixty-seven percent of the men and 62 percent of the women gave second choices in the same category as their first choices, but only 9 percent of each selected

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[2] Cooley (1967), on the basis of his studies of developing science interests, and of studies of Project TALENT data, has proposed a hierarchy of developing interests, with an early differentation into science- or people-oriented, and with later differentiations within these groups.

[3] Normal advancement within an organization was not considered a job change.

contiguous categories. In an examination of those who changed categories, Holland's scheme was a somewhat more efficient predictor.

As was noted, the arrangement of the groups has been considered not only as along a continuum but as circular. A circle, however, has two dimensions, and some further analysis is in order to attempt some understanding of the nature of the second dimension.

The second factor reported by Jones (1965) was interpreted by him as representing,

> to use Riesman's terms, "other-directed" versus "inner-directed" occupations. Other-directed occupations are those where the goals are external to the individual (e.g., income, power, prestige); inner-directed occupations are those where the goals are internal (i.e., a sense of accomplishment, helping others, discovering one's place in nature, etc.). We could also, perhaps, interpret Factor II as theoretical versus economic values.

Figure 1 reproduces his plot of these relationships, but it is reoriented in order to compare it more easily to other analyses.

Klos (1967) has examined the implications of applying Parson's and Shil's General Theory of Action. According to this theory, when a role is institutionalized as an occupation, the behavior of the person acting-in-role can be judged as relatively appropriate or inappropriate, adequate or inadequate, on the basis of a set of complementary expecta-

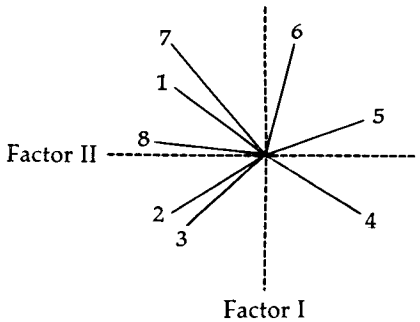

FIGURE 1. From Jones. Category relationships underlying the Roe classificatory scheme (Length of test vectors equal to the square root of the test's total variance accounted for by the two dimensions)

tions concerning the performer's actions and those of others with whom he interacts. Three of the five "pattern variables" (or "fundamental action choice dichotomies") specified by Parsons and Shils (1951) are determined and are the same for all occupations; occupational role performance is characterized by affective neutrality, universalistic primacy, and collectivity-orientation. The remaining pattern variables (diffuseness vs. specificity and attributes vs. performance) are determined but are not the same for all occupations; the role performer's orientation to social and nonsocial objects varies accordingly with the type of occupation. The analysis is represented graphically in Figure 2.

"These considerations lead to two conclusions: (1) Roe's ordering of groups is identical to the order that would arise from differentiating them on the basis of Parsons and Shils' theory; and (2) on the basis of the pattern variable conception, we can hypothesize that the underlying dimensions are role performers' orientations to *interpersonal relations vs. natural phenomena* and to *purposeful communication vs. resourceful utilization*" (Parsons & Shils, 1951).

Holland, Whitney, Cole, and Richards (1969) have now arranged Holland's six occupational categories in a hexagon, so that adjacent main categories are most closely related. Holland presents a configuration of his scales in a "best-fitting" plane from analysis of the correlation matrix for men, as shown in Figure 3. Although his categories are not directly comparable to those of the Roe system, the major axes of his plane are comparable to the two main dimensions shown in Figure 2. (His figure is reversed for comparison.) That is, Enterprising versus Intellectual is not far from Orientation to Resourceful Utilization versus Orientation to Purposeful Communication, and Artistic and Social versus Realistic is comparable to Orientation to Interpersonal Relations versus Orientation to Natural Phenomena.

In view of these studies we propose continuing the groups in the same arrangement. Further studies should help in analysis of the necessary second factor.

Studies of Levels

This classification is based upon degrees of responsibility, capacity, and skill. It should be noted that these factors are not exactly correlated. Whenever there are marked differences, level of responsibility is considered primary. By level of responsibility is meant not only the number and difficulty of the decisions to be made but also how many different kinds of problems must be decided. It should be realized

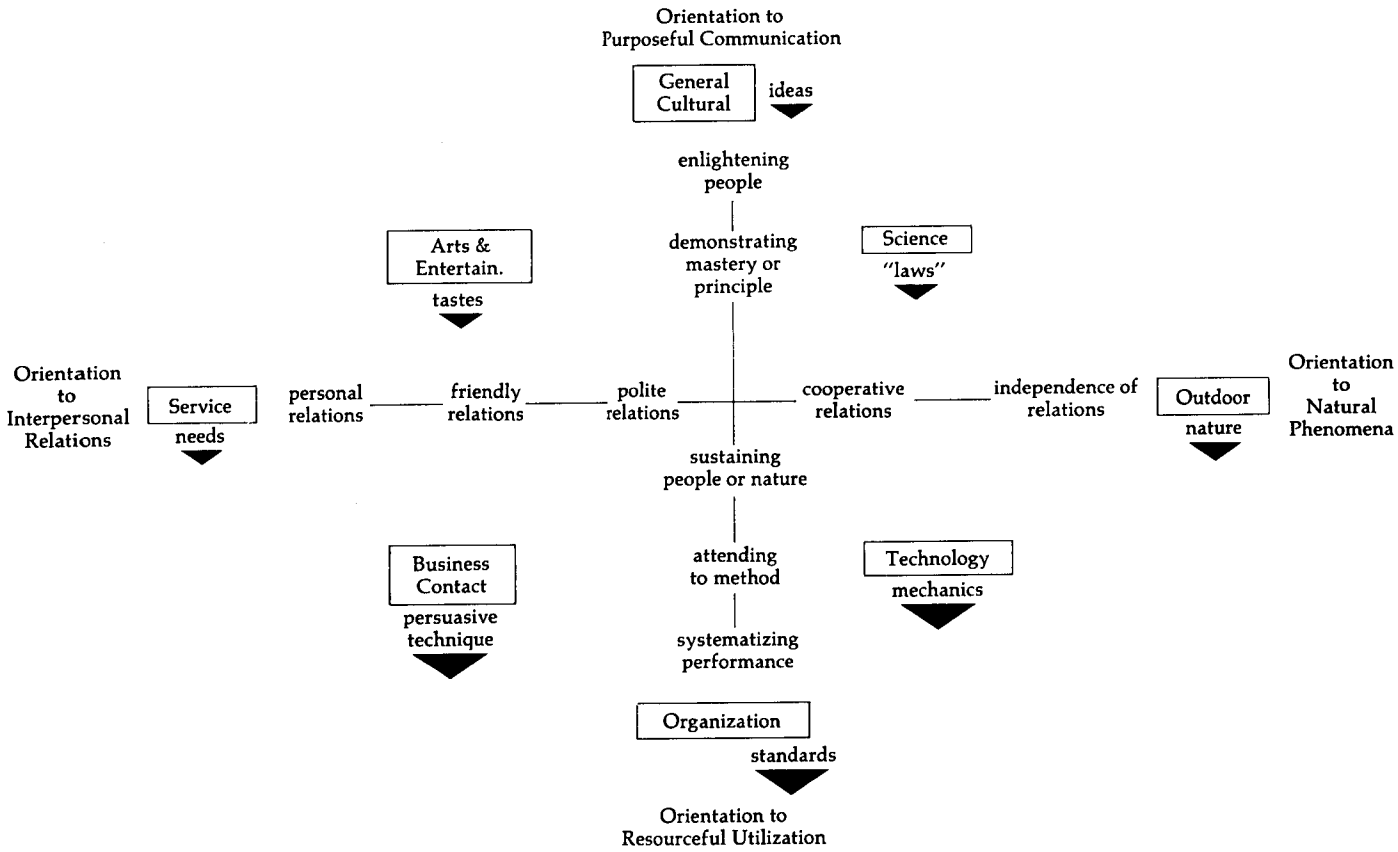

FIGURE 2. Occupational groups ordered by role performers' orientations to people, key data, and natural phenomena

Note.—Hypothesized horizontal dimension—Role performer's orientation to *interpersonal relations versus natural phenomena*
Hypothesized vertical dimension—Role performer's orientation to *purposeful communication versus resourceful utilization*
Hypothesized "key data" are listed near each occupational group.

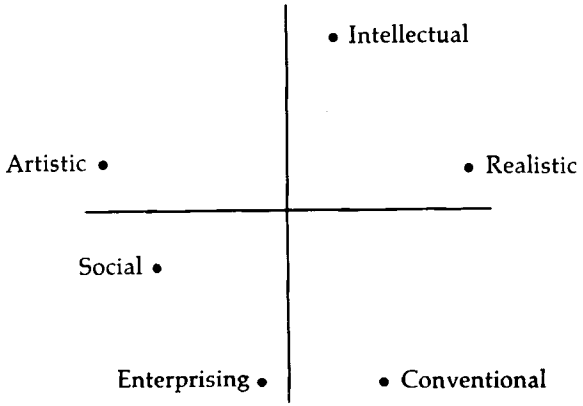

FIGURE 3. From Holland et al. Configuration of six VPI scales in a "best-fitting" plane for analysis of the correlation matrix for men.

that this dimension is essentially a continuum and that each level includes a range of responsibilities. The levels follow:

1. *Professional and managerial 1: Independent responsibility*—This level includes not only the innovators and creators but also the top managerial and administrative people, as well as those professional persons who have independent responsibility in important respects. For occupations at this level there is generally no higher authority, except the social group. Several criteria are suggested: (a) important, independent, and varied responsibilities; (b) policy-making; (c) education—when high level education is relevant (it is not required in the creative arts, for example, or a necessity for dictators, or even for our own high government officials), it is at the doctoral level or equivalent.
2. *Professional and managerial 2*—The distinction between this level and the previous one is primarily one of degree. Genuine autonomy may be present but with narrower or less significant responsibilities than in Level 1. Suggested criteria are: (a) medium-level responsibilities, for self and others, both with regard to importance and variety; (b) policy interpretation; (c) education at or above the bachelor level, but below the doctorate or its equivalent.
3. *Semi-professional and small business*—The criteria suggested here are: (a) low-level responsibility for others; (b) application

of policy, or determination for self only (as in managing a small business); (c) education, high school and technical school or the equivalent.

4. *Skilled*—This and the following levels are classical subdivisions. Skilled occupations require apprenticeship or other special training or experience.
5. *Semi-skilled*—These occupations require some training and experience, but markedly less than the occupations in Level 4. In addition, there is much less autonomy and initiative permitted in these occupations.
6. *Unskilled*—These occupations require no special training or education and not much more ability than is needed to follow simple directions and to engage in simple repetitive actions. At this level, group differentiation depends primarily upon the occupational setting.

