

Discrepancies between Existing Jobs and Individual Interests: An Empirical Application of Holland's Model

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This study compared data on existing positions in a wide variety of occupational categories and corresponding normative data on career interests in those same occupations. Data was based on U.S. labor statistics and Holland typology norms for career interest categories using separate analyses for samples of high school students and working adults. For the adult sample, separate analyses were conducted for men and women. Results of loglinear analyses indicated an overall discrepancy between existing positions and normative interests. Certain occupational categories exhibited high normative interest but a low number of existing positions, while other occupational areas exhibited low normative interest relative to the number of existing positions. Implications are discussed for development of career interests that will reduce this discrepancy. © 1996 Academic Press, Inc.

The United States regularly experiences high rates of unemployment, while there are many U.S. jobs for which qualified American workers cannot be found. In some occupational areas, qualified workers are unable to find positions in the existing job market, while in other occupational areas employers are unable to find qualified workers in the U.S. labor pool.

With unemployment fluctuating around the 7.0% mark, approximately 7.8 million Americans are out of work (U.S. Department of Labor, 1994). Had U.S. workers been qualified for many of the available jobs, the job market could have been able to accommodate as much as one-tenth of those who are unemployed. Although the causes of this imperfect match between available jobs and available workers are complex, the nature of interests of the labor force is undoubtedly a contributing factor. The purpose of this study was to identify occupational categories for which there are large discrepancies between the number of existing positions and the number of people with interests compatible with those occupations (hereafter referred to as the level of normative interest). Specifically, this study attempts to ascertain which general occupational categories are characterized by low normative interest and a high surplus of existing positions, and which general occupational categories are characterized by high normative interest relative to the number of existing positions.

In the well-known "Global Workforce 2000" omnibus study, Johnston (1991) cautioned that the United States and other industrialized nations are

not producing enough workers having the much-needed skills to compete in both the domestic and international job arenas. Conversely, we seem to be producing an abundance of workers with skills that are either technologically obsolete or incompatible with current organizational labor demands. While a number of studies have focused on worker skills as a solution to the unemployment problem (c.f. Johnston, 1991; Kutscher, 1993; Prediger, 1989), another possibility is that this persistent real-world problem may be traceable to occupational interests and beliefs in self-competence. For example, it appears that interests and capabilities in mathematics, engineering, and computer science are not as common in the United States as in some other industrialized nations (U.S. Department of Education, 1989; IMEDE, 1994), and this may partially explain the necessity of employing large numbers of foreign workers in related occupations. This is not to imply that the employment of foreign workers carries a negative connotation, but that the global competitiveness of U.S. worker skills is of concern.

According to London and Greller (1991), the United States will find it increasingly necessary to use its entire workforce effectively in the coming decade. In order to do so, the idea of individuals aligning their careers with the needs of the market becomes paramount. It is thus necessary to ascertain what drives the career decision-making process. Lent and Hackett (1994) state that genetic endowments, special abilities, and environmental conditions all contribute to career decision-making. While recent advances (Moloney & Bouchard, 1991; Betsworth *et al.*, 1994) in the study of genetic links to career interests offer an intriguing avenue, the relation between interests and abilities is more pertinent to the concerns expressed in this paper. Dawis (1991) summarized the research on the relation between interests and abilities, concluding that the association is weak at best with common variance between zero to four percent. He suggested that the weak associations may be due in part to differences in how interests and abilities are measured.

According to several prominent occupational theorists (Holland 1973; Roe, 1957; Super, 1953), interests are a function of one's familial values, social class, culture, and physical environment, whereby people learn to prefer some activities over others. It is in these activities that a person becomes competent or, perhaps more importantly, gains a presumption of competence. Gottfredson (1990) equated self-efficacy with self-estimated ability in stating that measured interests may be stable expressions of how respondents see themselves in terms of their abilities more so than a reflection of actual competence. Self-assessments of competence, perhaps a better predictor of perseverance in a particular occupation than measured competence (Dawis, 1991; Krumboltz, 1994), is the common ground on which several theories explain the relation between interests and occupational choice (Dawis & Lofquist, 1984; Holland, 1990; Krumboltz & Nichols, 1990).

