

## CHAPTER 3

# THE MEASUREMENT OF VOCATIONAL INTERESTS: ISSUES AND FUTURE DIRECTIONS

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E. K. Strong, Jr., in his classic book, *Vocational Interests of Men and Women* (1943), said:

*some people in various walks of life, including psychologists, have considered the study of interests as of "no scientific value," "extremely silly and pernicious stuff," "a sheer waste of time," "useless and inane." [p. x]*

Now, over forty years later, more than one million Strong-Campbell Interest Inventories (the latest form of the Strong Vocational Interest Blank) are scored annually, and hundreds of thousands of other interest inventories are taken each year by vocational counseling and guidance clients. Clearly, the study and measurement of interests currently are viewed as more than "silly and pernicious stuff." What began as an attempt to improve on the validity of using only ability measures in vocational and educational guidance has grown into a field with its own separate and viable identity.

### DEFINITION OF INTERESTS

No one commonly accepted definition of interests has emerged in the vocational psychology literature and, frequently, definitions of the measurement of interests (Berdie & Campbell, 1968), explanations of interest inventory scales or scores (Super & Crites, 1962), definitions of vocational choice (Super, 1947), theories of career development (Super, 1949), and theories or descriptions of the origin or etiology of interests (Carter, 1940), are substituted for definitions of interests.

Among the attempts to grasp the meaning of interests, three major components, or some combination of the three, have appeared in almost every definition. One major variable to which interests frequently are linked is personality (Berdie, 1944; Darley, 1941a; Holland, 1966). A second major variable in various definitions of interests is motivation or drive (Berdie, 1944; Darley & Hagenah, 1955; Strong, 1955). A third recurring variable is one labeled by some psychologists as an expression of "self-concept" (Bordin, 1943) and by other psychologists as "identification" (Kitson, 1925) or "role" (Tyler, 1960).

One of the most comprehensive definitions of interests, which stresses personality and motivation variables, is found in a monograph by Layton (1958), *Counseling Use of the Strong Vocational Interest Blank*. Layton stated:

*The interests of an individual can be defined as his [or her] like for, dislike for, or indifference to something such as an object, occupation, a person, a task, an idea, or*

an activity. Interests are one aspect of what is broadly considered as the motivation of an individual. Thus, interests are a part of the person's personality structure or organization. When the individual's interest is described in relation to occupations or the world of work, we speak of his [or her] vocational interests. [pp. 3-4]

## THEORIES OF INTERESTS

Theoretical discussions about the origin and development of vocational interests have occurred most frequently in the vocational psychology literature as part of theories of vocational choice or vocational development. Depending on the orientation of a particular theorist, the emphasis that the theory places on interest development, occupational choice, and career development varies, and frequently, the terms are used interchangeably. The following discussion will focus on interest development as opposed to occupational choice or career development; discussion of occupational choice and career development theories will be provided in Chapter 5 of the present volume.

### Dynamic and Static Theories

Most major interest theorists (Berdie, 1944; Darley, 1941a; Darley & Hagenah, 1955; Strong, 1943; Super, 1949) have included five determinants of interests in their theories:

1. Interests arise from environmental and/or social influences
2. Interests are genetic
3. Interests are personality traits
4. Interests are motives, drives, or needs
5. Interests are expressions of self-concept

These determinants may be classified as *dynamic* factors or *static* factors. The dynamic point of view describes vocational interests as the product of a wide range of psychological and environmental influences and emphasizes the effect of socialization and learning on the development of interests. The static point of view regards interests as genetically predetermined. (In addition to dynamic or static theories of interests, a third type of theory, derived from empirical investigations of interests, provides an organizational structure for interests but does not address extensively the process of how interests are acquired.)

The importance of the five determinants of interests to each theory varies and depends more on how the theorist envisions the career development or career choice process than on how he or she delimits the development of interests. Although most theorists are drawn to explanations of the development of interests that incorporate learning theories and environmental influences, the early appearance of interests in an individual and the subsequent stability of interests make explanations based strictly on nurture unsatisfying. Therefore, most theorists, some more reluctantly and with more qualifications than others, acknowledge some heritability component of interests as part of their explanation of the development of interests.

Fryer (1931) insightfully summarized the attractiveness of the dynamic theories on the one hand and the static theories on the other and, at the same time, captured the debate that has ensued since his time about the origin and development of interests:

*To hold that interests are stable, that interests are permanent, necessarily denies any great amount of variability in the life of an individual. [p. 143]*

*But, on the other hand, to hold that interests are unstable, absolutely lacking in their permanence, denies any possibility of the genetic development of interests, of the formation of habits of being interested. [p. 144]*

## Empirical Theories

Theories of vocational interest presented by Roe (1957) and Holland (1959) acknowledged the influence of structural analyses of interests—usually in the form of factor or cluster analysis—on their thinking. Holland's early work, in particular, represents theories that focus on the organizational structure of interests but not on the process of acquiring interests. Examination of the structure of interests has served three functions in interest measurement: (1) refinement of existing inventories, (2) development of new inventories or sets of scales, and (3) accumulation of construct validity data to identify psychological traits measured by interest inventories.

Although some authors (Duffy, 1949) have suggested that theories should be developed prior to test construction, the more usual chronology has been to use results of empirical techniques to develop a theory and, then, to return to empirical techniques again to clarify, refine, and expand the theory. Clearly, this has been the case in Holland's use of Guilford's factor analysis of interests (Guilford, Christensen, Bond, & Sutton, 1954) to develop his own theory of vocational personality types (Holland, 1959).

## Structural Analyses of Interests

Thurstone (1931a) developed the statistical technique of multiple factor analysis and first used data acquired from E. K. Strong, Jr., to demonstrate the application of this method. Thus, the field of interest measurement employed factor analysis technology early in its history to reduce the number of interest variables and to aid in the identification of interest factors and the formulation of theories about interests.

The result of Thurstone's factor analysis of eighteen of Strong's Occupational Scales (Thurstone, 1931b) was four factors which he labeled science, language, people, and business. As more Occupational Scales were developed for the SVIB, additional factor analyses were computed (Strong, 1943). Strong reported that four identical factors emerged in each of his four analyses and that his factors indicated the same classification of occupations as Thurstone had found working with fewer Occupational Scales.

Table 3.1 presents the results of a wide range of factor analyses dating back to Thurstone in the 1930s. Although comparison of results across studies is precarious because (1) subject samples differed from study to study, (2) a variety of statistical techniques were applied to the data, and (3) different pools of variables and different inventories were used for each study, there is an amazing degree of overlap in factors between the various analyses. Typically, an analysis of the structure of interests using scale scores as the variable produces between four and eleven factors or clusters, and an analysis at the item level produces between fourteen and eighteen factors.

The factor analysis study most frequently acknowledged as affecting the theorizing of Roe (1957) and Holland (1959) was conducted by Guilford and his colleagues (Guilford et al., 1954). Using new tests they developed themselves and new samples of subjects, they verified earlier factor analyses of the Strong Vocational Interest Blank. They found seven interest factors: (1) mechanical, (2) scientific, (3) social welfare, (4) aesthetic expression, (5) clerical, (6) business, and (7) outdoor work. They also provided a lengthy discussion pointing out the relationship of vocational and nonvocational interest factors as well as the relationship of interest factors to one another. They concluded that their data supported the belief that vocational interest factors were genuine psychological entities.

## Roe's Theory

Roe (1957) developed a theory of vocational interest and choice that included several family relationship factors. Generally, attempts to test Roe's theory have not been confirmatory (Grigg, 1959; Hagen, 1960; Switzer, 1962). However, Roe's (1954, 1956) work describing

**Table 3.1 Factors Emerging in Factor Analyses of Interests**

Thurstone (1931b)	Crissy and Daniel (1939)	Strong (1943)	Guilford et al. (1954)
<i>Subjects</i>			
Male adults	Female adults	Male adults	Male adults
<i>Inventory/Variables Analyzed</i>			
18 SVIB-M Occupational Scales	18 SVIB-W Occupational Scales	25, 30, 32 and 36 SVIB-M Occupa- tional Scales	98 short scales constructed for the study
<i>Resulting Factors</i>			
Science Language People Business	Science Language People Detail	Science Language People Business	Outdoor Mechanical Science Aesthetic Social Welfare Business Clerical
<hr/>			
Schutz and Baker (1962)	King and Norrel (1964)	Zytowski (1976)	Zytowski (1976)
<i>Subjects</i>			
Male college students	Male college students	Female adults	Male adults
<i>Inventory/Variables Analyzed</i>			
Kuder- Occupational Scales	Kuder- Occupational Scales	Kuder-DD women's scales	Kuder-DD men's scales
<i>Resulting Factors</i>			
Outdoor Engineering- Physical Science Health Scientist Verbal-Directive Aesthetic-Business Interpersonal- Directive Business-Detail	Outdoor Technical Engineering- Physical Science Health Scientist Verbal Artistic Business Social Service	Mathematic-Nu- meric Psychology Socio-Political Science Language Art Medical Service Homemaking Helping Lower level, easy access	Agriculture Skilled Trades Physical Science Mathematic-Nu- meric Psychology Political Science Language Art Medical Service Helping Managerial

Table 3.1 (Continued)

Farnsworth (1969)	Lorr and Suziedelis (1973)	Rounds and Dawis (1977)	Rounds and Dawis (1977)
<i>Subjects</i>			
Female adults	Male Adults	Female adults	Male adults
<i>Inventory/Variables Analyzed</i>			
Items on the SVIB for Women	Items on the SVIB for Men	Items on the SVIB for Women	Items on the SVIB for Men
<i>Resulting Factors</i>			
Agrarian	Outdoor Work	Mechanical and	Mechanical
Mechanical	Outdoor Sports	Athletic	Activities
Law Enforcement	Mechanical	Medical Science	Athletics
Research	Activities	Mathematics	Nature
Quantitative	Military Activities	Aesthetics	Military
Social Science	Risk and Change	Teaching	Activities
Humanities	Quantitative	Religion	Adventure
Dramatics	Science	Domestic Arts	Scientific
Literary	Art Activities	Fashionable	Activity
Artistic	Liberal	Appearance	Mathematics
Children and	Nonconformist	Meeting and	Aesthetics
Teaching	Social Welfare	Directing People	Nonconformity
Culinary	Activities	Business	Social Service
Sewing	Religious	Clerical	Religion
Religious	Activities		Public Service
Political	Extroverted-		Meeting and
Sales and	Competitive		Directing People
Business	Games		Business
Secretarial	Sales and Business		
	Management		
	Leading and		
	Directing		
	High-Status		
	Professional		

the structure of interests, which resembles the interest factors from Guilford's (Guilford et al., 1954) factor analysis of vocational interests, has been useful. She described two dimensions, as indicated in Table 3.2. The *Group* dimension focuses on work activities based on eight interest factors or categories: (1) Service, (2) Business Contact, (3) Organization, (4) Technology, (5) Outdoor, (6) Science, (7) General Cultural, and (8) Arts and Entertainment. The *Level* dimension, divided into six categories according to level of responsibility, also takes into consideration capacity and skill differentiations at each level.

### Holland's Theory

In 1959, John L. Holland outlined a theory of vocational choice which he expanded in 1966 and called a theory of vocational behavior, and modified again in 1973, renaming it a theory of careers. Holland (1966) described interests and vocational preferences as expres-

Table 3.2 Roe's Classification of Occupations

Group	Level
I) Service	1) Professional and Managerial 1
II) Business Contact	2) Professional and Managerial 2
III) Organizations	3) Semiprofessional, Small Business
IV) Technology	4) Skilled
V) Outdoor	5) Semiskilled
VI) Science	6) Unskilled
VII) General Cultural	
VIII) Arts and Entertainment	

sions of personality and referred to his theory as both a theory of vocational life and a theory of personality. This theory grew out of a series of empirical and theoretical reports beginning with the development of the Vocational Preference Inventory (Holland, 1958).

Holland's theory states that (1) people can be divided into six personality types or some combination of the six types; (2) environments also can be described according to the six types; and (3) choices are made as people seek the type of environment that matches, or is congruent with, their personality type. Development of vocational interests, or emergence of a resemblance to one of the six types, is a result of the environment modeling and reinforcing certain behaviors.

Holland's six types are Realistic, Investigative, Artistic, Social, Enterprising, and Conventional; he suggested that the six types can be arranged around a hexagon in an R-I-A-S-E-C order, as illustrated in Figure 3.1, and that types adjacent to one another are more related (more highly correlated) than are types diametrically opposed to one another on the hexagon.

Two supplementary concepts important to Holland's theory are *consistency* and *homogeneity*. Consistency means that a person's interests cluster in related types; homogeneity (also known as *differentiation*) is defined as the degree of difference between the person's strongest and weakest interests.

Many analyses have sought to verify the accuracy of Holland's hexagonal representation of the structure of interests for women and men. Comparison of findings across studies is limited by the different statistical procedures used, variables selected for analysis, and subjects

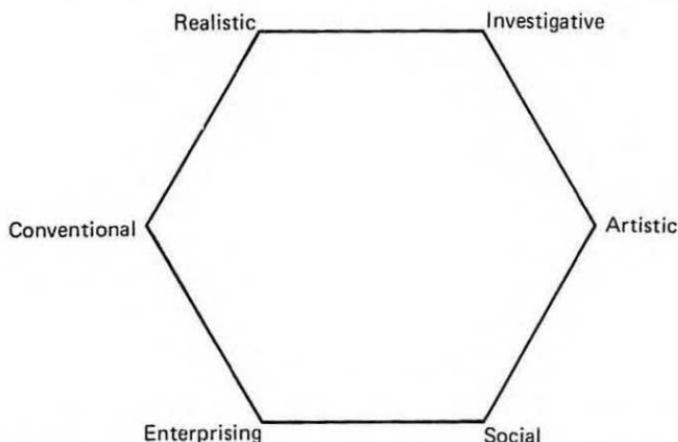


Figure 3.1 Holland's six types arranged in R-I-A-S-E-C hexagonal order.

sampled. Typically, no uniformity exists on any of these dimensions from one study to the next. However, the results generally indicate that the world of work does organize itself in approximation to Holland's hypothesized hexagon. The hexagon may not be as regular or equilateral as Holland's theory suggests, but given the diversity of methodologies used to study his theory, the comparability of results is remarkable (Campbell & Hansen, 1981; Cole & Hanson, 1971; Edwards & Whitney, 1972; Prediger, 1982; Rounds, Davison, & Dawis, 1979).