In originally assigning level classifications, particularly in industry, heavy reliance was placed on the old *Dictionary of Occupational Titles* (DOT) classification. The new DOT classification does not use the Skilled, Semi-skilled, and Unskilled categories, but instead level of complexity of industrial jobs is best reflected by the fourth digit (Data) of the new DOT code.[4]

For Group 4 occupations, Technology, the following equivalents to the DOT code have been used as guides, although some exceptions have been made on the basis of the sixth digit (Things). Where the Things category is more significant for the particular occupation than the data category, Roe levels depend more upon digit 6 than upon digit 4.

Group 4 Occupations

Digit 4 DOT	Roe	Digit 6 DOT	Roe
0 to 3	Level 4	0, 1, 2	Level 4
4 to 7	Level 5	3, 4	? individually determined
8	Level 6	5, 6, 7	Level 6

It was noted earlier that differences among levels included a marked

[4] It should be noted that the new DOT in effect uses a three-way classification of occupations in terms of Data, People, and Things, with their digits 4, 5, and 6 giving each occupation a designation of level in each of these functions. It is an interesting comment upon modern developments that the key digit for level locations for industrial jobs in the code is that for Data, and that in their use of the code the data in digit 6 are subsumed under the lower levels of digit 4.

tendency for persons in Levels 3 to 6 to show decreasing intelligence and education, but there is great overlapping, and at every level there are persons with higher intelligence and education than the mean of higher levels. Also, in general an increasing dislike for regimentation and supervision is expected as the level becomes higher.

There seems to be only one study of the validity of this level classification. Borgen and Weiss (1968) report data permitting a direct test of the relationship between these level categories and several empirically measured characteristics of occupations. Their instrument, the Minnesota Job Description Questionnaire, assesses the differential reward characteristics of occupations. Subjects were 2,976 immediate supervisors of workers in 81 different occupations and several hundred different firms. They conclude:

> The results of this study provide empirical confirmation for several of the dimensions which Roe (1956) postulates as underlying her classification of occupations level. Specifically, these results imply that in higher level occupations in Roe's system, workers are more likely to "make decisions on their own" (Responsibility), "try out their own ideas" (Creativity), "plan their work with little supervision" (Autonomy), and, to a lesser degree, "tell other workers what to do" (Authority). In addition to these specific expectations derived from Roe's system, the results indicated several other dimensions of reinforcement which are significantly related to Roe's occupational Level. Workers at higher Roe levels appear to be more likely to "get a feeling of accomplishment" (Achievement), "make use of their individual abilities" (Ability Utilization), "have the position of 'somebody' in the community" (Social Status), and less likely to "have bosses who train their men well" (Supervision-Technical).
>
> Moreover, it was found that Roe's level was substantially related, with an omega-squared value of .48, to the neutral point on the scaling of the ORPs. For these data the neutral point is equivalent to the average *number of reinforcers* perceived as salient in the occupational environment. Thus, an unexpected, but provocative, outcome of this study is the suggestion that the number of occupational rewards available to workers is related to the level of their occupation. These results are provocative because they appear to provide a theoretical explanation for what Paterson (1957) discusses as the occupational hierarchy of job satisfaction. Several studies (e.g., Paterson & Stone, 1942) have found that the proportion of satisfied workers in occupations increases with increases in occupational level. The present results suggest a factual basis for this satisfaction hierarchy, namely that occupations at higher levels are more likely to provide satisfaction simply because there are a greater *number* of reinforcers present in higher level occupations.
>
> The results of this study provide independent confirmation of some of the variables that Roe hypothesized as the basis for her level classification. It is interesting to note that all of the reinforcers for which

differences were not significant (Advancement, Company Policies, Compensation, Co-workers, Security, Supervision-Human Relations and Working Conditions) were extrinsic reinforcers. This finding suggests that Roe's level classification reflects occupational differences primarily among intrinsic reinforcers.

Study of Groups and Levels

There seem to be only two studies that concern this classification as a whole.

First, Knapp (1967) investigated whether levels of occupational interest within broad group factors of interest can be measured and isolated through factor analysis. To provide an item pool for constructing the California Occupational Preference Survey, "9 to 14 items were written for each of five occupational levels within eight interest categories generally following the classification of occupations presented by Roe." Subjects were asked to express their degree of interest or disinterest in each of the activities described in the 445 items. Eight group factors plus four doublets and three singlets were found. It was then hypothesized that clusters of variables representing professional level occupational interests within a group factor and clusters representing skilled level interests would appear. The 14 hypothesized factors were: Science Professional, Science Skilled, Technical Professional, Technical Skilled, Outdoor, Business Professional, Business Skilled, Clerical, Linguistic Professional, Linguistic Skilled, Aesthetic Professional, Aesthetic Skilled, Service Professional, and Service Skilled. All 14 factors emerged in the rotated matrix. It is clear that in general these factors correspond to upper and lower levels of the eight Roe groups.

The second study was conducted by Meir (1968). In a thesis at Tel-Aviv University, he reports on a structural elaboration of the Roe Classification. Over a thousand 13- and 14-year-old Israeli boys were used as subjects. The subjects were divided into three samples, and each one was given one of three interest questionnaires that contained about 100 names of occupations. The subjects were asked to indicate their attitude to the occupations listed by marking each with "Yes," "No," or "?" to indicate their interest in them. He was unable to confirm a radex for the group categories, finding instead two simplex structures, in neither of which Arts and Entertainment could be incorporated, although Business and Service appeared in both. These two structures were comprised of: (a) Service, Organization, Business, Technology,

Outdoor; and (b) Business, Service, General Cultural, and Science. He used only four levels instead of the six in the standard classification, and found a graded order of levels in each of the categories.

Counseling Experience

There are few formal reports of counseling experience using the Roe Classification, but it seems clear from its adoption in several computer-based approaches that it has been accepted in this situation. The computerized Vocational Information System now in use at Willowbrook High School in Illinois (Harris, 1968) presents the student with the classification and asks him to select an interest category and training level based upon it. He then explores occupations appropriate to it through use of the information about each one stored in the computer.

Tiedeman has entered this classification in his computer program Information System for Vocational Decisions in Chapter 5.

Revised Presentation of Classification

In view of the above it would seem that the classification of occupations into groups and levels is a useful device. Further experience with the original form brings out the fact that the classification is actually a three-dimensional one, in which only two dimensions were explicit from the start: Level and Things-versus-Persons. The third dimension is technically required by the circular arrangement of the groups categories, but no additional designation seems needed for it. The nature of this dimension is not entirely clear, although it seems to be a theoretical versus economic continuum or one contrasting purposeful communication with resourceful utilization. These relationships seem now to be most appropriately represented by a truncated cone, as shown in Figure 4.

The use of a cone in place of a cylinder, with the upper Level occupations located at the largest diameter, also suggests the greater inter-occupational differentiation at these levels. At Level 6, it would seem that fewer differentiations than into the eight groups might be more descriptive of the actual situation.

Figure 5 is a diagram in two dimensions of a projection of the cone onto a plane surface; this approach should clarify the suggestions somewhat.

Klos (1967) has suggested further differentiation *within* each group,

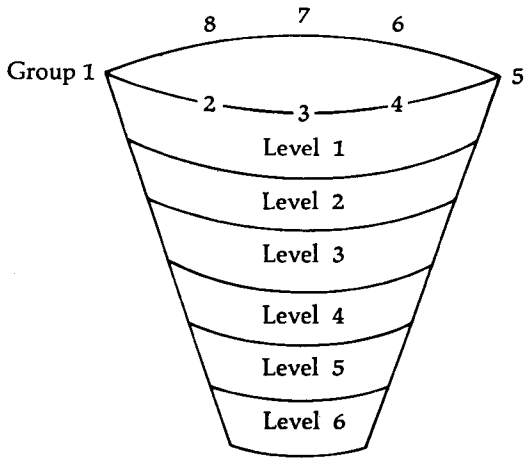

FIGURE 4. Present three-dimensional conceptual model of occupational classification

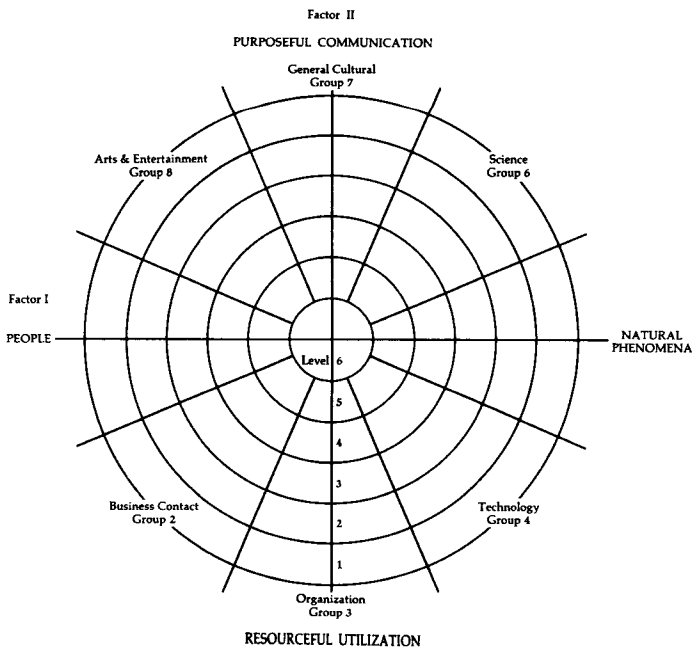

FIGURE 5. Projection of Figure 4 on a plane surface

as indicated in Figure 6. This suggestion is perfectly feasible, and his arrangement is an appropriate one, with the arrangement within groups adjusted to the contiguous groups. Whether or not this additional refinement is useful depends upon the particular problem. In general, the overall purpose of the classification was to reduce the whole world of work to a rather simple conceptual scheme.

An Additional Classification

As was mentioned earlier, I have felt that classification into groups and levels did not fully specify the nature of the work. For this further specification, the nature of the employer is needed, to give the context within which the occupation is carried on. Super has suggested that the census classification of enterprises applied as a third dimension would serve this purpose, but this addition is unsatisfactory for several reasons. For one, one classification, Agriculture, applies only to Group 5 occupations and does not differentiate among them. This also does not differentiate among enterprises of varying size and complexity.