Shaping and reshaping individual interests and competencies may be a critical step toward a more appropriately skilled and hence more employable labor pool. Although it is recognized that any long-term attempt to shape

interests is constrained by the dynamic nature of labor demand, certain occupational categories have been projected to increase at a substantial rate well into the next century (e.g., math and computer scientists, +73%; health technicians, +42%; protective service workers, +32%). Other occupational areas (e.g., machine operators, -9%; financial records processors, -4%) are expected to maintain a steady decline in labor demand (Kutscher, 1993).

While information on occupational growth rates may be useful in choosing a potentially stable career, interest may be lacking and hence the career may not be stable after all. The question of what accounts for stability and change in occupational interests has not been empirically explored (Dawis, 1991, p. 859), nor is the extent to which change is possible well understood (Spokane, 1985). While trait theorists assume that interests are crystallized at an early age, developmental theories (e.g., Crites, 1976; Super, 1953, 1990) acknowledge the possibility for modification of interests through adjustments to realistic work opportunities, demands, and conditions (Dawis and Lofquist, 1984) or through social-cognitive learning processes in person-environment interactions (Lent and Hackett, 1994). Indeed, several recently advanced or expanded models (e.g., Mitchell & Krumboltz, 1990) have advocated shaping interests as one important career intervention.

Although Holland's theory of vocational interests has been the dominant model for the past 20 years, little attention has been given to the normative interests of the population across the different occupational areas and the actual availability of jobs in those areas. No research to date has specifically linked occupational interests with the likelihood of employment.

Holland (1992) and Dawis and Lofquist (1984) postulate that people search for environments that allow them to exercise their skills and abilities, express their attitudes and values and take on roles that are agreeable. The organization, in turn, tries to select individuals who will be effective and satisfied with the job and the organization. Holland's theory and *The Dictionary of Holland Occupational Codes* (DHOC) (Gottfredson & Holland, 1989) provide a meaningful scheme for studying the relation between occupational interests and the number of people employed in actual occupations.

While interest inventories are used to diagnose individual career orientations, accumulated data may be assumed to represent normative levels of both expressed activity preferences and self-estimates of competence in different occupational areas. This study uses archival data from Holland's (1985b) Self-Directed Search to compare normative occupational interests with actual existing positions in those occupations. The intent is to identify career interest areas where demand for employees may be the greatest and areas where jobs may not be very plentiful despite strong normative occupational interest. This study tested the hypothesis that there is an overall discrepancy between normative occupational interests and the number of existing positions in the United States. This hypothesis implies that some specific occupational areas will have a surplus of existing positions and low normative interests while others will have high normative interest and a low number of existing positions.

METHOD

Sample

Normative interest data was collected from December 1993 through March 1994 by researchers of Psychological Assessment Resources (PAR). Permission was granted by PAR to use this published data, which appears in the second edition of the SDS Professional Manual. Two samples were used in the analysis. One sample comprised 819 students from 10 high schools (42% male and 58% female), while the other sample comprised 656 working adults (38% male and 62% female) from diverse sources such as career counseling centers, private clinical practices, employment services, and church groups. Data were gathered from 25 states and Washington D.C., with ages ranging from 17 to 79 for the adult sample and 14 to 18 for the high school sample. Both samples had similar ethnic compositions—75% White, 8% African American, 7% Hispanic, 4% Asian American, 1% Native American, and 5% from other ethnic backgrounds. Norms for these samples, based on their SDS scores, were then used to determine the number of individuals in each Holland occupational interest code.