Holland's theory has had tremendous influence on vocational interest measurement in at least three respects. First, his theory has led to the development of inventories and sets of scales to measure the six types, including his own Self-Directed Search (Holland, 1971), the ACT Interest Inventory (Lamb & Prediger, 1981), the General Occupational Themes of the Strong-Campbell Interest Inventory (Campbell & Holland, 1972; Hansen & Johansson, 1972), and the System for Career Decision-making (Harrington & O'Shea, 1976).

Second, the literature is replete with research that was stimulated by Holland's theory as it applies to everything from vocational satisfaction (Walsh, Spokane, & Mitchell, 1973), to vocational choice (Williams, 1972) to vocational stability (Villwock, Schnitzen, & Carbonari, 1976; Walsh & Lacey, 1969).

Third, the typology has been used to describe interests as they relate to people, jobs, and environments; to organize occupational materials; and to provide an integration of variables relevant to career choice—interests, abilities, values, needs, and personalities—under one system.

The simplicity of Holland's theory has made it amenable for use with clients. For the same reason, Holland's (1971) Self-Directed Search (SDS) has become quite popular; it is easy to administer, can be self-scored, has only six scores that need to be interpreted, and is inexpensive.

## WHY STUDY INTERESTS?

Although both education and industry now view interests as important psychological factors (Hansen, 1981a), Frank Parsons, an educator, was the first to write about the relationship between how people felt about their various occupational activities and their personal adjustment. In his book, *Choosing a Vocation*, Parsons (1909) stated that adjustment to the world of work was a function of the agreement between individual capacities and characteristics on the one hand, and demands of the occupation on the other. The first step recommended by Parsons for career exploration was "self-study" to determine capabilities, interests, and limitations which could be compared to requirements of jobs.

Although educators were first to recognize that consideration of a person's interests might lead to improved quality of education, in the 1920s industry also recognized the financial worth of having a person interested in his or her job. Thus, early research in interest measurement was conducted by psychologists such as Miner (1922), who attempted to help students analyze their work interests, and Moore (1921), who tried to understand differences between sales and design engineers.

To a large extent, development of interest inventories also resulted from attempts to provide information to supplement existing measures of special and general abilities. The early writings of E. K. Strong, Jr., still are relevant today and capture the essence of the use of vocational interest measurement in counseling psychology:

*The majority of [people] are practically equally fitted to enter a considerable number of occupations. Only exceptional [people] are fitted for some one occupation to the exclusion of all others. The probability is that today most of these exceptional [people] find the one occupation without the aid of a science of vocational guidance. The [people] who need help today are those whose interests are so balanced that they can enter a number of probably more or less related occupations with equal chances of happiness.*

*It is not the ability but interest in the work that the test is designed to measure. Such a test is badly needed since many [people] can do the work at which [they are] now employed, but will resign very soon because [they are] not interested in it. [Strong, 1927a, p. 297]*

He elaborated in 1943:

*Interests supply something that is not disclosed by ability and achievement. They point to what the individuals want to do, they are reflections of what he [or she] considers satisfying. If our objective is happiness and success we must consider both interests and abilities, for surely enjoyment is just as important as efficiency in everyday life. Counseling that considers both abilities and interests is distinctly superior to that based on either alone, for it is in a position to establish both what the [person] can do and what he [or she] wants to do. [p. 19]*

## WHY MEASURE INTERESTS?

Although the importance of interests had been established early (Miner, 1922; Parsons, 1909; Strong, 1927a, 1943), the need for measurement of interests, rather than self-report, occasionally was questioned.

Early researchers in the area of expressed versus inventoried interests (Arsenian, 1942; Bendell, 1941; Cronbach, 1970; Darley & Hagenah, 1955) conducted concurrent studies to identify how closely expressed interests, or estimates of interests, related to interests measured by objective tests such as interest inventories. Their conclusion generally was that little relationship existed due to several factors: (1) estimates of interests at young ages probably lacked a sense of reality, (2) the large number of items in inventories provided a more thorough sampling of interests, (3) students, even those who knew their own interests, were unable to judge how their interests compared to those of other persons, (4) expressed interests were less permanent, and (5) expressed interests were unduly influenced by factors such as prestige, family pressure, and misconceptions of the world of work.

Early negative findings led at first to neglect of expressed interests in counseling. Later, however, inquiry into the validity of expressed interests was renewed and research focused on predictive, rather than on concurrent, studies of expressed versus inventoried interests (Borgen & Selig, 1978; Enright & Pinneau, 1955; Holland & Gottfredson, 1975; McArthur & Stevens, 1955). Data from these studies indicated that expressed and inventoried interests probably are equally predictive of occupational entry. However, a final conclusion on expressed versus inventoried interests must be qualified because of many inadequacies in the methodological designs of most of these studies; these inadequacies include choice of the prediction criteria, method used for identifying "hits" or "misses" in prediction, sample composition, and unsystematic methods used to identify expressed interests that vary from asking for daydreams to more sophisticated assessments of probabilities of occupational entry.

The preferred mode of vocational exploration now is integration of expressed and inventoried interests. For those students who have a definite occupational choice, interest inventory scores may serve as confirmation of choices already made. Conflicting results between expressed and inventoried interests can lead to useful discussions about the causes of the discrepancies and to a better understanding of an individual's motivation for the occupational selection, which may be related to factors other than interests.

## INTEREST INVENTORIES AND THEIR CONSTRUCTION

### The History of Interest Inventories

The earliest work in assessing interests was accomplished by asking persons to estimate how they felt about an occupation or activity (Fryer, 1931). *Try-out methods* were used

to help increase the accuracy of an individual's estimates. These included taking courses in the field of the occupation, reading about the occupation, or gaining work experience in the occupation. Try-out techniques still are used to help individuals evaluate the strength of their interests.

Interest questionnaires, such as *checklists* or *rating scales*, were intended to be more cost- and time-efficient than the try-out method. The most popular checklist was Miner's Analysis of Work Interests (1922). After completing the questionnaire, the client discussed his or her responses to each item with the counselor. Like checklists, rating scales required self-ratings. The most popular rating scale was Kitson's (1925) Vocation-to-Vocation, which asked the individual to rate the vocation in which he or she was working in relation to all other vocations.

Development of interest inventories followed interest questionnaires as another method for improving estimated interests. Interest inventories were more efficient than questionnaires in that they incorporated a statistical procedure for summarizing an individual's expression of likes and dislikes into a score, which represented the degree of interest in a field, profession, or occupation.

Interest inventories that incorporated objective scoring procedures flourished more over the years than did other early techniques for identifying interests. One of the first questionnaires to be scored was Kelley's (1914) battery of questions. According to Kuder (1980), this was the first measure worthy of the name interest inventory. However, Kelley's instrument was a combination of an *inventory*, which asked for estimates of interests, and an *objective test*, which assessed knowledge or factual information about certain occupational areas.

The earliest work on a standardized interest inventory (outside of Kelley's, which was really a hybrid format) occurred at the Carnegie Institute of Technology. A seminar taught in 1919 by Clarence S. Yoakum developed an item pool of over 1000 items, some of which eventually found their way into many different published inventories.

### *Yoakum Seminar Interest Items*

The assumption underlying development of measures of interests is that certain interests are common to various groups and distinguish them from other groups. For example, the first study using a sample of Yoakum seminar items attempted to measure the interests of sales and design engineers; the former were thought to be socially-oriented and the latter, mechanically (Moore, 1921).

In 1921, the Yoakum seminar condensed several interest inventories that had used samples of the seminar items into the Carnegie Interest Inventory, considered to be the first standardized interest inventory. Freyd (1922), using the Carnegie Interest Inventory, expanded earlier work on types of engineers to examine differences in interests between mechanically-oriented and socially-oriented groups of people, and Ream (1924) attempted to identify interests of successful and unsuccessful salesmen. Although Ream's findings were not encouraging (he found that it was not possible to distinguish the two groups on the basis of the inventory), his objective scoring technique was a progressive modification of the Carnegie Interest Inventory.

Derivatives of the original Carnegie Inventory included the Occupational Interest Inventory (Freyd, 1923), Interest Report Blank (Cowdery, 1926), General Interest Survey (Kornhauser, 1927), Vocational Interest Blank (Strong, 1927b), Purdue Interest Report (Remmers, 1929), Interest Analysis Blank (Hubbard, 1930), and Minnesota Interest Inventory (Paterson, Elliot, Anderson, Toops, & Heidbreder, 1930).

### **Developing Item Pools**

The original 1000-item pool from the Yoakum seminar was developed using a *rational sampling approach*, meaning that the item selection procedure did not involve any statistical

analysis of the items but rather was an attempt to write items representing the entire domain of interests. Later investigators worked to identify, through statistical analysis, the worth of the original items in terms of the degree to which the items discriminated between the like, dislike, and indifferent responses of various groups. This process of refining item pools never ends; changes in society, technological discoveries, and technological obsolescence periodically make revisions and modifications necessary.

### Methods of Scale Construction

Most research in interest measurement is conducted using interest inventories to operationalize or measure interests. Two types of scales have been used to measure interests—*heterogeneous* scales and *homogeneous* scales.

#### *Heterogeneous Scales*

Early research in interest measurement used the empirical method of contrast groups to differentiate among specialties within an occupation (e.g., types of engineers; Moore, 1921) or to differentiate between different occupational groups (e.g., salespeople and engineers; Freyd, 1923). E. K. Strong, Jr. (1927b), modifying the first empirical methods used to differentiate occupations from one another, developed a technique designed to identify the items that discriminated specific occupations from people in general. Another type of heterogeneous scale construction, developed by G. Frederick Kuder (1966) for the Kuder Occupational Interest Survey Form-DD (KOIS-DD), compared the individual person's pattern of responses to the items directly to the responses of criterion samples composed of subjects from various occupations and college majors. Occupational scales developed using the empirical method of contrast groups are called *heterogeneous* because items selected for the scales have low correlations with one another (Berdie & Campbell, 1968).

#### *Homogeneous Scale Construction*

The other type of scale used frequently for measuring interests is the *homogeneous scale*, which contains items that have high correlations with one another. Empirical methods of cluster analysis and factor analysis are used to identify and gather together related items for homogeneous scales; these scales are named on the basis of the item content of the scales. The Kuder Preference Record (Kuder, 1939) was one of the first widely used inventories to have homogeneous scales. Later, Clark (1961) combined the construction techniques of the heterogeneous scales of the SVIB and the homogeneous scales of the Kuder when he developed the Minnesota Vocational Interest Inventory (MVII); Campbell also combined homogeneous and heterogeneous scales in one inventory when he added the Basic Interest Scales (BIS), developed by cluster analysis, to the SVIB (Campbell, Borgen, Eastes, Johansson, & Peterson, 1968).

Another type of homogeneous scale is developed by rational selection of items. This technique was used to develop Holland's Self-Directed Search (1971) and the General Occupational Themes (Campbell & Holland, 1972; Hansen & Johansson, 1972) which appear on the latest edition of the SVIB-SCII (Campbell & Hansen, 1981). For rational scale construction, theory is used to determine which items in the pool are appropriate for each scale. Item selection for scales developed using contrast groups or factor or cluster analysis, on the other hand, is strictly an atheoretical, statistical procedure.

#### *Comparison of Heterogeneous and Homogeneous Scales*

Heterogeneous scales used to measure occupational interests (Berdie & Campbell, 1968) are more powerful in separating criterion groups and are more clearly related to the measure-

ment of occupational interests than are homogeneous scales; however, homogeneous scales have been shown to measure not only vocational interests but also leisure interests (Cairo, 1979), and interest in types of people and in living and working environments (Holland, 1973). Consequently, heterogeneous scales have the best predictive validity in terms of occupational choice, but homogeneous scales can be useful in exploring a client's interests as they relate to her or his entire life style. Together, the heterogeneous and homogeneous scales provide a system of checks and balances that allows an individual to identify interests in a general way through homogeneous scales and, then, to more clearly define which of those interests are occupationally related using the heterogeneous scales (Campbell & Hansen, 1981; Johnson, 1971).

Homogeneous scales also are useful in research that tests hypotheses about vocational interests and appeal to many because of their simplicity. However, methods of homogeneous scale construction typically derive only a small number of scales. Although a limited number of homogeneous scales may be sufficient to describe basic interests, they do not provide specific occupational information. Consequently, many interpretive aids are needed for the most effective use of these scales in vocational counseling. Inventories with a small number of general scales do not stand on their own and do not provide an individual with specific career options as effectively as do inventories with discrete occupational scales.

### Evaluating Technical Adequacy of Inventories

A plethora of new instruments are being marketed that claim to provide assistance for career guidance, exploration, choice, and decision making. Thus, the need to evaluate the reliability and validity of interest inventories never ceases. As new inventories are developed and old inventories revised, new evidence needs to be presented to verify the worth of the instruments. And the user needs to beware of inventories that are touted more for their speed, ease, and low cost of administration and scoring than their technical excellence.

The principal source of information on the technical adequacy of an inventory should be the test manual. In addition, critical reviews appear in *Buros' Mental Measurement Yearbook* (1978), started by O. K. Buros (who first released listings of critical reviews in 1934), and in professional journals, such as *Measurement and Evaluation in Guidance* and *Journal of Counseling Psychology*. The National Vocational Guidance Association has published the *Counselor's Guide to Vocational Guidance Instruments* (Kapes & Mastie, 1982), which contains reviews of tests used in vocational guidance; it is designed to serve those users who do not have a strong background in statistics and psychometrics.

### Review of Interest Inventories

The four most widely used interest inventories by both high school and college counseling services are the Strong-Campbell Interest Inventory (SCII), the Kuder Occupational Interest Survey (KOIS), the Kuder Preference Record (forms C and E), and the Self-Directed Search (SDS) (Engen, Lamb, & Prediger, 1982; Zytowski & Warman, 1982). The SCII (and its predecessor, the Strong Vocational Interest Blank), the various forms of the Kuder, and the SDS (and its predecessor, the Vocational Preference Inventory) will be discussed from an historical perspective.

#### *Strong Vocational Interest Blank—Strong-Campbell Interest Inventory (SVIB-SCII)*

Strong was the first interest inventory author whose work had a lasting effect on the field of interest measurement. As early as 1931, Strong's Vocational Interest Blank (SVIB) was cited as the foremost standardized interest inventory (Fryer, 1931), and according to a study by Zytowski and Warman (1982), the latest revision of the SVIB, the Strong-Campbell

Interest Inventory (SCII), still is the most frequently used test in college counseling centers by a wide margin.