Klos has proposed what seems to be a much better solution: a classification of employers which is analogous to the classification of occupations as shown in Table 2 on page 216. He states:

> The work of an engineer can be quite different depending on whether he works for an industrial organization, a scientific research center, a university, a network, the military, or the government. The occupation of "engineer" tells the nature of the individual's daily endeavor, whereas the name of the person's employer tells the *context* in which the engineering role is performed. "Engineer" denotes a focus of activity and role-inherent attitude along with a certain level of salary, skill, responsibility, etc. "Bell Labs" denotes the nature of the employer's orientation as well as the "level" of performance, range of salaries paid, influence on the community, etc., that the employer has.

The categories for employers, under this system, are quite like those for individuals, except that an additional category (0) is used for self-employed. The others are described in the following descriptions of employer groups:

0. *Self-employed.*
1. *Service*—These employers are nonprofit organizations concerned with health, welfare, recreation, the military, or government.
2. *Business Contact*—These employers are merchandising-oriented, household-item manufacturers, wholesalers, and retailers; merchandising-oriented, business services firms; consumer services

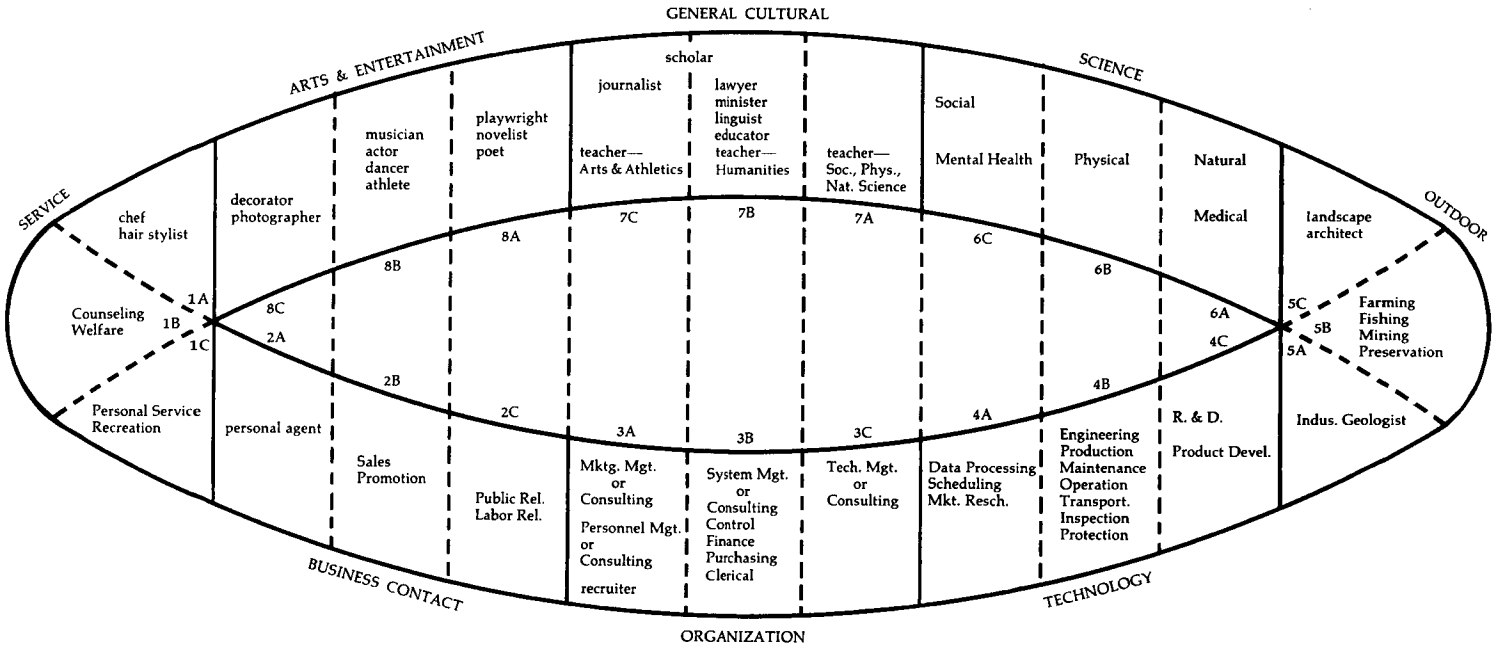

FIGURE 6. From Klos. Possible subdivisions of Roe groups

TABLE 2. Two-Way Classification of Employers

Level	*I Service*	*II Bus. Contact*	*III Organization*	*IV Technology*	*V Outdoor*	*VI Science*	*VII Gen. Cultural*	*VIII Arts & Entmt.*
1	(non-profit) federal government	*Commercial Organizations*				(nonprofit) university & gov't. research ctrs. prof'l assocs.	*Commercial or Nonprofit*	
		sales household-oriented mfgrs. $1. bil. or more merchandising firms	*assets* banks $2. bil. or more insurance companies	heavy industry utilities transportation	*sales & revenue* $1. bil. or more	— —	top museums, universities, newspapers, religious institutions	top music, drama, dance, opera groups networks
2	Nationally known hospitals	$300. mil. or more	$1. bil. or more	industrial services	$300. mil. or more	— —	centers of lesser predominance	top colleges & near-top universities nat. educ. t.v.	lesser predominant national groups top publishers
3	state gov't.	$100. mil. or more	$100. mil. or more		$100. mil. or more	— —	regionally known centers & professional associations	regionally predominant colleges & universities outstanding secon. schls. big-city newspapers	regionally known groups & publishers

Level	I Service	II Bus. Contact	III Organization	IV Technology	V Outdoor	VI Science	VII Gen. Cultural	VIII Arts & Entmt.
			(lesser-regional and big-city local)					
4	big-city gov't local hospital	gen'l consumer products & services firms nat'l unions chambers of commerce	banks, insurance companies auditing firms consulting firms law firms	technical services local mfg. for industry cultivation & gathering firms	small farms & fisheries	— —	local educational institutions, museums, educt'l t.v.	big-city groups entertainment establishments t.v. and radio stations
5	sm.-city gov't local clinics	local merchants consumer services establishments	sm. financial & consulting firms	sm. industrial products & services firms	very small farms & fisheries	— —	local newspapers	local groups & establishments

firms in general; public relations firms; chambers of commerce; trade unions; and law firms.

3. *Organization*—These employers are banks, investment houses, insurance companies, auditing firms, and all types of business consulting firms.
4. *Technology*—These employers are heavy manufacturers in general, industrial products and services firms, utilities, and transportation companies.
5. *Outdoor*—No employers are in upper levels in this group, since people typically work for employers in groups 1, 2, or 4. Food processing businesses for example, would be placed in 4. However, there are still some local producers whose employees would be classed here.
6. *Science*—These employers are nonprofit research centers run by universities or the federal government.
7. *General Culture*—These employers are newspapers, churches, museums, educational radio or television networks, and educational institutions of all types.
8. *Arts and Entertainment*—These employers are oriented to entertainment or the performing arts, e.g., music, dance, drama, and sports groups. Networks and publishers are also included in this group.

"Occupational level can be called prominence and employer level can be called predominance. Below is listed a number of characteristics which increase as occupational level and employer level increase" (Klos, 1967).

Occupational level	*Employer level*
prestige	degree or extent of prestige
salary	number of high salaries
responsibility and power	importance in the community and influence on the community
training required	number of people with high training
diversity and depth of skills	diversity and depth of skills demanded at several organizational levels
extent of proactive or innovative behavior on the job	extent, etc., at several organizational levels
freedom of activity	freedom of activity permitted at several organizational levels

The characteristics increasing with occupational level are summarized by the word *prominence* (i.e., (a) sticking out; projecting, (b) noticeable at once; conspicuous, (c) widely and favorably known). The characteristics increasing with employer level are summarized by the word *predominance* (i.e., (a) having ascendancy, influence, or authority over others, (b) most frequent, noticeable; prevailing; preponderant). In Table 2 the "level" dimension is a measure of predominance. Again, 0 indicates self-employed.

Level	*Predominance Within Group*
1	National—high
2	National—moderate
	Regional—high
3	National—lesser
	Regional—moderate
4	Regional—lesser
	Local—high
5	Local—moderate
	Local—lesser

Note that predominance is relative to *industry within employer subgroup*. For example, retailers, ad agencies, and architects are in the same level but in different industries.

> Since the focus of this paper is one presenting a rationale rather than on presenting a finished classification, we will neither discuss a specific classification nor attempt to present a full chart. The rationale for subgroup classification should be quite easy to apply, whereas the rationale for the "level" dimension is stated quite ambiguously; without some further research, it is infeasible to state a subjective, and possibly arbitrary, rationale for differentiating levels. It was possible and fruitful to specify levels of *occupations*, so we assume that levels of employers (based on criteria similar to what underlies levels of occupations) are also feasible and relevant. A quick and somewhat reliable way to classify employers in Levels 1–3 of groups 2, 3, and 4 is to follow the rank specified in *Fortune 500* (1968), arbitrarily choosing cut-off levels. This is a good approximation to estimating predominance, since size (by gross sales or assets) probably correlates with predominance at the regional and national levels. Further research would have to be done before specifying a quick way to approximate predominance at the fourth and fifth levels [Roe, Hubbard, Hutchinson, & Bateman, 1966].

Thus, following the style of the DOT, an occupational classification is proposed which would be written in four-digit terms, with the second

and third separated by a period. Thus, for example, a business executive could be classified as 32.42 which would mean he was classed in Roe Group 3 (Organization), at Level 2 of responsibility, and working for a manufacturing organization (4) which is at Level 2 of the Klos classification. A physician in private practice would be designated as 61.00, whereas one with little or no private practice, working, for example, in a small state mental hospital, would be classed as 61.14.

Klos has further pointed out that use of both classifications, including group in his classification as well as level, makes possible a much more comprehensive system of charting the career path of any individual.

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CHAPTER 13

Can a Machine Counsel?

Allan B. Ellis, David V. Tiedeman

Just about everyone who spends his time trying to figure out what counseling in education is all about agrees that only human beings can counsel. These men—school counselors, professors of guidance, counseling psychologists, and the like—disagree with each other on all the other matters in their profession, which makes this one point of agreement that much stronger. Indeed, the power of this agreement and the common sense on which it is based make the question, "Can a machine counsel?" a strange thing to ask. By asking it we seem to be wondering whether or not something can be human and non-human at the same time, and it must be difficult to imagine how we can take our question seriously. To make matters worse, we are willing to admit, for the duration of the next few paragraphs at least, that people are correct when they say that only human beings can counsel. But

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we do not consider ourselves contradictory because we go along with the consensus only to suggest that the answer to a question can be unrelated to the posing of it. We assert—and those who recall the works of G. E. Moore, Russell, Wittgenstein, and the other philosophers of language will recognize that this idea is not new—that the trouble with questions is that they seem so strongly to demand answers. People tend to judge questions by whether or not they can answer them, or on their willingness to live with the answers. But questions are good for other things, of course, besides the answers that come from them.

With the question that heads this paper, our intention is to gain perspective on our feelings about the activity of counseling. One thing a question can do, of course, is lead to other questions, and we hope to get from our perspective a better sense of what those other questions are that must be considered when coming to terms with our idea of counseling. Because of what machines are, we accomplish our task best, we think, by using the word "machine" the way we do in our question.

Machines execute procedures, and each machine is the embodiment of the procedure it executes. This important relationship exists for all machines; people are not simply in the habit of speaking about machines in this way. It means, of course, that knowing in detail what a particular machine does—how it works—is enough to know what procedure it is executing. The thing that counts about a machine is the way it behaves, and this behavior is prescribed by the procedure it executes. All automation, far from being magical, as some suppose, is nothing more than the physical expression of well-formed procedures.

When we say that a machine is the embodiment of the procedure it executes, we are saying, in effect, that a statement of a procedure *describes* the machine needed to carry out that procedure. Thus, mechanizing means thinking about procedure, not about hardware, and once we state a procedure explicitly we should not really be surprised that a machine can be built to execute it.

To make things simpler, we will in this paper confine ourselves to computers instead of machines in general. This poses no real restriction, however, since a computer is a device whose job it is to accept descriptions of other machines and to imitate the behavior of those machines. This description is called a computer program and is usually thought of as a set of instructions for what the machine is to do. But a computer program is more like a blueprint which the computer uses to build itself into the particular machine needed to execute the par-

ticular procedure described by the program. It is as though the computer were armed with pliers and screwdriver, rebuilding itself to conform step-by-step to the elements of our procedure. Having done this, the computer becomes the machine our program described, and it will then function as that machine.

A computer without a program will do nothing, whether or not it is plugged in, because computers are not like other machines. In a sense the computer is not a machine at all in its own right, and yet it can become many machines—in fact, any one which can be fully described to it. For example, one may build an address printing machine, or he may write a program which will turn a computer into an address printing machine. In either case the results will be the same, with the exception that even though both machines would be operationally equivalent, they would be different from each other in one crucial respect: The computer can do other things tomorrow. Whereas the power of most machines is in what they do, the power of the computer rests in what it can become, and the essential idea of a computer is that it is an incomplete machine ready to be completed in an infinite number of ways, each way producing a different machine. Thus, a computer program is at the same time an explicit statement of a procedure and the blueprint of a machine needed to carry it out, and whether or not a computer can execute a given procedure depends primarily upon how well we understand the components of that procedure, and how imaginative we are in conceiving procedures in terms of the basic elements of which they are comprised. Centering our attention on a computer, therefore, has the advantage that we depict a machine in terms of such a procedural statement and thus maintain a clearer attitude about machines and their relation to procedures.

Now this attitude about machines is helpful to us because, contrary to first impressions, the form of our question does not impose any preconceived notions on our exploration of counseling. We hope, with this attitude, to avoid the kind of commitment that led Christopher Columbus, for example, to think that Watling Island was the East Indies or the kind of vision that led Abel Tasman to discover two islands in the Southern Hemisphere and at same time to sail completely around the continent of Australia without ever noticing it was there.

One thing that this attitude about machines—and its subsequent application to the activity of counseling—frees us from is a concern about the physical aspects of machines. If there is such a thing as a

counseling machine, we need not worry about whether or not it must have arms and legs. Furthermore, we are feed from the somewhat more general worry of whether or not such a machine should be able to smile or frown or nod sympathetically. We may discover later, of course, that these or similar characteristics are necessary parts of our notion of the act of counseling, but our question does not impose this on us and therefore we do not start out needing to believe that such is the case. In this spirit our question represents a point of view about problems. As with all points of view we do not expect resolution from it, but rather some insight into the topography of the problem under consideration. This is why the answer to the question, even if it happens to come out of our analysis, is secondary to the analysis itself.

Imitation and Meaning

We begin this analysis by considering the meaning of the question, "Can a machine counsel?" To do so, we first look at the procedure adopted by the late Alan M. Turing in his consideration of a similar question. In 1950 Turing, who was an eminent mathematician and logician in England, published an article entitled "Computing Machinery and Intelligence" in which he proposed to examine the question of whether or not a machine could think. His first step was to replace this question by another "which is closely related to it and is expressed in relatively unambiguous words." He said:

> The new form of the problem can be described in terms of a game which we call the "imitation game." It is played with three people, a man (A), a woman (B), and an interrogator (C) who may be of either sex. The interrogator stays in a room apart from the other two. The object of the game for the interrogator is to determine which of the other two is the man and which is the woman. He knows them by labels X and Y, and at the end of the game he says either "X is A and Y is B" or "X is B and Y is A." The interrogator is allowed to put questions to A and B thus:
>
> C: Will X please tell me the length of his or her hair? Now suppose X is actually A, then A must answer. It is A's object in the game to try to cause C to make the wrong identification. His answer might therefore be, "My hair is shingled, and the longest strands are about nine inches long."
>
> In order that tones of voice may not help the interrogator the answers should be written, or better still, typewritten. The ideal arrangement is to have a teleprinter communicating between the two rooms. Alternatively the question and answers can be repeated by an intermediary. The object of the game for the third player (B) is to help

> the interrogator. The best strategy for her is probably to give truthful answers. She can add such things as "I am the woman, don't listen to him!" to her answers, but it will avail nothing as the man can make similar remarks.
>
> We now ask the question, "What will happen when a machine takes the part of A in this game?" Will the interrogator decide wrongly as often when the game is played like this as he does when the game is played between a man and a woman? These questions replace our original, "Can machines think?" [Turing, 1950]

Now, our interest in Turing's approach is in determining if such a procedure for establishing the meaning of the question will work for us. Can we make use of the idea of an imitation game?

Clearly, there are two kinds of imitation possible and even though Turing was never explicit about their differences, it is possible to think about the imitation game in terms of one or the other. The first of these two kinds of imitation we will call Imitation #1 for lack of some better term, although the word 'simulation' comes very close to our intended meaning. Imitation #1 consists in the machine *becoming* the thing imitated. Our question, in these terms, becomes, "Can a machine *be* a counselor?" the implication being that the inner workings of the machine would be identical to a counselor, not a particular counselor or even counselors in general. We mean that these inner workings would be such that the resultant behavior would be counseling.

If we replace our question with some test or other, perhaps one like Turing's, that would indicate whether or not a machine is making a successful Imitation #1 of a counselor, we are quickly in trouble. Aside from the formidable difficulties of constructing the test itself, we are faced with the problems posed by all the new questions that arise out of Imitation #1. Because Imitation #1 requires that the machine *become* a counselor, we must expect it to experience all the relevant conditions in which counselors find themselves. If the counselor cares, the machine must care. If he experiences the dilemma of the counselee in order to mirror its form and substance, then so must the machine. If it is important that the counselor empathize with the client, then too must the machine empathize and do all the things in the range of human conditions that are essential for the counselor when he counsels.

You no doubt see what we get ourselves into by adopting Imitation #1 as our meaning to the question. We are forced to expect the machine to feel what a counselor feels, and this feeling must arise *in the same way* in the machine as in the human being. But this is a contradiction,

making the question nothing more than a word game. To expect something to undergo a human experience is to expect it to become human to that extent. On what grounds, for instance, can we say that a machine that feels and loves and cares is not by that very fact human to some degree? We confuse ourselves with this, not because we are led to consider machines to be human even though they are not flesh and blood and do not live and die and breathe, but because our words deceive us into thinking we ask something meaningful, when in fact all we have done is wonder if something that can become human can do human things. In light of these difficulties we reject Imitation #1 as our approach.

The second kind of imitation, which we will call Imitation #2, is essentially the approach adopted by Turing in his imitation game. Imitation #2 consists in the machine *behaving like* the thing imitated, and in our case there is some hope in this approach. Our question in these terms becomes, "Can a machine *behave* the way counselors do?" That is, no matter what the real state of the machine is, can it give the appearance of being a counselor?

An imitation counseling game in this case would become a test to see if a machine could do as well as a human counselor in exhibiting all those behaviors which make up the relationship between the client and the counselor. For instance, can the machine *exhibit* concern? Can it seem to be honest and trustworthy? Can it generate confidence? Can the machine make utterances that are relevant and of a kind that assist the individual in dealing with his problem? Compared to Imitation #1, this approach seems much more manageable, although we probably do not know enough about the act of counseling to be able to catalogue all the things that must be exhibited by this brand of counseling machine.

We see on closer inspection, however, that Imitation #2 is much more troublesome than Imitation #1 precisely because it seems reasonable. The approach does not clearly reveal its weaknesses and faulty assumptions and thus can too easily lead us astray. One objection is that Imitation #2 is based on deceit. We believe that a counselor behaves in order to reveal himself, and this revelation is the mechanism by which he helps the counselee to gain insight. To mirror the counselor's behavior without the substance behind it would be to violate one of our basic premises of what counseling is. Beyond this, Imitation #2 ignores the fact that counseling behavior has its effect only when the client's perception of that behavior is appropriate. Not

only must a counselor exhibit honesty, for example; the client must perceive this honesty and believe it. But regardless of its behavior, how do we convince someone that his counselor-machine is honest or concerned or even relevant?

While these handicaps are severe, they are not the worst things about Imitation #2 when applied to counseling. Foremost among the difficulties with Imitation #2 is its assumption that the things a human being does when he counsels are essential to the notion of counseling itself. This is not necessarily the case, and we miss the opportunity to consider what is essential when we accept this form of imitation as appropriate. To see what we mean here, consider a mountain climber. In preparing to climb a good-sized mountain, he will, of course, pack a lot of things in his knapsack, including a supply of food. Food is a very important thing on a climb of long duration, but we must be clear about the reason behind it. Food is important when you climb a mountain not because it is in any way essential to the notion of mountain climbing, but precisely because human beings climb mountains and human beings must eat at regular intervals. If we built a robot to climb a mountain, no food would be needed.

It may be the same with counseling. Perhaps things like honesty are important in counseling only when human beings counsel. It may be that such things are irrelevant to counseling by machine. Imitation #2 does not allow for this possibility, and thus it gives up the chance we get by the use of the word "machine" to consider what behavior is or is not essential to our view of counseling. The perspective we gain by our question we would therefore have to give up with Imitation #2. On this ground, as well as on the basis of its other weaknesses, we discard Imitation #2.