Of all interest inventories, the SVIB-SCII is the most complex in terms of both the number and types of scales on its profile. The original SVIB (Strong, 1927b) included only ten Occupational Scales, constructed with the empirical method of contrast groups, that compared the interests of an individual to the likes, dislikes, and indifferences of men already in various occupations. A women's form of the SVIB was published by Strong in 1933 and, until 1974, the SVIB continued to be published with separate forms for females and males. In 1974, David P. Campbell merged the two forms into one single-sex form, now known as the Strong-Campbell Interest Inventory (SCII). The SCII was revised in 1981 (Campbell & Hansen) and expanded to include 162 Occupational Scales in an effort to provide a profile with the same offerings for males and females.

Between publication of the first men's and women's forms and publication of the merged sex form, the SVIB-SCII was revised twice for each sex; the men's form in 1938 (Strong, 1938) and 1966 (Campbell, 1966c) and the women's form in 1946 (Strong, 1946) and 1969 (Campbell, 1969). The revisions in the 1960s featured the addition of the homogeneous Basic Interest Scales (BIS) (Campbell, Borgen, Eastes, Johannson, & Peterson, 1968). Developed by cluster analysis of the SVIB items, each Basic Interest Scale focuses on the measurement of only one area of interest. Consequently, the BIS are easier to interpret than are the heterogeneous Occupational Scales that incorporate a wide range of items and interests.

The 1974 SCII (Campbell, 1974) featured, for the first time, the integration of Strong's empiricism with a theory of interests, that of John Holland. Scales, called General Occupational Themes (GOT), were developed using rational scale construction, to represent each of Holland's six types (Campbell & Holland, 1972; Hansen & Johannson, 1972); the twenty-three Basic Interest Scales were clustered on the profile according to their highest correlation with the General Occupational Themes; and the 162 Occupational Scales were assigned Holland codes and ordered on the profile in Holland's hexagonal R-I-A-S-E-C order.

The SVIB-SCII also included two Special Scales, Academic Comfort and Introversion-Extroversion. The Academic Comfort scale measures interest in being in an academic environment and in academic research and theory (Campbell & Hansen, 1981; Swanson & Hansen, 1983); the scale has little to do with ability but rather indicates comfort in an academic environment. The Introversion-Extroversion scale measures preferences for working with things or ideas (introversion) versus working with people (extroversion). The scale correlates highly with other measures of introversion and extroversion, such as scales on the MMPI (Cottle, 1950) and the Omnibus Personality Inventory (Goodyear & Frank, 1977).

### *Kuder Interest Inventories*

About the time that Strong was revising the Vocational Interest Blank for the first time (1938), G. Frederick Kuder was publishing his Personal Preference Record-Personal, Form A (1939), which included seven almost independent homogeneous scales. Kuder added two more homogeneous scales in 1943 (Form B) and another homogeneous scale, for a total of ten, in 1948 (Form C); Form C-Vocational has had the greatest use. Eventually Kuder (1966) published the Occupational Interest Survey (KOIS), also known as the Kuder-DD, which measures interest in specific occupations and college majors.

The main purpose of the Kuder Preference Record is to indicate interests in a small number of broad areas, rather than in specific occupations. The items were originally grouped on the basis of content validity and later by item analyses that looked for high internal consistency of item groups (or scales). The scale scores are the person's percentile standing in various interest categories as compared to normative samples appropriate to the person's age group.

The economical self-scoring method of the first Kuder Preference Record, which required

the client to respond to the inventory by pricking the answer sheet with a pin, was one reason for its popularity. The pricked answer sheet could be analyzed locally, avoiding the need to send the answer sheet to a commercial service for scoring. The Kuder-C and the Kuder-E (Kuder, 1964), an easier version of Form C, still may be answered using the pin-prick method; the KOIS-DD, like the SVIB-SCII, must be machine scored.

### *Vocational Preference Inventory (VPI) and Self-Directed Search (SDS)*

The Vocational Preference Inventory (VPI) and Self-Directed Search (SDS) are two inventories developed by John Holland. According to Holland (1978), development of the VPI led to a theory of careers (Holland, 1966); the theory later generated the development of the SDS (1971).

Unlike the atheoretical construction of the SVIB-SCII and KOIS-DD Occupational Scales, development of the VPI rested on a psychological rationale initially proposed by Holland (1959), which later was enlarged and expanded into his theory of careers. First, Holland examined the vocational interest, vocational choice, and personality literature to identify interest and personality factors and how they related to one another. Next, he constructed scales to measure each of the factors by using occupational titles as items representative of the factors. The original seven scales were Physical Activity (now called Realistic); Intellectual (now known in Holland's theory as Investigative); Responsibility (now called Social); Conformity (now called Conventional); Verbal Activity (called Enterprising); Emotionality (called Artistic); and Reality Orientation.

Other VPI scales, developed using empirical rather than rational methods, were the Response Bias Scale, later called Acquiescence, measuring willingness to say "yes" in response to items; a Status Scale, indicating interest in occupational status; Masculinity, measuring masculinity-femininity; and the Infrequency Scale, assessing the tendency to answer items in an atypical manner.

Raw scores for each scale are plotted on a profile that provides conversion to percentile scores based on male and female samples of employed persons that roughly represent working Americans.

The SDS differs from the VPI, a traditional interest inventory, in that it was developed to simulate vocational counseling through self-rating of competencies, activities, and likes and dislikes for various occupations. Rather than a numerical score to indicate the strength of an interest, the SDS "score" is a three-letter code summarizing the individual's similarity to Holland's types.

## **DEVELOPMENT, HERITABILITY, AND STABILITY OF INTERESTS**

### **Development of Interests**

Empirical research on the development of interests at a young age is sadly lacking in the literature on interest measurement. Many studies focus on research populations whose members are 15 or 16 years old at their first testing; an even more frequently used population is college students. Studies with these populations (Hansen & Stocco, 1980; Rosenburg, 1953; Strong, 1951) have shown that interests are established and are relatively stable as early as the ninth grade and, consequently, give no additional insight into the emergence of those interests.

Leona Tyler (1964) conducted one of the few longitudinal studies of the interests of children. She tested children (both females and males) six times over a twelve-year period, in grades 1, 4, 8, 10, 11, and 12. The first and fourth graders were assessed with instruments that Tyler eventually concluded were technically insufficient. For example, the instrument she developed for first graders was an individually administered device that had marginally acceptable test-retest reliability. With the fourth graders, she attempted to develop scales

based on the Drees-Mooney Interest Inventory for Elementary Grades (Drees & Mooney, 1941); however, the scale scores were dependent on an individual possessing enough dislikes to express an individual pattern of interests. The fourth graders tended to mark "like" for almost everything, thus impairing the scoring system of the inventory.

Tyler also administered the SRA Primary Abilities Test (Thurstone, 1939) at grades 1, 4 and 8; the Kuder Preference Record (Kuder, 1948) at Grade 8; the Strong Vocational Interest Blank (Strong, 1959) at Grades 10, 11, and 12; Iowa Tests of Educational Development (Lindquist, 1959) at Grade 11; and the California Psychological Inventory (Gough, 1957) at Grade 12.

To explore interest development, Tyler finally used a *trace-back procedure* that involved, as the first step, an examination of the sample's twelfth-grade SVIB results. From the entire sample ( $N = 145$ ), she selected subjects who had identifiable interests in Grade 12 and traced them back to determine when those interests first appeared. The groups she selected for this trace-back procedure were boys who had Scientific ( $n = 22$ ) and Nonscientific ( $n = 17$ ) interests, and girls who had Career ( $n = 15$ ) and Noncareer ( $n = 30$ ) interests.

Tyler found that interests of Scientific-interest boys were significantly different in the science area from Nonscientific-interest boys at the eighth grade Kuder testing and that these differences were maintained on the SVIB in the tenth, eleventh and twelfth grades. In the first and fourth grades, the principal difference between the two groups was on a measure of masculinity, with Scientific-interest boys appearing more masculine. A few items, related to scientific interests, did differentiate the two groups at the fourth grade level, suggesting that Scientific-interest boys had begun to differentiate from the other students at this early age.

The two groups of boys were not differentiated on the SRA Primary Mental Abilities tests taken in Grades 1, 4, or 8; however, in the eleventh grade, science and math subtests of the Iowa Tests of Educational Development did differentiate between Scientific- and Nonscientific-interest boys. These data suggested that the higher ability of the Scientific group on eleventh grade subtests—but not previously—was a result of their interests rather than a cause of their interests.

Tyler also found that the interests of Career- and Noncareer-interest girls were differentiated on the Kuder by the eighth grade. Although eleventh-grade comparisons revealed many differences in ability and school achievement (with the Career-interest girls scoring higher), no significant differences were found between the two groups on ability tests at the first, fourth, and eighth grades.

Tyler concluded that interests characteristic of Scientific-interest boys and Career-interest girls crystallized sometime between the ages of 10 and 14, but that certain developmental antecedents emerged at a much earlier stage. She also concluded that high or low abilities and social status or socioeconomic status during early childhood were not related to twelfth-grade patterns of interests; that is, interests appeared to develop and differentiate Scientific and Nonscientific and Career and Noncareer groups first. Later, the groups were differentiated on other traits such as abilities and personality factors (Tyler, 1964).

### Heritability of Interests

Studies on heritability of interests add to the information on the origin of interests. They have the advantage over developmental studies on interests in that they can use reliable and valid measures available for use with adults that are not available for use with young children.

One of the first researchers to investigate heritability was H. D. Carter (1932), who, in response to early hypotheses about the inheritance of interests, studied the degree of resemblance of related persons on the trait of interests. His sample was 120 sets of twins, most of whom were junior high or high school students; of these 120 sets, 43 were classified as monozygotic, 43 as same-sex dizygotic, and 34 as opposite-sex dizygotic. The SVIB was

administered to all subjects, and the profiles included comparison with 23 occupational interest groups. The mean correlations (all significant) for the three groups of twins were .50 for the 43 pairs of identical twins; .26 for the 43 pairs of same-sex fraternal twins; and .30 for the 34 pairs of opposite-sex twins.

Since Carter, the heritability of interests has been studied using three major research designs: (1) monozygotic and dizygotic twins studies, (2) biological and adoptive parent-child and sibling similarity studies, and (3) a combination of methods using monozygotic and dizygotic twins who were reared apart.

### *Interests of Monozygotic and Dizygotic Twins*

The behavior-genetic method for studying the heritability of interests involves comparing interests of individuals of different degrees of biological relatedness. The most frequently used approach has been to compare interests of monozygotic and dizygotic twins. This was the method used by Carter (1932), and his results have been replicated by other researchers using different age groups, interest inventories, and statistical procedures (Johansson, 1969; Roberts & Johansson, 1974; Vandenburg & Kelly, 1964; Vandenburg & Stafford, 1967). The variance between monozygotic (MZ) twins is due to environmental factors because they have identical genes; the variance between dizygotic (DZ) twins is due to both environment and heredity. The twin method identifies the difference between the variance of MZ and DZ pairs; the difference is the amount of variance that is genetically controlled.

The most recent of these studies (Roberts & Johansson, 1974) used the General Occupational Themes of the SVIB-SCII (which, as noted earlier, are six scales that measure Holland's six vocational types) to measure interests of MZ and DZ twins. The study sample ( $N = 3172$ ) included 570 MZ female pairs, 370 DZ female pairs, 409 MZ male pairs, and 237 DZ male pairs. All subjects were high school juniors. For females and males, the median MZ intraclass correlation was .55 and .50, respectively, and the median DZ intraclass correlation for both sexes was .27.

### *Interests within Biological and Adoptive Families*

Another behavior-genetic method is the adoption design, which allows comparisons of biological and adoptive parent-child and sibling pairs. Grotevant, Scarr, and Weinberg (1977) studied biological ( $n = 114$ ) parent-child families and adoptive ( $n = 109$ ) parent-child families using the General Occupational Themes of the SVIB-SCII to measure interests. They found no resemblance between adoptive parents and their children (Father-son,  $r = .13$ ; Mother-daughter,  $r = .13$ ; Father-daughter,  $r = .06$ ; Mother-son,  $r = .07$ ), even though the children had lived in their adoptive homes for 15 to 22 years. Like adopted children and their parents, adoptive siblings showed no pattern of similarity in interests (Sibling-sibling,  $r = .08$ ).

However, biological parents and their children had moderately similar interests (Father-son,  $r = .29$ ; Mother-daughter,  $r = .24$ ; Father-daughter,  $r = .19$ ; Mother-son,  $r = .24$ ), suggesting a genetic hypothesis. Also, biological siblings were moderately similar to each other (Sibling-sibling,  $r = .25$ ), unlike adoptive siblings, further supporting the hypothesis that genes contribute to interests.

### *Interests of Twins Reared Apart*

Four major studies have been conducted on twins reared apart, a method that controls for potential inflation of similarity coefficients as a function of environmental similarities (Bouchard, Heston, Eckert, Keyes, & Resnick, 1981; Juel-Nielson, 1980; Newman, Freeman, & Holzinger, 1937; Shields, 1962). The Minnesota Study of Twins Reared Apart (Bouchard et al., 1981), which began in 1979 and is continuing at the University of Minnesota, is

the most comprehensive, involving both a full week of testing and a sample of twins who were separated earlier and reunited later. To date, results reported for the Minnesota Study have been descriptive and conclusions speculative. However, the frequency of interest similarities between twins in the reported case studies seems larger than might be expected based on coincidence (Bouchard et al., 1981; Eckert, Heston, & Bouchard, 1981; Holden, 1980a, 1980b).

Results of the Minnesota Study, when available, should provide additional knowledge and insight into the origin of interests and into the roles that nature and nurture play in development of interests.

### Stability of Interests

Studies on stability of interests sometimes are confused with studies of test-retest reliability of interest inventories. Reliability is studied to determine if inventories measure the same thing on two different occasions or if, on the other hand, the test itself works differently at various times. Typically, the period between initial testing and retesting is no more than six months (Anastasi, 1982); studies designed to retest interests after longer elapsed times go beyond investigation of reliability of an inventory and actually explore the stability of the interests being measured.

Perhaps the most well-documented knowledge in the entire field of interest measurement is the remarkable stability of interests of individuals (Hansen & Stocco, 1980; Strong, 1955), occupational groups (Campbell, 1966b; Hansen, 1982a), and society in general (Hansen, 1982a; Johansson, 1975). Cross-sectional and longitudinal methods have been used to study stability of measured interests.