Neither kind of imitation will do, it seems, and the expectation that our question can be answered through an imitation game like Turing's must be abandoned. In saying this, we seem to do nothing more than confirm the suspicions probably existing at the onset—that the question, "Can a machine counsel?" is a strange and fruitless one to pose. But we do not give up the enterprise simply because we discard Turing's approach. Indeed, we learn a very important thing from our consideration of the imitation game—a fact which helps us construe our question properly. This knowledge is that all our difficulties with both kinds of imitation stem from the assumption that a machine can counsel only if it can mimic a human counselor. If we think of our question in a different way—one in which, although we maintain the

notion of imitation, we need not expect a machine to ape a counselor—then we can proceed without running such a risk of heresy.

The idea that "imitation" need not mean "copying" is not new. Aristotle, for instance, begins his *Poetics* with a consideration of imitation and Oates and O'Neill (1938) tell us that he "is seeking to give a secondary meaning to the term." They say that Aristotle uses the word to mean the process which takes place when an artist creates his work of art. "It is through *mimesis* [imitation], that form comes to be imposed upon the artist's material broadly conceived" (p. xxiii). That which art imitates is nature, or more accurately, the *process* of nature; and even though the objects of nature are natural and the objects of art are artificial, these objects of art "are produced as nature would have produced them" (McKeon, 1947, p. 621). Art imitates nature in the processes of production as well as in the objects produced.

The difference between art and nature to Aristotle rests in the difference between internal and external causation. He considers nature to be "a cause of motion internal to the thing moved, while art is an external cause employed by the artist to impose on matter a form first conceived in his mind" (McKeon, 1947, p. 621). This distinction is important to our purpose because it is in the play between the internal and the external imposition of form that we can begin to characterize our beliefs about the act of counseling and thus the role, if any, that a machine can have in this act.

The artist wishes his audience to undergo an experience and as a result to become more sensitive not to the objects of art themselves but to the natural phenomena which the process of their creation mirrors. The artist differs from others not so much because he can draw or sculpt or write the language well, but because he can experience in a natural phenomenon that which the rest of us can experience only through his artistic expression of that phenomenon. Thus the artistic process—the imitation—is a way of experiencing the world, and the object of art is an effort to communicate this experience.

Artistry and Counseling

But this meaning of imitation can also be used, we feel, to describe generally the act of counseling, and the mission of the counselor can be thought of as much like that of the artist. The counselor's material is his client's predicament, and the manner in which the counselor establishes and develops the relationship between the client and himself

and their subsequent creation together of the basis for resolution of this predicament constitute the counselor's mode of imitation. The counselor's intent is not merely the resolution of difficulty but rather the revelation of the *process* by which such resolution becomes possible. He accomplishes this through a kind of enactment where form comes to be imposed upon the client's predicament first by the counselor's external representation of the process of resolution but eventually, through insight, by the client's internal experiencing of the process.

This internalization is the goal which the counselor seeks to reach through the essentially artistic activity of revealing, by way of the counseling relationship, the process of resolution. Should the relationship become more important to either of them, then the counselor has failed just as the sculptor fails if his model of man obscures the experiencing of men from which the sculpting stems.

Now, what all of this means, of course, is that counselors are themselves imitators. When we wonder if a machine can counsel, therefore, we will confuse the issue by expecting the machine to mimic the human counselor because, in expecting this, we forget that a human being is one kind of medium and a machine is another kind. Because machines and human beings are different media, to expect one to act like the other is much like expecting a poet literally to paint a portrait with words. We must let the machine stay a machine, but recognize that the activity of counseling by human beings is a means to an end, this end being some desired condition in which the client will eventually find himself. Our interest thus centers on the possibilities of a machine achieving this same end even though it does so in a manner clearly different from human beings.

In this way we come to the heart of our question, "Can a machine counsel?" By it we mean to ask: Is it possible to create a machine environment such that an individual who functions in certain specifiable ways within this environment can be said to have been counseled? We do not ask if a machine can copy what human beings do when they counsel, but rather if we can achieve an identity of goals between a counselor and a machine.

The Goals of Counseling

Having settled on this meaning of the question—and thus gained the perspective we need—we are faced with the problem of answering it. To deal with this problem we will first consider what it is a machine

must accomplish (notice we do not say, "what it must *do*") in order for the answer to our question to be "yes." That is, the primary concern here must be with the *basis* on which the question is to be answered. Following this we can assess the possibilities that such a machine can exist.

Since we pose the question in order to gain perspective on our beliefs about what counseling is, we will at this point present these beliefs although we will be general about it and hardly as explicit as might be desirable. Notice, however, that even though we speak about a particular idea of counseling, the approach to the question is not bound to any specific technique or form of counseling. As a way of viewing the problem, it is general. Thus we recognize the diversity of opinion that can be tolerated within this approach, and we offer one notion of counseling not to argue its merits here but to provide a case in point from which to evolve a basis for an answer to our question.

Counselors, we assert, deal with problems of a particular kind in the manner generally proposed earlier. That is, they deal with these problems by concerning themselves, and hopefully the client, with the processes by which such problems in general may be resolved. In this way some specific problem and the resultant condition in which it leaves the counselee are used by the counselor as the material with which to fashion an understanding of the process of problem-solving. This, of course, is the reason why the giving of advice is not enough by itself to amount to counseling.

Now to be more specific about this, we argue that you should send a person to a counselor, instead of some other kind of psychologist, when that person has a problem [1] related to his career. The word "career" and the word "problem" are two poor choices of words because in their meanings in ordinary language they do not say all we intend to say. Usually, "career" is used in far too limited a way and "problem" in far too general a way to suit our needs here; but they both, nonetheless, contain the grains of meaning we seek. A brief explanation of our intentions with these two words will clarify the situation.

By career we do not mean just a person's job, or occupation, or voca-

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[1] We use the strong word "problem" here even though we consider that a problem is not the only thing that can be an appropriate motivation for seeking counsel. Curiosity, for example, may well be equally appropriate as may be the kind of involvement and individual experiences when in a game-playing mode.

tion, or even his life's work. These are all parts of our meaning, of course, but we include much more. In saying that we include more, however, we do not mean to suggest that a career is something pieced together or that it is in fact definable by whatever may be included in it, anymore than we would say that the motion of a motion picture is definable in terms of the frames that make up the film or anymore than we would think of electrical current as the piecing together of electrons. Motion and flow are not inherent in the objects that move or the liquids that flow, but rather they are the impressions that moving and flowing things leave behind. Thus while motion, for instance, may be implied by objects that move, it is not in the strictest sense made up of those objects.

In this sense career is like motion. We view career—and this idea is not new—as the time extended working out of self. This working out of self provides the context and the opportunity for the "expression of hope and desire and limitation upon life" (Tiedeman & O'Hara, 1963, p. iv). By the working out of self, the continuity we call career is created, and while purposive behavior is central to the process, we do not consider career strictly as a road that *leads* somewhere. It is, instead, a trace of much the same kind as the bread path of Hansel and Gretel. Career is the consequence of passage.

Now the mechanism for this working out of self, and thus for the inscription of career, is the activity of deciding, and this leads to our meaning of the word problem. By problem we mean some difficulty with deciding. The reason deciding is so important to the process is that it is by the exercise of individual freedom through choice that career becomes the mapping of self instead of just a smoke trail. One difficulty that a person might have with deciding is the lack of ability to decide: He may not know how to decide. A second difficulty might be that he is not aware of the nature of the decision to be made. Perhaps the most general difficulty a person can have—one for which a counselor is most needed—is the inadequate sense that one *can* decide. Basic to the much trouble people have with deciding is the absence of a clear sense that a person can be an agent in determining what happens in his life. Later, we will discuss further this sense of agency and its relation to the development of self.

The specifics of the process of decision-making may be characterized by way of a paradigm proposed in 1963 by Tiedeman and O'Hara. In confining the paradigm to the rational form of decision-making they state: "It seems sufficient to suggest a paradigm of the process of

reaching a rational decision since such is the differentiated and later integrated condition that the practices of guidance attempt to facilitate" (p. 38). It is through the notion of decision-making as depicted in this paradigm that we will view the counselor's effort to impose form on the client's predicament and thus to reveal the process by which the imposition of such form can be generally achieved.

According to the paradigm, the process of decision-making is divided first into two aspects called *anticipation* and *accommodation.* The anticipation aspect consists essentially of a person's preoccupation with the pieces—facts, alternatives, options, consequences—out of which a decision is to be fashioned and with the aspirations, hopes, expectations, constraints, and the like which will determine the form of the decision. The accommodation aspect—also called "the aspect of implementation or adjustment"—represents the movement from anticipation to induction; it is the point where imagination meets reality. In the case of both anticipation and accommodation it is possible to speak about "subaspects" or stages.

The first stage of anticipation, called exploration, begins with a person's awareness "that a problem does or will exist and that a decision must be reached in order to resolve it in a satisfying manner" (p. 38). In discussing exploration, Tiedeman and O'Hara state:

> In the step of exploration . . . a number of different alternatives or possible goals . . . may be considered. Relevant goals are those which can possibly be attained from the opportunities associated with the problem under consideration. . . . During the exploratory step fields are relatively transitory, highly imaginatory (perhaps even fantastic), and not necessarily related one to the other. They may be a relatively unassociated set of possibilities and consequences. . . . In the step of exploration in relation to a problem of career development, a person probably reflects at least upon his aspiration, opportunity both now and in the future, interest, capability, distasteful requirements that still can be tolerated, and societal context for himself and his dependents. These are relevant aspects of the field set by each goal. In short, a person attempts to take the measure of himself in relation to each alternative as he senses it [pp. 38, 41].

Of *crystallization,* the second stage of anticipation, they assert:

> In [crystallization] the cost of the several goals can be considered in relation to the return from each. The value of alternatives can then be assessed. Relevant considerations are organized or order in this process of valuing. . . . The process of valuing gives rise to values which tend to fix the organization or order of all relevant considerations in relation to each of the goals as crystallization occurs. . . . Crystallization normally represents a stabilization of thought. A setting of thought

> is achieved which is ordinarily of some durability and hence of some reliance. This set readies the person for investment of self along a line that then becomes more noticeable. The situation becomes defined, so to speak, at least for a time [p. 41].

The third stage is that of choice, and it follows readily on the heels of crystallization. Quoting again from Tiedeman and O'Hara:

> With *choice,* a particular goal, and its relevant field . . . orients the behavioral system of the person of relevance for his problem. . . . This goal may be elected with varying degrees of certainty and its motive power will vary as a result. . . . Furthermore, the degrees of clarity, complexity, and freedom generally available to the person in the solution of this problem and in the pursuit of the indicated decision will also affect the motivating power of the resulting resolution of alternatives [p. 42].

The fourth and final stage of anticipation is called *clarification.* One would expect that once a choice had been made, aspects of the decision-making which precedes action would have been finished. But even though the decision is made and held firmly, often doubt about the decision will arise. This is true

> . . . in even a short period of waiting (a week or more, say) for the expected situation to begin to unfold . . . doubt experienced in the waiting period causes the individual further to clarify his anticipated position. An elaboration and perfection of the image of the future . . . ensues. . . . *Clarification* not only perfects the image of self in position, but also dissipates some of the former doubts concerning the decision [p. 43].

The three stages of accommodation may be briefly described in the following way:

> *Induction:* . . . A general defense of self and a giving up of an aspect of self to group purpose; . . . the individual's goal and field assimilatively become a part of the region . . . of the social system in which the person is implementing his desired solution of his problem. He learns the premises and structures-in-interaction required for continued identification. This process leads to a further perfection of individual goal and field in the social system. . . .
>
> *Reformation:* . . . The receptive orientation of induction *[gives]* . . . way to *[an]* assertive orientation. . . . The person is well immersed in a relevant group. . . . He has a strong sense of self and actively enjoins the group to do better. . . . Since . . . the person acts both upon the in-group goal and field . . . in order to bring that group into greater conformance with his modified goal and field . . . and upon the out-group to bring their view of his identification into greater consistency with his, the effect, if any, is the modificaton of group goal and field. . . .
>
> *Integration:* Synthesis is, of course, the essence of integration. . . . A differentiation in identification has been achieved. The new-found

> appreciation of self is integrated with its larger field. This new part of the self-system becomes a working member of the whole self-system. In integration, individual and group both strive to keep the resulting organization of collaborative activity. . . . The individual is satisfied, at least temporarily, when integration occurs [p. 44].

Now there is something peculiar about this paradigm, a potential difficulty quite similar to the problems we sometimes get into when we use language. A peculiarity of language known to philosophers for some time is that in order to talk about language, we must use language itself. Bertrand Russell, for example, had shown that it is a case of bad "philosophical syntax" to assert something like, "The golden mountain does not exist"; in stating it thus, you are attributing some kind of existence to the very thing whose existence is denied in the sentence. As language does sometimes, the paradigm of decision-making turns back onto itself in a way about which we must be clear. Not only does the paradigm depict the decision process but also by this depiction, it prescribes how one should relate to that process. That is, in enunciating the aspect of accommodation, the paradigm argues that one of the things to which one must accommodate is the decision process itself. But integration is the development of meaning that is independent of language as the instrument of that meaning. Thus, the language of decision-making, even though it is the medium through which understanding of the process comes, must be thrown off before the accommodation is complete.

This throwing off—perhaps making invisible is a better way to say it—of the instrument of meaning gets us back to the play between the external and the internal imposition of form we spoke of earlier. Accommodation to decision-making itself is the most general kind since it represents internalization of the *processes* of resolution. First the language must be established for the individual (induction), then it must itself become an object of analysis (reformation), and finally it must dissolve, as the individual goes past it to meaning (integration).

By way of the essentially artistic activity described earlier, the counselor must take his client through these phases, not with respect to a particular problem so much as with respect to the process itself. He must establish the client's proficiency in the language of the process, develop his awareness of this language and its effects, and, in the end, facilitate the individual's internalization of this process. In doing this, we argue that the counselor leaves the client with a sense of agency as a logical consequence. The state in which one believes himself to be a significant agent in determining what happens to him comes not from

convincing him about it but from the internalization of the decision process.

Reconsideration of the Question

Having said all of this about our views of counseling—briefly and with hardly enough explanation—we can now pursue the terms under which an answer to the question we pose in this paper might reasonably be formulated. In the most general sense, before we would be willing to say that a person has been counseled by machine, this machine would have to accomplish at least three things. First, it would have to reflect the elements of decision-making in such a way that the language of the process was exposed to the client. Naturally this exposure of the language must lead to the development of the individual's proficiency in its use. Second, the machine must encourage the development of awareness of the process and the relation of self to problems as viewed by that process. That is, the process must become a mechanism for the manipulation of this relationship between self and predicament. Finally, the machine must allow and foster the individual's accommodation to the decision process both in terms of specific predicament and, more important, in terms of the process in general. Remember, because we seek *identity of goals* between machine and counselor we need not expect this act of counseling to be carried out the same way by each.

But this is easy enough to say and, even though the idea of identity of goals enhances our perspective and subsequent analysis, we have no reason yet to suppose that a machine can accomplish anything resembling what we need. To repeat the point we made in the first paragraph, however, we really do not have to bother with what it would take specifically for a machine to counsel. What we are hoping for here is that you, the Counselor, will be encouraged to ask our question about your view of counseling. In our case we should go back and examine the many roads we have opened for ourselves. We should wonder, for instance, what a human counselor can do to achieve the ends of counseling as they have emerged from our attempt at the question. Are certain techniques more defensible than others? Are the counselor's honesty or his concern or his objectivity important techniques or essential conditions of counseling? Are there pedagogical issues central to the achievement of counseling goals?

Even though such questions must be dealt with carefully and fully before we will know enough to talk in any but a superficial way about

machines and counseling, we will nonetheless attempt an answer here. For two other reasons, the answer will be bad. First, it will be an answer by example—the coward's way out. Second, the example is a weak one. But some of our previous argument will at least be clarified by this attempt at an answer.

There is an old oriental saying that if a man has 100 miles to walk, he is wise to consider himself half way there only when he has walked 90 miles of the journey. By such reckoning our example is hardly more than a glance in the direction we wish to go. For our example we will describe a project on which we have worked for about two years. This project is called ISVD, which stands for an Information System for Vocational Decisions.

In June 1966 the United States Office of Education granted Harvard University's request for $1.8 million to conduct a project (contract number OEG-1-6-061819-2240) called the Information System for Vocational Decisions Project (ISVD). Cooperating with Harvard in this project is the New England Education Data Systems (NEEDS), a nonprofit facility which provides computer data processing and research service to 62 school systems in New England. The responsibility of Harvard and NEEDS is to create a working model of a computer-based information system that can become part of the vocational and educational guidance efforts of school systems, government employment agencies, trade schools, skills training centers, and even industry. In the development of the first model, the Newton, Massachusetts, school system is the main focus. This working model was to be delivered on or before July 1, 1969, which is three years and one month from the day the ISVD project began.

The theory underlying the ISVD project deliberately plays upon a potentially useful distribution between *data* (facts) and *information* (facts interpreted in relation to use). The task of the information system is to enable the individual to transform data into information. This is to be done by teaching him to interpret the data in the light of his own knowledge, experience, and intention, so that his organization and use of the data represent his own personal relationship to them in the process of decision-making. We presume that only when data are used in this way can they be described as information where the individual is concerned. The information so generated can then, in turn, serve as data in the making of future decisions. Given that the quality of decisions is directly related to the kind, quality, and comprehensiveness of the *information* (i.e., data in relation to personal

intention) considered by the individual during the process of decision-making, then a fundamental task of guidance is to identify, evaluate, and classify needed data *and to make them readily available to students in usable forms and at needed times and places.*

Throughout the individual's passage from point to point in the decision-making process, he continues to engage in the act of turning data into information. This is a major concern of the project, since, in the real world, data are never complete and neither is information. Often, it is precisely this incompleteness that makes decisions necessary in the first place. In any event, the quality of the choice depends upon the quality of the data. Before one attempts to make a decision, therefore, he must first understand the incompleteness of the data and information with which he is dealing.

Accepting data and information on these terms leads naturally to the condition that one is more likely to take responsibility for the choices he makes, since they are not totally determined by external factors. If they were, then choice would be either irrelevant or superfluous. Furthermore, in order to create information on which to base decision, one must *actively* process data rather than passively be guided by them, and, therefore, the individual must become a significant agent in the choice process. That is, the incompleteness of data implies that the individual is *responsible* for his desisions in both meanings of the word: He is the one who makes the decisions, not someone or something external to him; he is the one who enjoys or suffers the consequences. This is one way to define "freedom," and it is to this notion that the project is dedicated. It will achieve this goal by developing in the student the ability to engage in this kind of decision-making relative to his career choice. That is, the project will place the student among resources, enhance his access to them, teach him the stages in decision-making, and have him engage the resources in a controlled setting so that he can develop the skills of processing data and making decisions.

An additional factor in the decision-making procedure which this project proposes is called *monitoring*, which consists in keeping track of the student as he goes from stage to stage through the paradigm time and again. Aside from the usual reasons for monitoring a student's behavior—to analyze his performance, select from alternate courses of action, and generally maintain an account of his interaction with a system—the project expects to present to him the facts of this monitoring so that he might use them as additional data. These facts become a kind of meta-data which the student processes. The idea of

data and meta-data is analogous to the philosophical notion of being and becoming. Not only does the individual act but he becomes aware of his pattern of action. The desired result is a higher order of understanding of both the decision-making act and the panorama of career choice in which decision points are linked. Career becomes a time-extended set of choices, and decision at any given point is enhanced by an overall awareness of the road being travelled.

What the project proposes, then, is a model of decision-making behavior that requires a setting capable of providing feedback and of generating feedforward—the individual's feedforward, that is. It is an interactive setting in which an individual engages one or more data files in certain specifiable ways as a means of determining alternatives and of selecting from among them on bases understood to himself.

The setting we seek is one which will develop in the student the ability to engage in the decision process as depicted by the paradigm described earlier. Some of us call this setting a reckoning environment because we want students to do more than just make up their minds. We want them to figure up, measure, estimate, compare, judge, make calculated guesses, and in the end decide *and* take responsibility for their decisions. This, of course, is what "deciding" means, but often people equate decision-making with choice-making and thereby miss the inherent notion of the process and its extension over time. What is left, usually, is the mistaken idea that a person decides by making up his mind, and thus we hear about the *moment* of decision as though it all happens at a point in time which is discrete and unbounded by thought and reflection. To make it clear that it is precisely this misconception and the resulting inflexibility we wish to challenge in ISVD, we have come to refer to the setting for vocational decision-making which we are creating as a vocational reckoning environment.