#### *Cross-sectional Studies*

One method of cross-sectional analysis involves studying a particular group at Time 1 and later, at Time 2, studying different individuals who meet the same criteria as did the subjects studied at Time 1. For example, Campbell (1966a) contrasted interests of bankers tested in 1934 (Time 1) with another group of bankers who in 1964 (Time 2) were in the identical jobs held by the 1934 bankers. Results indicated that substantial similarity existed between the interests of the two groups. A recent project (Hansen, 1981b, 1982a) made use of 50 years of data on the interests of working adults collected on the SVIB-SCII in the 1930s, 1960s, 1970s, and 1980s. More than 30 occupations, as well as women-in-general and men-in-general (large samples of women and men from a variety of occupations), were tested at least three times during that period. Interests of the in-general samples tested over five decades were virtually identical for women, while there were a few small changes for men (higher scores in the 1980s in Enterprising areas of interest and on Adventure); the same trend of stability existed within specific occupations. As Figure 3.2 illustrates (using female business education teachers as an example), even when the scale scores had shifted to some small extent, the general configuration of the profile for a particular occupation remained the same and the relative importance of various interests for a particular occupation had not changed.

Another cross-sectional method for analyzing stability of interests is to compare several age groups, all of whom are tested at roughly the same time (e.g., comparing interest patterns of adolescents and adults). Using this approach, Strong (1943) concluded that age does not affect interest to any great degree, that by age 25 a person's interests have stabilized, and that experience as an adult will change a person's interests very little. He reported correlations of .82 between the interests of 15 and 25-year-old men; .73 between 15 and 55-year-old men; and .88 between 25 and 55-year-old men. These high correlations suggest more similarities than differences among the interests of 15 to 55-year-olds.

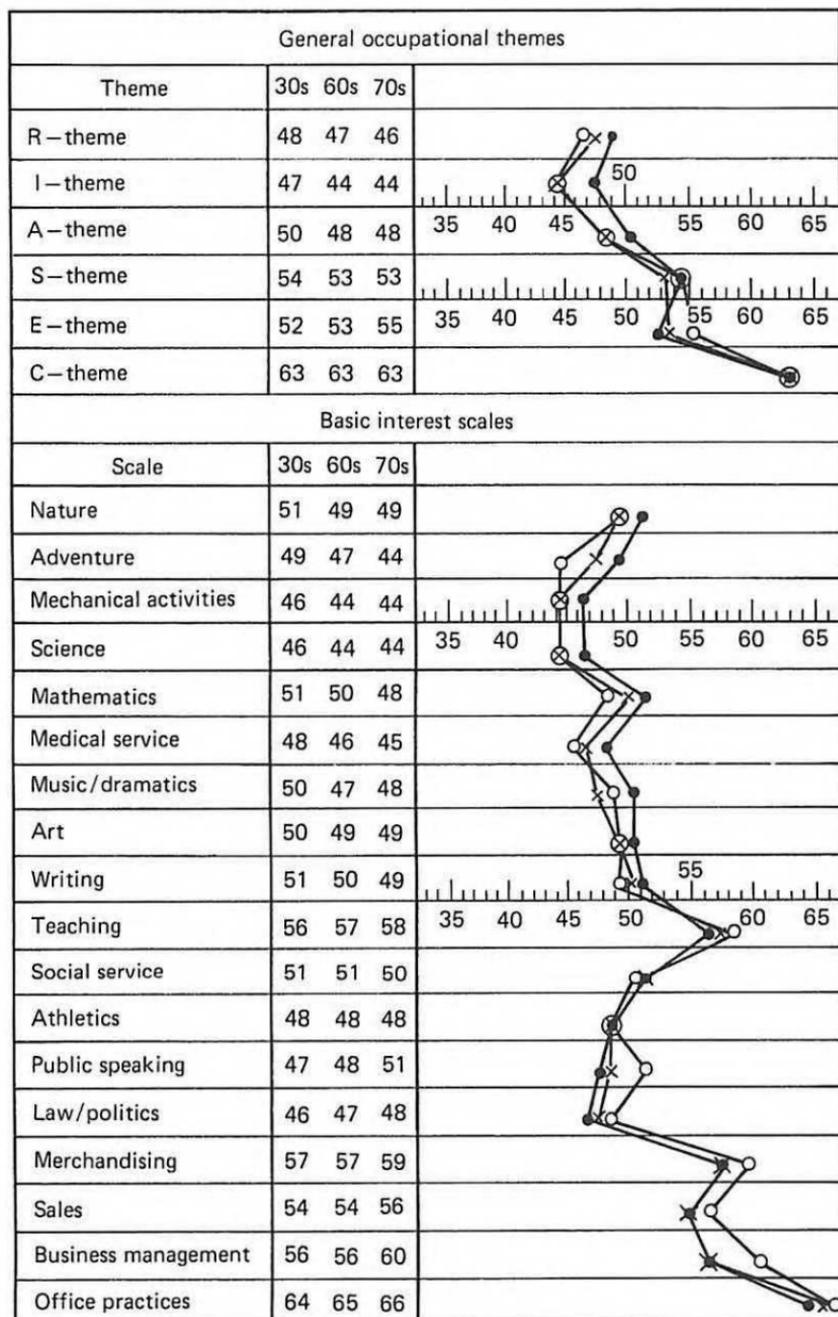


Figure 3.2 Mean interest profile for female business education teachers tested in the 1930s (●—●), the 1960s (X—X), and the 1970s (○—○).

In a more recent study, Hansen (1978a) examined the possible effects of age differences on interests, paying special attention to differences between the younger (26–35 years) and older (46–55 years) groups, because the younger sample may reflect changes resulting from societal influences such as the women's movement. Her findings, for a mixture of traditional and nontraditional occupations for one sex or the other, indicated that people of different ages who are in the same occupation do not have significantly different interests.

### *Longitudinal studies*

Longitudinal methods for studying the stability of interests involve testing the same sample of individuals two or more times over a period of years and, then, determining the similarity of interests at the time of each testing by (1) computing test-retest correlations for each scale, (2) searching for significant differences between the test and retest means, or (3) computing interest inventory profile test-retest similarity coefficients for individuals (Helmstadter, 1957).

In an extremely informative study, Johansson and Campbell (1971) computed test-retest correlations for 66 male groups that differed on the variables of age at initial testing and length of time between test and retest. They found that when the test-retest interval was held constant, the median stability of interests increased with age. They also found that, for a given age, stability was lower the longer the interval between test and retest. Figure 3.3 summarizes their results as well as the results of other stability-of-interest studies conducted with the SVIB and SCII (Campbell, 1965, 1966a, 1971; Campbell & Hansen, 1981; Campbell & Soliman, 1968; Hansen & Stocco, 1980; Thomas, 1955), the Kuder-DD (Zytowski, 1976b), and the VPI (Harvery, 1971; Holland, 1975). Test-retest correlations in Figure 3.3 also provide data for comparing reliability of the SVIB, SCII, Kuder, and VPI. For example, the median test-retest correlation for 18-year-olds over one year of elapsed time on the SVIB is .82, compared to .72 for the VPI. Generally speaking, the most unstable interests (indicated by low correlations) occur for adolescents tested prior to high school graduation; by age 20 considerable stability of interests is obvious even over test-retest intervals of 5 to 10 years, and by age 25 interests are very stable over intervals of more than 20 years.

One important consideration in evaluating the usefulness of interest inventories for career exploration with clients is the stability of the configuration of an individual's interest profile over time. By examining test-retest profile similarity indices, it is possible to determine the distribution of interest consistency of a sample of subjects. This information is especially important for counselors working with adolescent or young adult populations. Using this method, Hansen and Stocco (1980) examined the stability of individual SCII Occupational Scale profiles for high school and college students tested and retested over a period of three and a half years. The median correlation between test and retest profiles was .80 for the college students and .72 for the high school students, indicating that a large percentage of the students had reasonably stable interest patterns throughout their educational careers. However, the range of correlations for the adolescent sample (-.31 to .96) and the young adult sample (.17 to .97) was large, suggesting that the stability of measured interests is not universal. These findings emphasize the importance of recognizing individual differences in vocational counseling. For example, other data (Hansen & Swanson, 1983) indicate that interest inventories are better predictors of eventual college majors for college students with stable interests than for those with unstable interests.

## **FACTORS RELATED TO VOCATIONAL INTERESTS**

Attempts to establish the relationship of interests to six factors—personality, ability, achievement (or success), satisfaction, sex, and race (or culture)—have been extensive.

### **Interests and Personality**

One of the most enduring hypotheses within interest measurement, in spite of only weak research confirmation, is that interest and personality variables are correlated and, therefore, interest inventories measure personality.

Research on interests and personality can be divided into two major areas: (1) the relation-

ship between measured interests and measured personality factors, and (2) the use of interest inventory item pools to develop scales to measure personality factors.

### *Correlation Between Interests and Personality*

For the most part, correlational studies between interest scores and personality scores have been extremely disappointing. For example, a large study by Cottle (1950) used the SVIB, Kuder Preference Record, Minnesota Multiphasic Personality Inventory (MMPI) (McKinley & Hathaway, 1940) and Bell Adjustment Inventory (Bell, 1935). He computed all possible Pearson product-moment correlation coefficients between the scales of these four instruments and found that, although a high proportion of the personality scores had significant correlations with each other (as did a high proportion of the interest scores), the range of the correlation coefficients between personality and interest scores was from  $-.41$  to  $.35$ , with a mean of only  $.08$ , disregarding sign.

The few modest correlations reported in the literature that do occur between interests and personality are between factors that measure *social orientation* and those that measure *independent thought*. Johnson, Flammer, and Nelson (1975), for example, calculated multiple correlation coefficients between five personality factors derived from the California Psychological Inventory (CPI) (Gough, 1957) and the Occupational Scales of the SVIB. The Adjustment Factor, which accounted for more of the total CPI variance than any other factor, and the Conventionality Factor did not correlate significantly with the Occupational Scales, but Extroversion, Emotional Sensitivity, and Independent Thought were moderately associated with the Occupational Scales. Johnson et al. concluded that the three factors were tapping personality characteristics identified with Holland's theory: Extroversion resembled a Social (versus Investigative-Realistic) dimension; Emotional Sensitivity resembled Artistic (versus Realistic) types; and Independent Thought resembled Artistic-Investigative (versus Conventional-Enterprising) types.

Mossholder (1981) used three personality factors from the Adjective Check List (ACL) (Gough, 1965) to assess personality characteristics, and the Basic Interest Scales of the SVIB to measure interests. Only three of the 66 correlations were of the  $.30$  or greater magnitude, and these all were between the SVIB Adventure Scale and the three ACL factors:  $-.77$  with Social Adjustment,  $.31$  with Self-Assertiveness, and  $.31$  with Personal Flexibility.

### *Interest Inventory Scales for Measuring Personality*

As correlational data between interest measures and personality measures suggest, the personality factors most related to interests are social orientation (including social adjustment and introversion-extroversion) and independent thought, including liberalism and flexibility (or their opposites, dogmatism, authoritarianism, and dominance). Scales developed from pools of interest inventory items have been constructed to measure each of these factors.

Campbell (1971) reported construction of the Occupational Introversion-Extroversion (OIE) scale for the SVIB using the empirical method of contrast groups. Social Introversion scores from the MMPI were used to identify introverted and extroverted subjects; their SVIB response percentages were compared, and items that differentiated the two groups were identified. These items became the OIE scale. The 1974 revision of the SVIB (the SCII) retained the OIE scale, which now is called Introversion-Extroversion (IE). High scores (introverted) on the IE scale reflect an interest in working with things or ideas or in being alone, while low scores (extroverted) indicate an interest in working with people.

Goodyear and Frank (1977) studied the relationship of the SVIB OIE scale and the Omnibus Personality Inventory's Social Extroversion (SE) scale (Heist & Yonge, 1968). Using incoming freshmen, they found a correlation of  $.55$  between scores on the OIE and SE scales.





The SCII IE Scale also correlates in the expected direction with Holland's Vocational Preference Inventory (VPI) Scales:  $-.48$  with Social and  $-.55$  with Enterprising, both people-oriented types, and  $.37$  with the VPI Self-control Scale (Hansen, 1983a).

These data provide construct validity for IE scales developed from interest inventory items and suggest that counselors can be confident that this important personality trait may be assessed as part of interest testing.

Hansen and Johansson (1974) also used the empirical method of contrast groups to develop a scale, composed of SVIB items, to measure dogmatism. The Rokeach Dogmatism Scale (Rokeach, 1960), developed to measure individual differences in openness and closedness in belief systems, was used to identify high and low dogmatism criterion samples. The interest item response percentages for the criterion samples were contrasted to identify items that differentiated the two groups. Validity data for the Dogmatism scale confirmed earlier findings (Kemp, 1957) that people with dogmatic belief systems concentrated on commercial pursuits, military careers, and administrative fields; nondogmatic subjects pursued occupations such as the ministry, social work, psychology, the arts, and reporting. The SVIB Dogmatism Scale correlated  $-.62$  with an SVIB Liberalism-Conservatism scale (Campbell & Rossman, 1972), suggesting a similarity in patterns of dogmatic and conservative interests and nondogmatic and liberal interests.

These data suggest that a limited number of personality variables do appear related to interests. Holland (1973), in hypothesizing his six types, incorporated the social orientation and independent thought personality factors in his descriptions. He described Realistic types as conservative, conforming (dependent thinking), and shy (introverted); Investigative types as independent and introverted; Artistic types as nonconforming (independent thinking) and introspective (introverted); Social types as susceptible to social influences (dependent thinking) and socially competent (extroverted); Enterprising types as seeing the world in stereotyped, constricted, and dependent terms, and as sociable and exhibitionistic (extroverted); and Conventional types as conforming, dependent, and inhibited (introverted).

## Interests and Ability

The relationship between abilities and interests, like the relationship between personality and interests, is small, with very few correlation coefficients above  $\pm .30$  (Campbell, 1971; Hubbard, 1930). For example, Kornhauser (1927) correlated scores from the Kornhauser General Interest Inventory and the Otis General Intelligence Test (Otis, 1920) for 108 college students and found a correlation of only  $.29$ . In a large study involving more than 1000 students, Darley (1941b) administered a battery of ability (Thurstone Primary Mental Abilities Test; Thurstone, 1939), achievement (Cooperative Social Studies, English, National Science, and Mathematics Tests; Cooperative Test Service, 1940), interest (SVIB), and personality (Minnesota Personality Inventory; Darley, 1937) instruments; he also obtained high school scholastic ranks and freshman grade-point averages. He found that scores on the personality scales were slightly more related to interests than were scores on the abilities tests.

Berdie (1955) completed a follow-up on Darley's freshmen who obtained degrees within the following ten-year period. He was interested in determining the extent to which freshman tests differentiated among the various curricular groups. Although verbal and reasoning ability tests and achievement tests differentiated significantly among the curricular groups, the sizes of the  $F$  values suggested that vocational interest scores were even more effective in differentiating among the curricular groups. The personality inventory scales did not differentiate among the groups. Berdie concluded that, at the college level, differential interests were more important than differential abilities in determining educational and vocational choices.