Once we recognize the obvious fact that data and information are never complete it becomes wise—often vital—to place the condition on choice that it be made with the best possible data available. We must ask of the data: Are they *accurate?* How *complete* are they? Do they reflect the full *complexity* with which we must deal? Can we get them *in time* to explore alternatives adequately? A library is unsatisfactory in this area, because the time involved in searching is often more than the individual can afford. Certainly large amounts of data—occupational descriptions, for example—can be stored, indexed, cross-referenced, and made generally available in a library, but that is only part of what is needed. The computer, on the other hand, is capable of all

this and of providing fast access so that search time need not hamper decision-making. Furthermore, the computer can interact with the student and thereby help him to ask relevant questions about the world of work. The project looks to the computer, therefore, as a device to store large amounts of occupational data and to make them immediately and selectively available to the individual as he proceeds through the decision-making process. With this kind of accessibility, the individual can feel he is among resources and as he becomes more integrated into the reckoning environment, the data become more like extensions of him and less like external qualities; that is, they move toward becoming information.

Along with the student himself there are two additional components within the ISVD reckoning environment. The first of these is an extensive collection of data about the world of work, military service, and education. Facts about jobs, colleges, trade schools, military specialties, and about the student himself are just a few of the types of data to be stored and made available to him. These data are organized into five major data files: occupational, military, educational, personal and family living, and student characteristics. Naturally while each of these files is separate from the other, they all reference each other so that a student may follow a question through all its aspects.

Between the student and the data we intend to place a guidance machine. The function of this third and final element of the ISVD reckoning environment is to facilitate student's access to data and vice versa. That is, not only do we wish to provide a means for the student to gain convenient access to data but we wish to keep track of such access as well. In this way, not only can an individual get facts with which to make decisions but he can also gain a sense of the way he goes about making decisions.

One way to describe the ISVD reckoning environment is shown in this diagram.

We in ISVD call our machine a guidance machine, and we will continue to use this term here even though our intention is to suggest that its behavior approaches counseling.

Now, the purpose of ISVD is to create a sufficiently explicit descrip-

tion of the behavior of a guidance machine so that a computer can behave as though it were that machine. Our efforts to create a description of a guidance machine fall into two categories. The first is the development of "necessary software." This consists of a fairly elaborate set of computer programs which permits certain basic and generally required functions to be performed. We need, for example, to operate in a time-shared setting so that more than one student can use the system at any one time. Furthermore, we must provide the ability to create, maintain, edit, and retrieve data files. A programming language to allow both string manipulation and list processing, programs for statistical analyses, routines to permit content analysis, and the general facility of keeping track of who is on the system and what needs to be done next are some other examples of the kind of necessary computer software with which we must be concerned.

The second category, and perhaps the more interesting one, is the development of ISVD software. These are the programs that enable our time-shared computer to behave like a guidance machine, and it is here that any substantative contributions of ISVD rest.

Figure 1 depicts in a general and incomplete way the overall organization of the ISVD software. This software may be divided into four parts, each of which plays a role in the student's development of a sense for the decision process.

The first of these parts consists of the ISVD data files. In the chart these data are represented in the last two lines. Thirteen such data files are included thus far, and our plan is to increase this number as time goes on.

Even though the 13 data files that are presently going into ISVD are different from each other in a number of respects, they are essentially alike in overall structure. A brief description of one of the data files, therefore, will provide an indication of what the rest are like. The one we will describe is the occupations data file.

The occupations data file contains about 50 facts on each of about 850 occupations. These facts relate to such things as wages, education, physical demands, worker traits, high school courses needed, and the like. The 50 or so facts about each occupation are grouped together to form a record. We call these level-zero records and, of course, there is one level-zero record for each occupation.

In addition to these records, we have made provision for including hierarchical records—level one, level two, and so forth—which may be thought of as summary records. The level one records in the occupa-

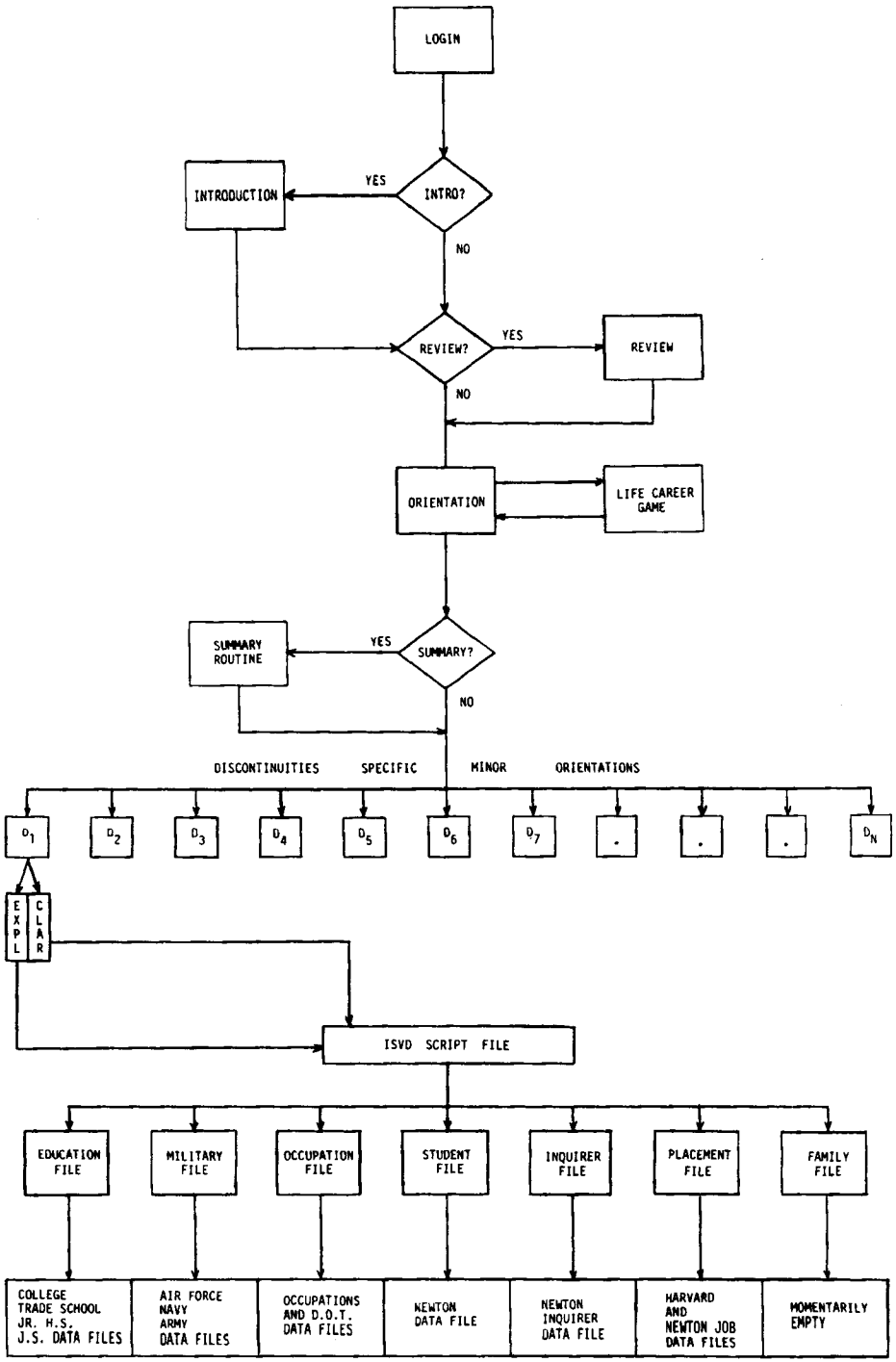

FIGURE 1. An Overview of ISVD

tions data file, for instance, are used to represent simultaneously many different *logical* organizations of the data without concern for their *physical* organization. One set of such records might be used to characterize the records in terms of the Roe categories while another set might represent someone else's taxonomy.

Besides these two kinds of records, the occupations data file contains a fairly extensive collection of incomplete, but completable, English sentences of the form, "The salary of X is Y" or "To be an X requires Y years of education." If a student should ask something like, "How much do doctors earn?" or "How long do I have to go to school to become a plumber?" then the variables X and Y in these template sentences would be replaced by the appropriate facts and presented to the student. The use of these template sentences—and paragraphs—need not be as trivial as the example offered here.

The present version of ISVD—called Prototype I—contains in its 13 data files several million data potentially relevant to career choice. This part of the ISVD software, while in no sense complete, is nonetheless sufficiently extensive to allow nontrivial exploration.

As extensive as these data are, however, the single, most significant component of ISVD software is that network of routines we call *scripts*. Not unlike the manuscript of a play (from which it was given its name) a script is a set of rules describing how the guidance machine is to act. Scripts contain such things as the text to be presented to a student via either a video display device or a printer, commands to activate a tape recorder, or motion picture projector to display a 35mm slide, instructions for how to process the student's responses, and rules for any computation or storage or retrieval of data.

Some scripts deal with the concepts underlying the decision process and are called teaching scripts. These superficially resemble the usual computer-aided-instruction material. Preference scripts are a second kind. They are used to assist the student in his consideration of the factors on which choice may be based. The taking of a preference script has the effect of processing the associated data file, leaving behind only those records that conform to the stated preferences. Finally, direct access scripts are used to retrieve specific bits of data from the files.

A third part of the ISVD software is called the *access routine*. Exploration, clarification, and review access routines serve to engage the student in behavior representative of the decision paradigm. They are used like filters between the student and his access to data and in

this way are supposed to develop his proficiency and his awareness of the decision process. In access routines must rest the artistry inherent in counseling.

To show what we mean, we will give an example of how an access routine works. The example deals with the discontinuity of college choice; and even though this excerpt is an actual interchange between individual and a computer, we do not wish to give the impression that this program functions perfectly or even well enough to be impressive. To us it has been nothing more than a test case. In the example the computer's output is in roman type and the student's input is in italic.

What would you like to do today.

I want to think about colleges to apply to next year.

Since we know that you have not explored your college choice with the system before, the first thing we would like to find out is if you have thought about this choice enough to have some alternatives in mind. If you do, type the names of each of the alternative colleges. If not, type in the word no.

Harvard University, Boston College, Berkeley.

Good. What kinds of things did you do in exploring college choice. Did you read any college catalogues or talk with your guidance counselor. Make as complete a statement as possible.

I read the catalogue for Harvard and Boston College. I talked with my guidance counselor, and had a couple of interviews with the dean at Harvard. My father went to Berkeley so that's why I'm interested in going there.

These are the activities the machine has recognized or analyzed from your statement. You have discussed the matter with members of the family, spoken with a guidance counselor, read some college catalogues, spoken with college officials.
Here are some other things that may be a good idea to do if you haven't already. You could have discussed the matter with a teacher. Now then, look at this list of exploratory activities that you performed outside of the system. Here is the list of your present alternatives.
Harvard University, Boston College, and Berkeley. Now type in the activities that you feel helped you most about making up your mind or gave you some alternative colleges to think about. Please type them in in order of importance.