## Interests and Success

Early attempts to distinguish between successful and unsuccessful members of an occupation (Craig, 1925; Freyd, 1927; Ream, 1924) were sufficiently disappointing that researchers became more intent upon designing interest inventories to identify interests and to predict occupational entry than to predict success. Later studies have shown that interest scores do, in some situations, predict success. However, most studies on the relationship between interests and success are limited by the use of only one indicator of job success, and correlations between interest and success variables tend to be low (Tyler, 1965).

A major problem in studying the relationship between interests and success is determining the criterion to represent success. Criteria that have been used include receipt of organizational rewards over years of employment (such as increases in income level or in job responsibilities); the number and types of promotions; honors, awards, and special assignments; persistence in the discipline or organization; the individual's perceived success in reaching career goals (Howes, 1981); and academic success (e.g., grades or completion of training).

Campbell (1971) examined interest scores of men in twenty-two occupational samples who were defined as outstanding according to criteria specific to their occupation. For example, *corporation presidents* were Chief Executive Officers from companies listed as the 100 largest U.S. corporations; *psychologists* were all past presidents of the American Psychological Association; *journalists* were all Pulitzer Prize winners; and *college football coaches* were (at the time of testing) among the top 25 active coaches in lifetime won-lost records at major colleges or universities. Scores for all of these groups on their respective SVIB Occupational scales were reasonable. For example, the psychologists scored 55 on the *Psychologist* scale, which is one-half standard deviation above the mean for psychologists-in-general, and Pulitzer Prize winners scored 50 on the *Author-Journalist* scale, which is at the mean for journalists-in-general. However, no pattern appeared across the occupations that might be identified as "successful," and, generally speaking, these outstanding "successful" groups had mean interest inventory profiles that looked very similar to "everyday" people in their respective occupations. Campbell concluded: "Within occupations, interest inventory scales are not, and perhaps never can be, very effective in separating the spectacular successes from the merely adequate" (p. 272).

Studies that have used innovative techniques for scale construction, for identifying criteria of success, and for considering the effect of moderator and mediator variables, have found greater relationships between interests and success. For example, studies employing a variety of experimental designs suggest that interests in combination with ability may determine success or failure. Clark (1961) used ability as a mediator variable and found interest scores more predictive of success at some ability levels than others. He studied a sample of electronic technicians and found that the highest correlation (.47) between interest and achievement was for the subgroup whose intelligence scores were just below the mean for the entire sample.

Reeves and Booth (1979) found that adding the Hospital Corpsman (HM) interest scores from the Navy Vocational Interest Inventory (NVII) (Clark, 1956) to verbal and arithmetic aptitude measures in a multiple regression equation significantly increased the validity for predicting Hospital Corpsman effectiveness from .36 to .41 [ $F(1,1211) = 64.75$ ]. Effectiveness was defined as completion of paramedical training, remaining on the job for two years, and advancement in position. They found that the percentage of ineffective HMs identified by the aptitude test alone was 39%, but that 47% were identified by using the interest and ability scores.

Barrilleaux (1961) identified students with high and low interest in science according to their Kuder interest scores and measured their aptitude levels with the California Test of Mental Maturity (Sullivan, Clark, & Tiegs, 1936). Using the Iowa Science Battery (Shindler, 1933) to identify "outstanding" science students, he found that 88% of the students

in the high IQ (>115) and high science interest group were outstanding; 55% were outstanding in the low IQ (<115) and high science interest group; 24% were outstanding in the high IQ, low science interest group; and only 15% were outstanding in the low IQ, low science interest group.

An interesting study by Frederiksen and Melville (1954) used compulsivity as a moderator variable. They found that the average correlation between interests and grades was about zero for the "compulsive" sample and about .30 for the "non-compulsive" sample. These data supported their hypothesis that compulsive students work hard regardless of their interests but noncompulsive students need to be interested in the topic before they work hard.

Recent research (Barak & Rabbi, 1982; Wiley & Magoon, 1982) used Holland's construct of *consistency* as a mediator variable in studies of the relationship between interests and academic success. Generally, results indicated that students with consistent interests (i.e., similarity between dominant and subdominant interests as defined by their proximity to each other on Holland's hexagon) have a higher level of persistence in college and a higher level of achievement (as measured by cumulative grade point average) than do students with inconsistent interests.

The various studies suggest that combining assessments of interests with assessments of abilities or aptitudes will improve prediction of achievement or success in academic or work settings. As a rule, persons with interests in, and the necessary ability for, an occupation will do well in it; persons with the necessary ability but not the interest may or may not do well.

## Interests and Satisfaction

Just as correlations between interests and abilities are not very high, correlations between interest scores and ratings of job satisfaction are low. One problem with the research is that variance in satisfaction among groups with homogeneous interests is very small; in other words, most people indicate satisfaction with their work (Campbell, 1971). A six-year study of job satisfaction in the 1970s (Weaver, 1980) showed that, between 1972 and 1978, 88% of American workers said that they were somewhat satisfied or very satisfied with their job. This restriction in range can have a negative effect on the size of correlation coefficients. In addition, a variety of studies have shown that many variables influence job satisfaction and that numerous moderator variables or mediator variables may influence the correlation between measures of satisfaction and measures of vocational interests.

A study by Lipsett and Wilson (1954) used the Kuder Preference Record, and a five-point satisfaction questionnaire that ranged from "Best possible job for you" to "Dislike it," and the Minnesota Occupational Rating Scales (Paterson, Gerken, & Hahn, 1941), a measure of academic ability. They found that respondents with the greatest job satisfaction had interests that were "suitable" for the jobs; those reporting job indifference or dislike had interests that were "unsuitable." All of the respondents who were indifferent to or disliked their jobs had either vocational interests or a level of academic ability that was unsuitable for their jobs.

Doré and Meacham (1973) found a positive correlation (.38) between the Manager Scale of the SVIB and job satisfaction for managers in a medium-sized insurance company. However, the best validity coefficient that they obtained was a multiple correlation of .44 resulting from a combination of the SVIB Manager Scale score and difference scores between measures of Self-concept (how a person perceives self) and Required-self-concept (how a person perceives the role requirements of the job) (Meacham, 1965).

Wiener and Klein (1978) used job tenure, which correlates with satisfaction, as a mediator variable to group subjects in a study examining the relationship between interest-job congruency and satisfaction with various job components such as pay, supervisor, and coworkers. They found that subjects who were in jobs congruent with their interests, and who had

been in the jobs for more than two years (long tenure), had greater satisfaction with work (.37) and supervision (.42) than did congruent workers with less than two years of job experience (work =  $-.12$ ; supervision =  $-.09$ ). However, satisfaction with pay, promotion, and co-workers was not significantly correlated with interests for either the long- or short-tenured group. This study illustrates the importance of using multifaceted measures of satisfaction.

A study on engineers (Meir & Erez, 1981) examined Holland's congruence hypothesis within the context of intraoccupational differences. According to Holland, job satisfaction will be greatest among subjects who have good matches (congruence) between their vocational interests and their job environment. An interest inventory was developed by Meir and Erez to measure six job functions in engineering—planning and design, production, maintenance, management, control and inspection, and training—and subjects also responded to a 20-item job satisfaction scale ranging from 1 (dissatisfied) to 20 (satisfied). They found a correlation of .45 between congruence of interests (as determined by the measured interests and job held) and satisfaction. In a similar study (Hener & Meir, 1981), a correlation of .44 was found between job and interest congruence and job satisfaction for registered nurses.

Other factors found to contribute to job satisfaction that might serve as useful mediator variables in studying the relationship of interests and satisfaction are sex, occupational level (Lee, Mueller, & Miller, 1981), career stage and role perception (Stumpf & Rabinowitz, 1981), flexible working hours (Orpen, 1981), and religious affiliation (Vecchio, 1980).

### Interests and Race or Culture

The relationship of interests to race or culture involves three lines of research: (1) use of the English version of interest inventories with English-speaking persons in cultures other than the United States (e.g., England, New Zealand, or Australia); (2) validation and use of English-interest inventories translated into other languages; and (3) use of interest inventories with minority cultures in the United States, such as Native Americans or Asian Americans.

#### *English Inventories with Other Cultures*

Most crosscultural research indicates that English versions of interest inventories based on U.S. norms can be used with people fluent in English who are from other countries or cultures even if English is their second language. For example, Strong (1943) reported a study that compared the interests of Scottish police officers and Scottish artists with corresponding data from SVIB criterion samples based on U.S. populations. No significant scale score differences were found for either population.

In a more recent study, Bull (1975) compared the structure of interests of a sample of U.S. psychology students, measured by the SVIB-SCII General Occupational Themes, with the interest structure of a similar sample of New Zealand students. Three principal components emerged for each sample and correlations between the U.S. and New Zealand components were substantial—.97, .93, and .97—indicating similarity of the structure of interests.

#### *Translated Inventories*

Most interest inventories have not been translated from their original English version into other languages. Three exceptions are the VPI, SDS, and SVIB-SCII. The VPI is available for research in nine languages and for commercial use in Japanese and British; the SDS is available for research in ten languages and for commercial use in Japanese and Canadian French.

The SVIB was translated into nineteen languages, but most translated versions (with the exception of German and French) were limited to use in the research project for which

they originally were translated (Hansen, 1983b). The SCII has been translated into a French version, which is widely used in Canada (Chevrier, 1979), as well as Spanish (Hansen & Fouad, 1983) and British (Cook, 1982).

The Spanish form of the SCII was used with Mexican engineering and law students to compare their interests to corresponding Anglo student samples (Fouad, 1982). The engineering students had similar interests, but law students from Mexico appeared to be more enterprising and political while Americans were more verbal-linguistic. Fouad hypothesized that occupations ruled by laws of nature (e.g., engineering) would be more similar crossculturally than would occupations ruled by human-made laws (e.g., lawyers), with the latter more susceptible to cultural influences.

Lonner (1968) used a German version of the SVIB with psychologists from Germany, Austria, and Switzerland. The American psychologists scored 50 on the Psychologist scale; the German psychologists scored 52; the Austrians scored 50; and the Swiss scored 49. Although statistically significant differences did exist among the groups on other scales (possibly due to large sample sizes), the overall configuration or pattern of interests was similar for all groups, with their highest scores occurring on the *Psychologist* and *Psychiatrist* Occupational Scales and their lowest scores on the *Forester* and *Army Officer* scales. An extension of this study (Lonner & Adams, 1972) included additional samples of English-speaking subjects from Australia, Canada, Great Britain, New Zealand, and South Africa; the data analyses supported the conclusion that the similarities of the interests of psychologists from different cultures are greater than the differences.

### *Interests of U.S. Minorities*

Just as interest inventories can be used crossculturally, inventories based on norms composed primarily of white U.S. subjects appear to be useful with U.S. minority groups.

Borgen and Harper (1973) tested the predictive accuracy of the SVIB and reported that it predicted membership in career groups as well for black winners of National Achievement and National Merit Scholarships as it did for whites. Barnette and McCall (1964) studied vocational/technical high school students with the Minnesota Vocational Interest Inventory (MVII) (Clark, 1961) and reported no differences between blacks and whites. These data suggest that interest inventories are useful with minorities who have a range of educational aspirations.

A number of studies have explored the validity of Holland's theory for black (Bingham & Walsh, 1978; Doughtie, Chong, Alston, Wakefield, & Yom, 1976; Lamb, 1978; O'Brien & Walsh, 1976; Wakefield, Yom, Doughtie, Chong, & Alston, 1975); Native American (Lamb, 1978; Scott & Anadon, 1980); and Hispanic (Fouad, Cudeck, & Hansen, 1983; Harrington & O'Shea, 1980; Lamb, 1978) subjects, using college students, noncollege-degreed subjects, college-degreed subjects, and high school students. The general conclusion is that interests of blacks, Native Americans and Hispanics correspond to Holland's model almost as well as they do for whites.

### **Sex Differences in Interests**

Sex differences in vocational interests have concerned test authors throughout the history of interest measurement. Early attempts by Gaw (1928), Hogg (1927), and Manson (1931) to measure interests of women, using techniques similar to those employed by E. K. Strong, Jr., with men, were disappointing. A few broad occupational groups were identified for women, but the scales did not differentiate occupations as well as did the scales for men.

In 1933, Strong developed the first widely used interest inventory for women. He later attempted to develop one scale (combined-sex) to measure the interests of women and men in the same occupation but found that for many occupations separate-sex scales were more valid (Strong, 1943). The reason for Strong's early findings is that men and women

report different interests; the differences appear early and persist into adulthood (Campbell & Hansen, 1981; Riley, 1981). Interest differences are obvious when women- and men-in-general are compared but, perhaps even more importantly, the differences are relatively constant across occupations and appear in both item-response percentage and scale-score comparisons (Hansen, 1978b). Data on the interests of women and men (Hansen, 1978b, 1982b) suggest that sex differences between females and males may be classified into two categories: *cultural differences*, which are predictable and almost invariably appear in the Realistic (with men scoring higher) and Artistic areas (with women scoring higher) and *occupationally-related differences*, which are not as predictable and vary from occupation to occupation.

Occupational differences in interests of women and men contribute to the failure of combined-sex empirical scale development and combined-sex standardization for homogeneous scales. For example, Kuder (1977) reported that for thirteen matched sex occupations, only one occupation (interior decorator) had interests for the two sexes that were closer to each other than either was to the interests of some other occupational group of the same sex. He concluded that failure to use separate sex norms for the two sexes would reduce the effectiveness of counseling. Data from several attempts to develop combined-sex scales for the SCII (Campbell & Hansen, 1981; Hansen, 1976) led to the same conclusion.

Some have argued that the sex differences in vocational interests that early researchers found may be diminishing in response to growing awareness that many aspects of traditional sex roles are arbitrary (Diamond, 1975). Hansen (1981b, 1982a) has studied that possibility, as well as the possibility that dramatic changes in women's interests would result from entering more diverse occupations, progressing up career ladders, and entering occupations previously closed to them. She examined, at both the item and scale-score level, female-male similarities and differences in interests over time by comparing occupational samples collected over fifty years. Her data illustrate the stability of sex differences in vocational interests. Societal changes seem not to have had a dramatic effect on the interests of women, and the differences in the 1920s and 1930s between women- and men-in-general, as well as men and women in the same occupation, still occurred in the 1980s.

Studies documenting cultural and occupational sex differences in interests have led to retention of empirically developed scales that are based on separate-sex criterion samples and to development of separate-sex norm groups for homogeneous scales.

## RECENT TRENDS

During the last few years, several areas within interest measurement have become increasingly important. Holland's theory, the equal opportunity movement, and the computer industry may have had the greatest influence on what has happened in the recent past and what will happen in the near future. As a result of these influences, the use of interest inventories has expanded, new inventories are being marketed, new interpretive materials have been developed, and new populations are being administered inventories.

### More Frequent Use of Interest Inventories

A walk through the exhibit halls at national meetings of counseling associations reveals the marketing explosion of new career guidance instruments and materials. For the most part, caution is recommended in selection of these new instruments, because many are marketed before adequate reliability and validity data are available for an informed evaluation. However, interpretive materials accompanying the tests often are very enticing, and sometimes the simplicity of a new instrument can make it seem more useful than it really is.

Although overall frequency of test use has not changed greatly in the last 25 years (Zytowski & Warman, 1982), use of interest inventories has increased appreciably. Also,

counselors have shifted from using measures of ability and achievement to using interest, value, and personality inventories. Schools indicate they would do even more testing for career guidance purposes if funds were available (Engen, Lamb, & Prediger, 1982).

### **More Materials to Use with Interest Inventories**

Along with the increased use of interest inventories has been a trend toward improved interpretive aids and materials. Guidance and career development materials that correspond to inventory results have been expanded for use in counseling or classroom settings within educational, government, and business institutions. Linkage between tests and other career planning materials and between different guidance systems has improved, and interest scores are accompanied by interpretive materials that help users to generalize from a single scale score to a variety of occupational or educational choices.

Advances in computer technology also have contributed to increased use of interest inventories as well as improved quality of inventories. The rapid speed with which computers can score an interest inventory has allowed instruments like the SVIB-SCII or the Kuder-DD to expand from a handful of scales measuring interests in various occupations to profiles presenting, in the case of the SVIB-SCII, over one hundred occupations (Hansen, 1983b).

The versatility of computer software has provided interpretive test-reporting formats, such as those available for the SVIB-SCII or Career Assessment Inventory (Johansson, 1976), that provide not only scale scores but also information designed to integrate the entire profile with suggestions for possible career options.

Beyond interpretive reports, interactive computer systems, called computer-based guidance systems, have been developed which allow clients to participate in the entire career exploration process, from test-taking to occupational choice, through interaction with a computer terminal. Other technological advances, such as user-friendly video machines, also have influenced the way in which test results are presented.

### **Evaluations of the Use of Interest Inventories**

An increased use of inventories, an increased variety of methods to present results, and greater use of inventories within career guidance modules have led to evaluations of the effect of inventories and to new concern about testing the interpretive competency of counselors.

Evaluations of interest inventories typically focus on (1) comparisons of different types of inventories or combinations of inventories, and (2) comparisons of different types of interpretive techniques such as group, client, or counselor-interpreted, and computer, video-tape, or audiotape interpretations.

Most studies have found similar results from the administration of two or more inventories. For example, clients have been equally satisfied with the VPI and SDS (Zener & Schnuelle, 1976), the SCII and SDS (O'Neil, Price & Tracey, 1979), and the SCII and Vocational Card Sort (Slaney, 1978). Also, few differences were found in the effectiveness of different methodologies for presenting occupational information. Early studies by Hoyt (1955) and Hewer (1959), indicating that group approaches to interpretation were as informative as or more informative than individual interpretations, have been replicated by Smith and Evans (1973) and Rubinstein (1978). Comparisons of various technological modes for presenting inventory results, such as slides, video tape, computer-assisted, and written interpretive information, suggest equivalent levels of client satisfaction (Johnson, Korn, & Dunn, 1975; Maola & Kane, 1976; Miller & Cochran, 1979; Oliver, 1977).

Group, video, computer, or individual presentations—rather than written interpretations—appear to provide the most information and lead the client to participate most fully in career exploration. But clients do express more satisfaction with the interpretation process when they have individual interviews with a counselor. However, considerations of cost,

counselor availability, and interview time-limits may make minimizing the amount of time spent with a counselor administratively attractive; fortunately, the data indicate that clients do not suffer under modified interpretive formats with reduced counselor contact.

### **Counselor Competency**

In addition to research evaluating interpretive methods for inventories, more emphasis needs to be placed on evaluation of the competency of test interpreters.

Counselors need to be knowledgeable about the technical properties of inventories as reported in test manuals; they must develop skills for explaining results to clients; they should know the limits of interest inventories; and they should learn to emphasize that interest inventories provide only one source of information about interests (Miller, 1982).

Increased emphasis on interpretation of results and counselor competency also is reflected in the publication of interpretive guides for inventories (Hansen, 1984; Holland, 1971; Zytowski, 1981). In the past, test manuals were designed exclusively to convey information about scale construction and reliability and validity of the instrument; little instruction was given on interpretive techniques.

### **Use of Interest Inventories with Special Populations**

The use of career exploration groups, career development classes, and programs by high schools, colleges, industry, and placement offices has increased tremendously the number of people who at some point in their lives take an interest inventory—not just once, but several times as they arrive at educational or career choice points. Career counseling previously was limited to high school and college advising, but now programs for rehabilitation, mid-career, leisure, re-entry, pre-retirement or retirement, and out-placement counseling are becoming popular. A consequence is that a demand for information on the interests of special populations has increased. Unfortunately, research on the use of interest inventories with special populations is limited.

One study illustrating the usefulness of interest information in counseling special populations studied persons with spinal cord injury (Rohe & Athelstan, 1982). Results indicated that many spinal cord-injury patients have vocational interests that distinguish them from people in the general population, and especially from the professionals with whom they work during rehabilitation. Also, they are introverted, a characteristic often mistakenly diagnosed as depression; their interests typically are in jobs which are physically impossible for them; and they prefer concrete and practical activities, suggesting that rehabilitation programs stressing concrete goal setting might be favored over abstract planning.

Mid-career change, re-entry, and out-placement clients are other populations with whom interest inventories are used. Vaitenas and Wiener (1977) found that career changers, as one might suspect, had low congruity between their occupational environment and their measured interests. They also found that career changers were more likely to have a combination of inconsistent interests (i.e., interests that are not highly correlated with one another), than were nonchangers. This research suggests practical implications for prevention of and intervention in the career change process; for example, early vocational counseling may help to prevent entry into occupations incongruent with interests.

Retirement and leisure counseling involve a new use of interest data to examine hobby and leisure interests. Cairo (1979) found that the SVIB-SCII was useful for identifying avocational as well as vocational interests, suggesting that interest inventories can be used to assist in identifying interests as one step in the leisure and retirement counseling process.

### **THE FUTURE IN VOCATIONAL INTEREST RESEARCH**

The study of vocational interests consistently has enjoyed high research priority within the field of counseling psychology (Gottfredson, 1982; Holcomb & Anderson, 1977; Schmidt

& Pepinsky, 1965; Yungman, 1972), and no evidence exists to suggest that interests will be a less popular research topic in the future.

### Research on Special Populations

As the use of interest inventories has expanded to new populations, research often has lagged behind the demand for practical application; consequently, research in interest measurement frequently is stimulated by questions arising from applied settings. For example, research reports concerned with the interests of elderly and retired subjects, school dropouts, and rehabilitation clients are almost nonexistent. Measurement of interests of special populations and research on effective application of interest inventories with those populations certainly will be a focus of the future.

### Cross-Cultural Studies

Interest inventories gradually are gaining popularity as tools of cross-cultural counseling and research, as clients more frequently come from different subcultures or countries. However, more inventories need to be translated into a wider variety of languages and validated for use with non-English-speaking populations.

### Research Using and Exploring Holland's Theory

Investigation of Holland's theory will continue to be a dominant theme in interest research. The theoretical constructs of differentiation, congruency, and consistency will be used as independent variables in studies ranging from assessment of predictive validity of interest inventories to analyses of job satisfaction and academic success. Holland's typology already has been used successfully to match clients and treatment environments to facilitate group vocational counseling (Kivlighan, Hageseth, Tipton, & McGovern, 1981); undoubtedly, this is only the first of many studies in this area.

### Continued Efforts to Answer Old Questions

Along with new research directions in interest measurement, the search for answers to many of the questions asked by early investigators will continue. For example, the identification of individual differences affecting stability and predictability of interests remains important to the work of career counselors; attempts to understand the interaction of interests with work, and life, satisfaction and success will continue; and important information on the origin of interests should come from studies on adopted twins (Bouchard et al., 1981) and from studies on family resemblance (Bouchard, Hansen, Scarr, and Weinberg, 1983).

### REFERENCES

- Anastasi, A. *Psychological testing* (5th ed.). New York: Macmillan, 1982.
- Arsenian, S. Own estimate and objective measurement. *Journal of Educational Psychology*, 1942, 33, 291-302.
- Barak, A., & Rabbi, B. Predicting persistence, stability, and achievement in college by major choice consistency: A test of Holland's consistency hypothesis. *Journal of Vocational Behavior*, 1982, 20, 235-243.
- Barnette, W. L., Jr., & McCall, J. N. Validation of the Minnesota Vocational Interest Inventory for vocational high school boys. *Journal of Applied Psychology*, 1964, 48, 378-82.
- Barrilleaux, L. E. High school science achievement as related to interest and IQ. *Educational and Psychological Measurement*, 1961, 21, 929-936.
- Bell, H. M. *The theory and practice of personal counseling with special reference to the Adjustment Inventory*. Palo Alto, CA: Stanford University Press, 1935.

- Bendell, R. The relationship between self-estimated and measured vocational interests. *Journal of Applied Psychology*, 1941, 25, 59-66.
- Berdie, R. F. Factors related to vocational interests. *Psychological Bulletin*, 1944, 41, 137-157.
- Berdie, R. F. Aptitude, achievement, interest, and personality tests: A longitudinal comparison. *Journal of Applied Psychology*, 1955, 39, 103-114.
- Berdie, R. F., & Campbell, D. P. Measurement of interest. In D. K. Whitla (Ed.), *Handbook of Measurement and Assessment in Behavioral Sciences*. Reading, PA: Addison-Wesley, 1968.
- Bingham, R. O., & Walsh, W. B. Concurrent validity of Holland's theory for college-degreed black working women. *Journal of Vocational Behavior*, 1978, 13, 242-250.
- Bordin, E. S. Theory of vocational interests as dynamic phenomena. *Educational and Psychological Measurement*, 1943, 3, 49-65.
- Borgen, F. H., & Harper, G. T. Predictive validity of measured vocational interests with black and white college men. *Measurement and Evaluation in Guidance*, 1973, 6, 19-27.
- Borgen, F. H., & Selig, M. F. Expressed and inventoried interests revisited: Perspicacity in the person. *Journal of Counseling Psychology*, 1978, 25, 536-543.
- Bouchard, T. J., Jr., Hansen, J. C., Scarr, S., and Weinberg, R. A. *Family resemblance for psychological interests*. Paper presented at the meetings of the International Congress on Twins Research, London, England, June, 1983.
- Bouchard, T. J., Jr., Heston, L. L., Eckert, E. D., Keyes, M., & Resnick, S. The Minnesota Study of Twins Reared Apart: Project description and sample results in the developmental domain. *Twin Research 3: Intelligence, Personality and Development*, 1981, 227-233.
- Bull, P. E. Structure of occupational interests in New Zealand and America on Holland's typology. *Journal of Counseling Psychology*, 1975, 22, 554-556.
- Buros, O. K. (Ed.) *Eighth mental measurement yearbook*. Highland Park: Gryphon Press, 1978.
- Cairo, P. C. The validity of the Holland and Basic Interest Scales of the Strong Vocational Interest Blank: Leisure activities versus occupational membership as criteria. *Journal of Vocational Behavior*, 1979, 15, 68-77.
- Campbell, D. P. *The results of counseling: Twenty-five years later*. Philadelphia: Saunders, 1965.
- Campbell, D. P. Stability of interests within an occupation over thirty years. *Journal of Applied Psychology*, 1966, 50, 51-56. (a)
- Campbell, D. P. The stability of vocational interests within occupations over long time spans. *Personnel and Guidance Journal*, 1966, June, 1012-1019. (b)
- Campbell, D. P. *Strong Vocational Interest Blanks manual*. Palo Alto, CA: Stanford University Press, 1966. (c)
- Campbell, D. P. *Strong Vocational Interest Blanks manual supplement*. Palo Alto, CA: Stanford University Press, 1969.
- Campbell, D. P. *Handbook for the Strong Vocational Interest Blank*. Palo Alto, CA: Stanford University Press, 1971.
- Campbell, D. P. *Manual for the Strong-Campbell Interest Inventory*. Palo Alto, CA: Stanford University Press, 1974.
- Campbell, D. P., Borgen, F. H., Eastes, S. M., Johansson, C. B., & Peterson, R. A. A set of basic interest scales for the Strong Vocational Interest Blank for Men. *Journal of Applied Psychology Monograph*, 1968, 52, 1-54.
- Campbell, D. P. & Hansen, J. C. *Manual for the SVIB-SCII* (3rd Ed.). Palo Alto, CA: Stanford University Press, 1981.
- Campbell, D. P., & Holland, J. L. Applying Holland's theory to Strong's data. *Journal of Vocational Behavior*, 1972, 2, 353-376.
- Campbell, D. P., & Rossman, J. E. *Liberalism-conservatism, men and women, occupations*. Paper presented at the meeting of the American Psychological Association, Honolulu, September, 1972.
- Campbell, D. P., & Soliman, A. M. The vocational interests of women in psychology. *American Psychologist*, 1968, 23, 158-163.
- Carter, H. D. Twin similarities in occupational interests. *Journal of Educational Psychology*, 1932, 23, 641-655.
- Carter, H. D. The development of vocational attitudes. *Journal of Consulting Psychology*, 1940, 4, 185-191.
- Chevrier, J. M. *Test de préférences professionnelles Strong-Campbell manuel*. French translation of D. P. Campbell, *Manual for the Strong-Campbell Interest Inventory*. Montreal: Institut de Recherches Psychologiques, Inc., 1979.