The interviews and talking with my dad.

Good. Before we go on to explore college choice, what are the factors that you think are important in considering which colleges to apply to.

Grades, class rank.

Anything else.

Tuition costs, test scores.

Here are some of the factors that other students found important (1) curriculum choice (2) course selection (high school subjects) (3) grades (4) class rank (5) test scores (PSAT, SAT, CEEB, ACT) (6) extracurricular activities

(7) future vocational plans (8) goal in going to college (9) post college education and/or training.
Here is your list.
Grades, class rank, tuition costs, test scores. Look at both lists and then type in all factors from both lists that you consider important in thinking about college choice.

High school courses, grades, class rank, test scores, tuition costs, future vocational plans.

Fine. There are several ways that you can go about thinking about college choice within the ISVD system.
You can go through some concept scripts which are designed to give you some facts on topics relevant to college choice. Or you can play the Life Career Game. Using the data of a make believe student who is like you in some ways you go through the process of selecting a college for him. If you have specific colleges in mind, you can get data on them by accessing the education data file.
If you like, you can let the system guide you through a statement of preferences to come up with a list of colleges that most nearly matches your preferences. Or you can elect to first go through a unit of decision-making, a unit that tries to help you understand yourself and others in relation to making decisions.
What would you like to do.

Access the education data file.

You have accessed the education data file. For demonstration purposes only, the following schools have been implemented. Harvard College (men), Goucher College (women), Berkeley University (large state-supported school), Boston College (religiously affiliated), and Carnegie Institute (technical training school). The following four variables have been implemented . . . Costs (including tuition, room and board, and other fees), required entrance exams, criteria used in selecting students, and required high school courses. Now then you can query this micro data base in any way that you want. Please do not use question marks. If you wish to stop at any time, type in the word Stop.

How much does it cost to go to Harvard.

Tuition at Harvard is 2000 per year including lab and health fees. Room and board is 1170 dollars. Non-resident student fee is 25 dollars. Books and supplies about 70 per year. Personal expenses about 375 dollars including room supplies, clothing, cleaning and laundry, recreation, and other personal expenses (except travel).

How does that compare with Boston College.

Boston College's tuition is 1600, room and board is 1050 dollars. Other costs include books and supplies about 100 dollars, lab fee 100 dollars, and 30 dollars for women boarding students for health fees.

What high school courses should I take for Boston College.

No specific number of units is required however the following minimum is required. English (4), Algebra (2), Plane Geometry (1), Foreign Language (2), Trigonometry (½) (for students planning to major in Math, Biology, Chemistry, or Physics), Biology, Chemistry, or Physics (2) (for students planning to major in the above sciences and for applicants to the school of nursing), academic electives (5).

What specific entrance exams are required.

Boston College requires the SAT and three achievement tests. English, Level I or II Mathematics, and one of the candidate's choice.

Does Berkeley require the SAT.

Applicants who are ineligible, due to grade average, or to unit or distribution deficiencies, or who have graduated from an unaccredited secondary school, may qualify for admission by CEEB examinations. The three achievement tests required for those applying for admission are . . . English, one test in Social Studies or Foreign Language, one test in Mathematics or a science. Requirements for California residents . . . Total SAT score of at least 1000, and total score on three ACH of at least 1650 with no single ACH less than 500.0. Requirements for out-of-state residents . . . Total SAT score of at least 1100 and total score on three ACH of at least 1725.0.

What are the costs there.

Tuition at Berkeley is 980 dollars per year of three quarters for out-of-state students. No tuition for California residents. Room and board varies between 600 and 940 dollars. Incidental fee of 242 dollars. Associated students membership fee 11 dollars. Books and supplies about 80 to 110 dollars.

How do they choose their students.

Berkeley selects its candidates on the basis of a candidate's secondary school records and CEEB scores. Alumni relationship and geographical distribution not relevant.

How about Harvard.

Harvard chooses its candidates on the following criteria. Secondary school record, school's recommendation, and CEEB scores. Also, character, personality and extracurricular participation are strongly emphasized. Special talents and interests also considered.

How much does it cost to go to Goucher.

There is a comprehensive fee of 2950 dollars per year including tuition, room and board, and lab fees. Student activity fee of 13 dollars, health fee 50 dollars, and gymnasium outfit 27 dollars. Other costs include books and supplies about 100 dollars.

What kinds of courses should I take.

16 units required, the following recommended . . . English (4), Mathematics (3), (2 in Algebra, 1 in Geometry), one foreign language (3), History (2), Laboratory Science (1). The committee on admissions may allow entrance credit for work in elective subjects not listed.

How do they pick their students.

Goucher College bases its candidate selection on the secondary school record, the school's recommendation, and test scores. Other important factors are personal characteristics, extracurricular participation, and individual interests. Alumnae relationships and geographical distribution considered.

I think that I would like to stop now.

Would you like a summary of your exploration of the education data file.

Yes.

Fine.

You got data on the following variables for Harvard College . . . Costs, including tuition and room and board, how the school selects its students. For Bos-

ton College you got data on the following variables . . . Costs, including tuition and room and board, what high school courses are recommended or required for entrance, what admissions tests you should take.
You have found out about
What admissions tests you should take, costs including tuition and room and board, how the school selects its students, for the University of California at Berkeley.
For Goucher College you explored the data on the following variables . . . Costs, including tuition and room and board, what high school courses are recommended or required for entrance, how the school selects its students.
You didn't explore the available data on Carnegie Institute.
Now then. Would you like to go back and find out anything more about these schools.

No.

Would you like to go into clarification now.

Yes.

Of the following colleges that you have explored, which would you consider applying to.
Harvard University, University of California at Berkeley, Boston College, Goucher College.

Boston College, maybe Berkeley, and Harvard.

Are they listed in order of preference that is, is your first choice first etc.

No.

Please type them in order of preference.

Harvard University, Boston College, Berkeley.

You have decided to go into clarification concerning your preferred alternative Harvard University.
You have accessed the education data base and gotten some of the available data on Harvard University.
In exploration, you stated that you considered the following to be important factors in considering college choice . . . Grades, class rank, test scores, courses, goal.
Now then, you should have a fairly good idea of where you stand in relation to these factors as well as where students admitted to Harvard University stand. Right.

No.

Would you like to go back to exploration to find out how you compare with Harvard Students.

No.

Would you like to choose another activity.

Sure.

What would you like to do.

Find out about jobs.

How would you like to do this

I would like to access the occupation data base.

O.K.

The fourth part of the ISVD software consists of those routines that form the backdrop of the system. These elements perform the task of getting the student to the appropriate place in the system. When a student "logs on" the system, he is given an introduction should he need one. He is then asked what he wishes to do. The backdrop routines process his answer and determine which discontinuity (in Figure 1, D_1, D_2, etc.) he is dealing with. Another routine then determines whether he is in exploration or clarification with respect to this discontinuity and passes him through the appropriate access routine. From there the student will be provided access to the relevant scripts for his situation, and these scripts will in turn provide the needed access to the data bases.

This description is an oversimplification, obviously, but it makes the point of how we intend the guidance machine to function. That is, it indicates in a general way how we hope to develop—through scripts—the student's proficiency with the elements of decision-making and—through access routines—the student's awareness of the process underlying these elements. These are two of the three things which we earlier asserted a machine or a human being must accomplish to be said to be counseling.

The third requirement we listed was that the machine must allow and foster the individual's accommodation to the decision process. This, of course, is the heart of the matter.

In our development of the first prototype of ISVD we have dealt with this third requirement least of all. It is clearly the most difficult issue we face, and although we have certain hunches about it, we are not yet as clear as we would like to be. One hunch concerns the monitoring function, and we have already described how we wish to use the monitoring of student interaction with the system as a means to reveal the process and his relation to it.

Another hunch concerns the Life Career Game and other games we plan for the system. The Life Career Game, developed by Boocock (1967) and others, allows a person to develop and go through a life plan for any number of fictitious people. By using this game we hope to have the student experience some of the more realistic concomitants of choice. We place the game where we do in the chart to indicate that it is not merely a component of the ISVD system. We think of it as a point of view about the system in general. That is, a student can use the ISVD either for real (with his own interests of someone he pretends to be). The two major gains with the game are

the objectivity one has by dealing with someone else's predicaments, and the extension over as much as 20 (simulated) years that the game provides. As strong as these hunches are, however, we do not have enough experience yet to tell much about them.

One small force for accommodation to the system and thus to the decision process it reflects is the ISVD command language. With this simple language a student can take over control of the system flow moving about in the system the way he wishes. This is very much the kind of behavior characteristic of the integration stage of accommodation, and in this way we see the *possibility* that one can indeed accommodate to a machine-based system and thus to the process embodied by that system. We recognize that this is somewhat of an overstatement, and we would be more careful about it if our intention was to argue that ISVD's guidance machine can indeed counsel. We have no such intention.

We describe ISVD to provide a sense of what ISVD can become rather than of what it is today. Relating to the question of this paper, ISVD is not a case in point because it can prove or disprove anything about this question. On the contrary, in this case ISVD would be irrelevant. We describe ISVD to show a little bit of the relationship that exists between a process and its mechanization. It is here that ISVD is significant.

It is, of course, common sense to say that something must be proceduralized before it can be mechanized, and the significance of ISVD is that it clarifies what this means. That is, when thinking about whether or not a machine can counsel, do not be deceived into assuming that the thing that must be proceduralized is the *act* of counseling. If one assumes this, he inherits all the difficulties of Imitation #1 and #2. To simulate the act of counseling is not necessary. What are important are the effects and encouragement of counseling. Even if one decides that no machine could ever be a part of this environment, he will at least have a clearer notion of what the concept of counseling demands.

Now everything we have said in our attempt to answer the question, we recognize, is weak on at least two counts. First, of course, our assertions and our analysis of them need much more consideration if they are to become in any sense firm and sturdy. Second, not only is our example a long way from ideal but there may be no ideal to be reached. We have not gone far enough to know for sure if we can go further.

These are important limitations, but even though we have taken the question seriously enough to attempt an answer, our intention is to offer in the question a fresh look at some assumptions about counseling that are rarely challenged. We expect quarrels over our answer because we know it is simple-minded and a bare first attempt. We hope, however, that these quarrels will not discourage readers from seeing in our strategy an opportunity to start from scratch with the problem of what counseling is all about and of how machines may enter into the procedures of counseling when the goals of counseling and the goals for the machine are consonant.

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[2] Included in the references are a few works in which some of the ideas in this paper have been previously expressed.