- Clark, K. E. *Manual for use of the Navy Vocational Interest Inventory*. Minneapolis: University of Minnesota Press, 1956.
- Clark, K. E. *The vocational interests of non-professional men*. Minneapolis: University of Minnesota Press, 1961.
- Cole, N. S., & Hanson, G. *An analysis of the structure of vocational interests*. (ACT Research Report No. 40). Iowa City: American College Testing Program, 1971.
- Cook, M. Personal communication, July, 1982.
- Cooperative Test Service. *The Cooperative General Achievement Tests: Information concerning their construction, interpretation and use*. New York: Cooperative Test Service, 1940.
- Cottle, W. C. Relationship among selected personality and interest inventories. *Occupations, the Vocational Guidance Journal*, 1950, February, 306-310.
- Cowdery, K. M. Measurement of professional attitudes: Differences between lawyers, physicians, and engineers. *Journal of Personnel Research*, 1926, 5, 131-141.
- Craig, D. R. The Preference-Interest Questionnaire in selecting retail saleswomen. *Journal of Personnel Research*, 1924-25, 3, 366-374.
- Crissy, W. J. E., & Daniel, W. J. Vocational interest factors in women. *Journal of Applied Psychology*, 1939, 23, 488-494.
- Cronbach, L. J. *Essentials of psychological testing* (3rd ed.). New York: Harper & Row, 1970.
- Darley, J. G. *An analysis of attitude and adjustment tests: With special reference to conditions of change in attitudes and adjustments*. Unpublished doctoral dissertation, University of Minnesota, 1937.
- Darley, J. G. *Clinical aspects and interpretation of the Strong Vocational Interest Blank*. New York: The Psychological Corporation, 1941. (a)
- Darley, J. G. *A study of the relationships among the Primary Mental Abilities Test, selected achievement measures, personality tests, and tests of vocational interests*, (studies in higher education, Biennial report of the Committee on Education Research, 1938-40). Minneapolis: University of Minnesota Press, 1941. (b)
- Darley, J. G. & Hagenah, T. *Vocational interest measurement*. Minneapolis: University of Minnesota Press, 1955.
- Diamond, E. E. (Ed.) *Issues of sex bias and sex fairness in career interest inventories*. Washington, DC: National Institute of Education, 1975.
- Doré, R. & Meacham, M. Self-concept and interests related to job satisfaction of managers. *Personnel Psychology*, 1973, 26, 49-59.
- Doughtie, E. B., Chang, W. C., Alston, H. L., Wakefield, J. A., Jr., & Yom, B. L. Black-white differences on the Vocational Preference Inventory. *Journal of Vocational Behavior*, 1976, 8, 41-44.
- Dreese, M., & Mooney, E. *Interest Inventory for Elementary Grades (for Grades 4, 5, & 6)*. Washington, DC: George Washington University Press, 1941.
- Duffy, E. A systematic framework for the description of personality. *Journal of Abnormal and Social Psychology*, 1949, 77, 175-190.
- Eckert, E. D., Heston, L. L. & Bouchard, T. J., Jr. MZ twins reared apart: Preliminary findings of psychiatric disturbances and traits. *Twin Research 3: Intelligence, Personality, and Development*, 1981, 179-188.
- Edwards, K. J., & Whitney, D. R. A structural analysis of Holland's personality types using factor and configural analysis. *Journal of Counseling Psychology*, 1972, 19, 136-145.
- Engen, H. B., Lamb, R. R., & Prediger, D. J. Are secondary schools still using standardized tests? *Personnel and Guidance Journal*, 1982, January, 287-290.
- Enright, J. B., & Pinneau, S. R. Predictive value of subjective choice of occupation and the Strong Vocational Interest Blank over fifteen years. *American Psychologist*, 1955, 10, 424-425.
- Farnsworth, K. E. Vocational interests of women: A factor analysis of the women's form of the SVIB. *Journal of Applied Psychology*, 1969, 53, 353-358.
- Fouad, N. A. *Cross-cultural interest measurement*. Paper presented at the meeting of the American Psychological Association, Washington, DC, August, 1982.
- Fouad, N. A., Cudeck, R., & Hansen, J. C. *Structure of interests of Hispanic students*. Unpublished manuscript, Center for Interest Measurement Research, University of Minnesota, 1983.
- Frederiksen, N., & Melville, S. D. Differential predictability in the use of test scores. *Educational and Psychological Measurement*, 1954, 14, 647-656.
- Freyd, M. The measurement of interests in vocational selection. *Journal of Personnel Research*, 1922-23, 319-328.
- Freyd, M. *Occupational interests*. Chicago: C. H. Stoelting, 1923.

- Freyd, M. Selection of promotion salesmen. *Journal of Personnel Research*, 1926-27, 5, 142-156.
- Fryer, Douglas. *The measurement of interests in relation to human adjustment*. New York: Henry Holt & Co., 1931.
- Gaw, E. A. Occupational interests of college women. *Personnel Journal*, 1928-29, 7, 111-114.
- Goodyear, R. K. & Frank, A. C. Introversion-extroversion: Some comparisons of the SVIB and OPI Scales. *Measurement and Evaluation in Guidance*, 1977, 9, 206-211.
- Gottfredson, L. S. Vocational research priorities. *The Counseling Psychologist*, 1982, 10, 69-84.
- Gough, H. G. *Manual for the California Psychological Inventory*. Palo Alto, CA: Consulting Psychologists Press, 1957.
- Gough, H. G. *The Adjective Checklist manual*. Palo Alto, CA: Consulting Psychologists Press, 1965.
- Grigg, A. E. Childhood experience with parental attitude: A test of Roe's hypothesis. *Journal of Counseling Psychology*, 1959, 6, 153-155.
- Grotevant, H. D., Scarr, S., & Weinberg, R. A. Patterns of interest similarity in adoptive and biological families. *Journal of Personality and Social Psychology*, 1977, 35, 667-676.
- Guilford, J. P., Christensen, P. R., Bond, N. A., Jr., & Sutton, M. A. A factor analysis study of human interests. *Psychological Monographs*, 1954, Whole No. 375, 68, 1-38.
- Hagen, D. Careers and family atmospheres: An empirical test of Roe's theory. *Journal of Counseling Psychology*, 1960, 7, 251-256.
- Hansen, J. C. Exploring new directions for Strong-Campbell Interest Inventory occupational scale construction. *Journal of Vocational Behavior*, 1976, 9, 147-160.
- Hansen, J. C. Age differences and empirical scale construction. *Measurement and Evaluation in Guidance*, 1978, 11, 78-87. (a)
- Hansen, J. C. Sex differences in vocational interests: Three levels of exploration. In C. K. Tittle & D. G. Zytowski (Eds.), *Sex-fair interest measurement: Research and implications*. Washington, DC: U.S. Government Printing Office, 1978. (a)
- Hansen, J. C. Application of vocational interest inventories. In D. H. Montross & C. J. Shinkman (Eds.), *Career development in the 1980's: Theory and practice*. Springfield, IL: Thomas, 1981. (a)
- Hansen, J. C. *Changing interests: Myth or reality?* Paper presented at the meetings of the American Psychological Association, Los Angeles, August, 1981. (b)
- Hansen, J. C. *The effect of history on the vocational interest of women*. Paper presented at the meetings of the International Congress of Applied Psychology, Edinburgh, Scotland, July, 1982. (a)
- Hansen, J. C. Sex differences in interests and interpreting opposite sex scores on the Strong-Campbell Interest Inventory. *Illinois Guidance and Personnel Quarterly*, 1982, 84, 5-12. (b)
- Hansen, J. C. *Correlation between VPI and SCII scores*. Unpublished manuscript, Center for Interest Measurement Research, University of Minnesota, 1983. (a)
- Hansen, J. C. *Translations of the SVIB*. Unpublished manuscript, Center for Interest Measurement Research, University of Minnesota, 1983. (b)
- Hansen, J. C. *Counselor's interpretive guide for the SVIB-SCII*. Palo Alto, CA: Stanford University Press, 1984.
- Hansen, J. C., & Fouad, N. A. Translation and validation of the Spanish form of the Strong-Campbell Interest Inventory. *Measurement and Evaluation in Guidance*, 1983, in press.
- Hansen, J. C., & Johansson, C. B. The application of Holland's vocational model to the Strong Vocational Interest Blank for Women. *Journal of Vocational Behavior*, 1972, 2, 479-493.
- Hansen, J. C., & Johansson, C. B. Strong Vocational Interest Blank and dogmatism. *Journal of Counseling Psychology*, 1974, 21, 196-201.
- Hansen, J. C., & Stocco, J. L. Stability of vocational interests of adolescents and young adults. *Measurement and Evaluation in Guidance*, 1980, 13, 173-178.
- Hansen, J. C., & Swanson, J. L. Stability of interests and the predictive and concurrent validity of the 1981 Strong-Campbell Interest Inventory. *Journal of Counseling Psychology*, 1983, 30, 194-201.
- Harrington, T. F., & O'Shea, A. J. *Manual for the Harrington/O'Shea Systems for Career Decision-making*. Needham, MA: Career Planning Associates, 1976.
- Harrington, T. F., & O'Shea, A. J. Applicability of the Holland (1973) model of vocational development with Spanish-speaking clients. *Journal of Counseling Psychology*, 1980, 27, 246-251.
- Harvery, D. W. *The validity of Holland's Vocational Preference Inventory with adult women*. Unpublished doctoral dissertation, University of Connecticut, 1971.

- Heist, P. A., & Yonge, G. D. *Omnibus Personality Inventory: Manual*. New York: Psychological Corporation, 1968.
- Helmstadter, G. C. An empirical comparison of methods for estimating profile similarity. *Educational and Psychological Measurement*, 1957, 17, 71-82.
- Hener, T., & Meir, E. I. Congruency, consistency, and differentiation as predictors of job satisfaction within the nursing occupation. *Journal of Vocational Behavior*, 1981, 18, 304-309.
- Hewer, V. H. Group counseling, individual counseling, and a college-class in vocations. *Personnel and Guidance Journal*, 1959, May, 660-665.
- Hogg, M. I. Occupational interests of women. *Personnel Journal*, 1927-28, 6, 331-337.
- Holcomb, W. R., & Anderson, W. P. Vocational guidance research: A five-year overview. *Journal of Vocational Behavior*, 1977, 10, 341-346.
- Holden, C. Identical twins reared apart. *Science*, 1980a, 70, 1323-1327.
- Holden, C. Twins unlimited. *Science* 80, 1980b, November, 55-59.
- Holland, J. L. A personality inventory employing occupational titles. *Journal of Applied Psychology*, 1958, 42, 336-342.
- Holland, J. L. A theory of vocational choice. *Journal of Counseling Psychology*, 1959, 6, 35-45.
- Holland, J. L. *The psychology of vocational choice*. Waltham, MA: Blaisdell, 1966.
- Holland, J. L. *The counselor's guide to the Self-Directed Search*. Palo Alto, CA: Consulting Psychologists Press, 1971.
- Holland, J. L. *Making vocational choices: A theory of careers*. Englewood Cliffs, NJ: Prentice-Hall, 1973.
- Holland, J. L. *Manual for the Vocational Preference Inventory* (2nd Ed.). Palo Alto, CA: Consulting Psychologists Press, 1975.
- Holland, J. L. *Manual for the Vocational Preference Inventory* (3rd Ed.). Palo Alto, CA: Consulting Psychologists Press, 1978.
- Holland, J. L., & Gottfredson, G. D. Predictive value and psychological meaning of vocational aspirations. *Journal of Vocational Behavior*, 1975, 6, 349-363.
- Howes, N. J. Characteristics of career success: An additional input to selecting candidates for professional programs? *Journal of Vocational Behavior*, 1981, 18, 277-288.
- Hoyt, D. P. An evaluation of group and individual programs in vocational guidance. *Journal of Applied Psychology*, 1955, 39, 26-30.
- Hubbard, R. M. Interest Analysis Blank. In D. G. Paterson, R. M. Elliott, L. D. Anderson, H. A. Toops, & E. Heidbreder (Eds.), *Minnesota Mechanical Ability Tests*. Minneapolis: University of Minnesota Press, 1930.
- Johansson, C. B. *Psychometric characteristics of the Inventory of Interests*. Unpublished doctoral dissertation, University of Minnesota, 1969.
- Johansson, C. B. Strong Vocational Interest Blank in-general samples. *Journal of Counseling Psychology*, 1975, 22, 113-116.
- Johansson, C. B. *Manual for the Career Assessment Inventory*. Minneapolis: National Computer Systems, 1976.
- Johansson, C. B., & Campbell, D. P. Stability of the Strong Vocational Interest Blank for Men. *Journal of Applied Psychology*, 1971, 55, 34-36.
- Johnson, R. W. Use of Basic Interest Scales in interpreting SVIB-W Occupational and Nonoccupational Scores. *Measurement and Evaluation in Guidance*, 1971, 3, 220-224.
- Johnson, R. W., Flammer, D. P., & Nelson, J. G. Multiple correlations between personality factors and SVIB occupational scales. *Journal of Counseling Psychology*, 1975, 22, 217-223.
- Johnson, W. F., Korn, T. A., & Dunn, D. J. Comparing three methods of presenting occupational information. *Vocational Guidance Quarterly*, 1975, September, 62-65.
- Juel-Nielsen, N. *Individual and environment: Monozygotic twins reared apart* (revised edition). New York: International Universities Press, 1980.
- Kapes, J. T., & Mastie, M. M. (Eds.). *Counselor's guide to vocational guidance instruments*. Washington, DC: National Vocational Guidance Association, 1982.
- Kelley, T. L. Educational guidance. An experimental study in the analysis and prediction of ability of high school pupils. Columbia University, *Contributions to Education*, No. 71, 1914.
- Kemp, C. G. *Changes in patterns of personal values in relation to open-closed belief systems*. Unpublished doctoral dissertation, Michigan State University, 1957.
- King, D. P., & Norrell, G. A factorial study of the Kuder Preference Record-Occupational, Form D. *Educational and Psychological Measurement*, 1964, 24, 57-64.

- Kitson, H. D. *The psychology of vocational adjustment*. Philadelphia: Lippincott, 1925.
- Kivlighan, D. M., Jr., Hageseth, J. A., Tipton, R. M., & McGovern, T. V. Effects of matching treatment approaches and personality types in group vocational counseling. *Journal of Counseling Psychology*, 1981, 28, 315-320.
- Kornhauser, A. W. Results from a quantitative questionnaire of likes and dislikes used with a group of college freshmen. *Journal of Applied Psychology*, 1927, 11, 85-94.
- Kuder, G. F. *Kuder Preference Record—Form A*. Chicago: University of Chicago Bookstore, 1939.
- Kuder, G. F. *Vocational Preference Record—Form B*. Chicago: Science Research Associates, 1943.
- Kuder, G. F. *Kuder Preference Record—Form C (Vocational)*. Chicago: Science Research Associates, 1948.
- Kuder, G. F. *Kuder—E: General Interest Survey manual*. Chicago: Science Research Associates, 1964.
- Kuder, G. F. *General Manual: Occupational Interest Survey Form—DD*. Chicago: Science Research Associates, 1966.
- Kuder, G. F. *Activity interests and occupational choice*. Chicago: Science Research Associates, 1977.
- Kuder, G. F. A reminiscence. *Measurement and Evaluation in Guidance*, 1980, 12, 199-205.
- Lamb, R. R. Validity of the ACT Interest Inventory for minority group members. In C. K. Tittle & D. G. Zytowski (Eds.), *Sex-fair interest measurement: Research and implications*. Washington, DC: U.S. Government Printing Office, 1978.
- Lamb, R. R., & Prediger, D. J. *Technical report for unisex edition of the ACT Interest Inventory*. Iowa City: American College Testing Program, 1981.
- Layton, W. L. *Counseling use of the Strong Vocational Interest Blank* (Minnesota Studies in Personnel Work, No. 8). Minneapolis: University of Minnesota Press, 1958.
- Lee, R., Mueller, L. B., & Miller, K. J. Sex, wage-earner status, occupational level, and job satisfaction. *Journal of Vocational Behavior*, 1981, 18, 362-373.
- Lindquist, E. F. *The Iowa Tests of Educational Development: General manual for the separate booklet edition*. Chicago: Science Research Associates, 1959.
- Lipsett, L., & Wilson, J. W. Do "suitable" interests and mental ability lead to job satisfaction? *Educational and Psychological Measurement*, 1954, 14, 373-380.
- Lonner, W. J. The SVIB visits German, Austrian, and Swiss psychologists. *American Psychologist*, 1968, 23, 164-179.
- Lonner, W. J., & Adams, H. L. Interest patterns of psychologists in nine western nations. *Journal of Applied Psychology*, 1972, 56, 146-151.
- Lorr, M., & Suziedelis, A. A dimensional approach to the interests measured by the SVIB. *Journal of Counseling Psychology*, 1973, 20, 113-119.
- Manson, G. E. Occupational interests and personality requirements of women in business and the professions. *Michigan Business Studies*, 1931, 3, 281-409.
- Maola, J., & Kane, G. Comparison of computer-based versus counselor-based occupational information systems with disadvantaged vocational students. *Journal of Counseling Psychology*, 1976, 23, 163-165.
- McArthur, C., & Stevens, L. B. The validation of expressed interests as compared with inventoried interests: A fourteen year follow-up. *The Journal of Applied Psychology*, 1955, 39, 184-189.
- McKinley, J. C., & Hathaway, S. R. A Multiphasic Personality Schedule (Minnesota): I. Construction of the schedule. *Journal of Psychology*, 1940, 10, 249-254.
- Meacham, M. L. *The relationship between an index of motivation and a criterion of achievement*. Unpublished doctoral dissertation, Washington State University, 1965.
- Meir, E. I., & Erez, M. Fostering a career in engineering. *Journal of Vocational Behavior*, 1981, 18, 115-120.
- Miller, G. M. Deriving meaning from standardized tests: Interpreting test results to clients. *Measurement and Evaluation in Guidance*, 1982, 15, 87-94.
- Miller, M. J., & Cochran, J. R. Evaluating the use of technology in reporting SCII results to students. *Measurement and Evaluation in Guidance*, 1979, 12, 166-173.
- Miner, J. B. An aid to the analysis of vocational interests. *Journal of Educational Research*, 1922, 5, 311-323.
- Moore, B. V. Personnel selection of graduate engineers. *Psychological Monograph*, 1921, 30, 1-85.
- Mossholder, K. W. Relationships between the Strong Vocational Interest Blank and the Adjective Check List: An operational replication. *Measurement and Evaluation in Guidance*, 1981, 14, 138-147.

- Newman, A. H., Freeman, F. N., & Holzinger, K. J. *Twins: A study of heredity and environment*. Chicago: University of Chicago Press, 1937.
- O'Brien, W. F., & Walsh, W. B. Concurrent validity of Holland's theory for non-college degreed black working men. *Journal of Vocational Behavior*, 1976, 8, 239-246.
- Oliver, L. W. Evaluating career counseling outcome for three modes of test interpretation. *Measurement and Evaluation in Guidance*, 1977, 10, 153-161.
- O'Neil, J. M., Price, G. E., & Tracey, T. J. The stimulus value, treatment effects, and sex differences when completing the Self-Directed Search and the Strong-Campbell Interest Inventory. *Journal of Counseling Psychology*, 1979, 26, 45-50.
- Orpen, C. Effect of flexible working hours on employee satisfaction and performance: A field experiment. *Journal of Applied Psychology*, 1981, 66, 113-115.
- Otis, A. S. *Otis General Intelligence Examination*. Yonkers-on-Hudson, NY: World Book Company, 1920.
- Parsons, F. *Choosing a vocation*. Boston: Houghton Mifflin, 1909.
- Paterson, D. G., Elliott, R. M., Anderson, L. D., Toops, H. A., & Heibredner, E. (Eds.). *Minnesota Mechanical Abilities Tests*. Minneapolis: University of Minnesota Press, 1930.
- Paterson, D. G., Gerken, C. d'A., & Hahn, M. E. *The Minnesota Occupational Rating Scales and counseling profiles*. Chicago: Science Research Associates, 1941.
- Prediger, D. J. Dimensions underlying Holland's hexagon: Missing link between interests and occupations? *Journal of Vocational Behavior*, 1982, 21, 259-287.
- Ream, M. J. *Ability to sell: Its relations to certain aspects of personality and experience*. Baltimore: Williams & Wilkens, 1924.
- Reeves, D. J., & Booth, R. F. Expressed versus inventoried interests as predictors of paramedical effectiveness. *Journal of Vocational Behavior*, 1979, 15, 155-163.
- Remmers, H. H. The measurement of interest differences between students of engineering and agriculture. *Journal of Applied Psychology*, 1929, 13, 105-119.
- Riley, P. J. The influence of gender on occupational aspirations of kindergarten children. *Journal of Vocational Behavior*, 1981, 19, 244-250.
- Roberts, C. A., & Johansson, C. B. The inheritance of cognitive interest styles among twins. *Journal of Vocational Behavior*, 1974, 4, 237-243.
- Roe, A. A new classification of occupations. *Journal of Counseling Psychology*, 1954, 1, 215-220.
- Roe, A. *The psychology of occupations*. New York: Wiley, 1956.
- Roe, A. Early determinants of vocational choice. *Journal of Counseling Psychology*, 1957, 4, 212-217.
- Rohe, D. E., and Athelstan, G. T. Vocational interests of persons with spinal cord injury. *Journal of Counseling Psychology*, 1982, 29, 283-291.
- Rokeach, M. *The open and closed mind*. New York: Basic Books, 1960.
- Rounds, J. B., Jr., Davison, M. L., & Dawis, R. V. The fit between Strong-Campbell Interest Inventory General Occupational Themes and Holland's hexagonal model. *Journal of Vocational Behavior*, 1979, 15, 303-315.
- Rounds, J. B., Jr., & Dawis, R. V. Factor analysis of SVIB items. Paper presented at the meetings of the American Psychological Association, San Francisco, August, 1977.
- Rubinstein, M. R. Integrative interpretation of vocational interest inventory results. *Journal of Counseling Psychology*, 1978, 25, 306-309.
- Schmidt, L. D., & Pepinsky, H. B. Counseling research in 1963. *Journal of Counseling Psychology*, 1965, 12, 418-427.
- Shutz, R. E., & Baker, R. L. A factor analysis of the Kuder Preference Record-Occupational, Form D. *Educational and Psychological Measurement*, 1962, 22, 97-104.
- Scott, T. B., & Anadon, M. A comparison of the vocational interest profile of native American and Caucasian college-bound students. *Measurement and Evaluation in Guidance*, 1980, 13, 35-42.
- Shields, J. *Monozygotic twins: Brought up apart and brought up together: An investigation into the genetic and environmental causes of variation in personality*. London: Oxford University Press, 1962.
- Shindler, A. W. *The Every-Pupil Tests in Science* (Supplement to University of Iowa Bulletin, New Series No. 716). Ames: State University of Iowa, 1933.
- Slaney, R. B. Expressed and inventoried vocational interests: A comparison of instruments. *Journal of Counseling Psychology*, 1978, 25, 520-529.

- Smith, R. D., & Evans, J. Comparison of experimental group and individual counseling as facilitators of vocational development. *Journal of Counseling Psychology*, 1973, 20, 202-208.
- Strong, E. K., Jr. Vocational guidance of engineers. *Industrial Psychology Monthly*, 1927, 11, 291-298. (a)
- Strong, E. K., Jr. *Vocational Interest Blank*. Palo Alto, CA: Stanford University Press, 1927. (b)
- Strong, E. K., Jr. *Vocational Interest Blank for Women*. Palo Alto, CA: Stanford University Press, 1933.
- Strong, E. K., Jr. *Vocational Interest Blank for Men* (revised). Palo Alto, CA: Stanford University Press, 1938.
- Strong, E. K., Jr. *Vocational interests of men and women*. Palo Alto, CA: Stanford University Press, 1943.
- Strong, E. K., Jr. *Vocational Interest Blank for Women* (revised). Palo Alto, CA: Stanford University Press, 1946.
- Strong, E. K., Jr. Permanence of interest scores after 22 years. *Journal of Applied Psychology*, 1951, 35, 89-91.
- Strong, E. K., Jr. *Vocational interests eighteen years after college*. Minneapolis: University of Minnesota Press, 1955.
- Strong, E. K., Jr. *Strong Vocational Interest Blank manual*. Palo Alto, CA: Consulting Psychologists Press, 1959.
- Stumpf, S. A., & Rabinowitz, S. Career stage as a moderator of performance relationships with facets of job satisfaction and role perceptions. *Journal of Vocational Behavior*, 1981, 18, 202-218.
- Sullivan, E. T., Clark, W. W., & Tiegs, E. W. *Manual of directions, California Test of Mental Maturity*. Los Angeles: Southern California School Book Depository, 1936.
- Super, D. E. Vocational interest and vocational choice. *Educational and Psychological Measurement*, 1947, 7, 375-384.
- Super, D. E. *Appraising vocational fitness*. New York: Harper Bros., 1949.
- Super, D. E. & Crites, J. O. *Appraising vocational fitness by means of psychological tests* (revised ed.). New York: Harper & Row, 1962.
- Swanson, J. L., & Hansen, J. C. *Construct validity of the Strong-Campbell Interest Inventory Academic Comfort Scale*. Unpublished manuscript, Center for Interest Measurement Research, University of Minnesota, 1983.
- Switzer, D. K., Grigg, A. E., Miller, J. S., & Young, R. K. Early experiences and occupational choices: A test of Roe's hypothesis. *Journal of Counseling Psychology*, 1962, 9, 45-48.
- Thomas, R. R. Permanence of measured interests of women over 15 years (abstract). *American Psychologist*, 1955, 10.
- Thurstone, L. L. Multiple factor analysis. *Psychological Review*, 1931a, 38, 406-427.
- Thurstone, L. L. A multiple factor study of vocational interests. *Personnel Journal*, 1931b, 3, 198-205.
- Thurstone, L. L. *Manual of instructions for the Primary Mental Abilities Test*. Washington, DC: American Council on Education, 1939.
- Tyler, L. E. The development of interests. In W. L. Layton (Ed.), *The Strong Vocational Interest Blank: Research and uses*. Minneapolis: University of Minnesota Press, 1960.
- Tyler, L. E. The antecedents of two varieties of vocational interests. *Genetic Psychology Monographs*, 1964, 70, 177-227.
- Tyler, L. E. *The psychology of human differences* (3rd ed.). New York: Appleton-Century-Crofts, 1965.
- Vaitenas, R., & Wiener, Y. Developmental, emotional, and interest factors in voluntary mid-career change. *Journal of Vocational Behavior*, 1977, 11, 291-304.
- Vandenberg, S. G., & Kelly, L. Hereditary components in vocational preferences. *Acta Geneticae Medicae et Gemellologiae*, 1964, 13, 266-277.
- Vandenberg, S. G., & Stafford, R. E. Hereditary influences on vocational preferences as shown by scores of twins on the Minnesota Vocational Interest Inventory. *Journal of Applied Psychology*, 1967, 51, 17-19.
- Vecchio, R. P. A test of a moderator of job satisfaction-job quality relationship: The case for religious affiliation. *Journal of Applied Psychology*, 1980, 65, 195-201.
- Villwock, J. D., Shnitzen, J. P., & Carbonari, J. P. Holland's personality constructs as predictors of stability of choice. *Journal of Vocational Behavior*, 1976, 9, 77-85.

- Wakefield, J. A., Jr., Yom, B. L., Doughtie, E. B., Chang, W. C., & Alston, H. L. The geometric relationship between Holland's personality typology and the Vocational Preference Inventory for Blacks. *Journal of Counseling Psychology*, 1975, 22, 58-60.
- Walsh, W. B., & Lacey, D. W. Perceived change and Holland's theory. *Journal of Counseling Psychology*, 1969, 16, 348-352.
- Walsh, W. B., Spokane, A. R., & Mitchell, E. Consistent occupational preferences and satisfaction, self-concept, self-acceptance, and vocational maturity. *Journal of Vocational Behavior*, 1973, 3, 453-464.
- Weaver, C. N. Job satisfaction in the United States in the 1970's. *Journal of Applied Psychology*, 1980, 65, 364-367.
- Wiener, Y., & Klein, K. L. The relationship between vocational interests and job satisfaction: Reconciliation of divergent results. *Journal of Vocational Behavior*, 1978, 13, 298-304.
- Wiley, M. O., & Magoon, T. M. Holland high point social types: Is consistency related to persistence and achievement? *Journal of Vocational Behavior*, 1982, 20, 14-21.
- Williams, C. M. Occupational choices of male graduate students as related to values and personality: A test of Holland's theory. *Journal of Vocational Behavior*, 1972, 2, 39-46.
- Yungman, T. G. Content analysis of the Vocational Guidance Quarterly: Volume 1-19 inclusive. *Vocational Guidance Quarterly*, 1972, 20, 193-198.
- Zener, T. B., & Schnuelle, L. Effects of the Self-Directed Search on high school students. *Journal of Counseling Psychology*, 1976, 23, 353-359.
- Zytowski, D. G. Factor analysis of the Kuder Occupational Interest Survey. *Measurement and Evaluation in Guidance*, 1976a, 9, 120-123.
- Zytowski, D. G. Long-term profile stability of the Kuder Occupational Interest Survey. *Educational and Psychological Measurement*, 1976b, 36, 689-692.
- Zytowski, D. G. *Counseling with the Kuder Occupational Interest Survey*. Chicago: Science Research Associates, 1981.
- Zytowski, D. G., & Warman, R. E. The changing use of tests in counseling. *Measurement and Evaluation in Guidance*, 1982, 15, 147-152.