Jobs: Existing Positions

Data on existing positions in the United States were extracted from the June 1993 issue of the Monthly Labor Review (MLR), which listed all occupations recognized by the Department of Labor as of that date. Since this list represents the complete set of occupations under study, it is defined as the entire population of jobs rather than merely a sample. The MLR reported the total number employed in each of the 292 occupations listed. The first step in the coding process was to assign a 3-point Holland code to each occupation using The DHOC. Since both the MLR and DHOC are based on the *Dictionary of Occupational Titles* (DOT), 3-point codes were identified for all of the 292 occupations and therefore none had to be eliminated from the analysis. In some instances, however, job titles were not exactly the same in the MLR and the DHOC; for these cases, two job analysis experts were consulted and asked to reach consensus on matching MLR and DHOC job titles. For all occupations with the same 3-point code, the numbers employed were summed to arrive at the total number of existing positions for each 3-point code. The frequencies for the 3-point codes were then summed to obtain frequencies for 1- and 2-point codes. These total counts of existing positions for each 1- and 2-point DHOC code were used as the frequencies for the analyses.

Analysis

Loglinear analyses were performed to determine if there were significant discrepancies between existing jobs in the various occupational categories and students' and employed adults' interests in those categories. When a significant difference occurred, standardized deviates were calculated to iden-

tify those cells in which the observed frequencies deviated most from the expected frequencies.

RESULTS

The loglinear analyses revealed a significant difference between job availability and normative interests. For the 1-point codes, $\chi^2(5, N = 819) = 1,756.91, p < .0001$, for the high school students, and $\chi^2(5, N = 656) = 283.10, p < .0001$, for working adults. For the 2-point codes, $\chi^2(29, N = 819) = 18,824.24, p < .0001$, for high school students, and $\chi^2(27, N = 656) = 13,780.28, p < .0001$, for working adults. These analyses revealed discrepancies in the proportion of interests relative to existing jobs.

The standardized deviates are essentially z scores that are calculated from expected cell values based on proportions rather than cell means, so any absolute value larger than 1.96 is significant (at the .05 level of confidence). For example, the total deviate value of +6.7 for the adults' realistic category (see Table 1) indicates that there are significantly more individuals interested in realistic occupations than expected by the model. This effect is due to an excess of interest relative to existing positions, because the standardized deviate for normative interest (+7.0) deviates farther from the expected value of zero than does the standardized deviate for existing positions (-0.3). Standardized deviates of zero indicate a perfect match (or equilibrium) between the proportions of existing positions and normative interest for the particular occupational code. Table 1 reveals that significant discrepancies exist for all 1-point codes except the Artistic category (total standardized deviate = -1.3).

Figure 1 depicts the absolute differences in 1-point codes for the adult sample. Points directly on the hexagon represent equilibrium between existing positions and normative interest. Points outside the hexagon (i.e., positive standardized deviates) indicate a surplus of interests or positions while points inside the hexagon (i.e., negative standardized deviates) indicate a deficit of interests or positions. Solid lines in Fig. 1 represent dimensions where interest is high relative to positions, and dotted lines represent dimensions where interest is lacking.

The same analyses were performed separately for the adult males and females to ascertain whether gender had a significant effect on the findings (see Table 2). For both samples, significant discrepancies between existing positions and normative interests occur for all but the artistic categories.

DISCUSSION

Results of this study support the hypothesis. It was found that there are overall discrepancies between the number of existing positions and the frequency of normative interests and that there are specific occupational categories for which there is a high surplus of existing positions and low normative interest, as well as specific categories where there is high normative interest and a low number of existing positions. This study is evidence that interest

TABLE 1

Standardized Deviates for 1-Point and 2-Point Codes for High School and Adult Samples

Holland codes	High school			Adults		
	Existing positions	Normative interests	Total <i>SD</i>	Existing positions	Normative interests	Total <i>SD</i>
1-point						
R	0.8	-9.2	-8.4	-0.3	7.0	6.7
I	-0.7	8.0	7.3	-0.4	12.0	11.6
A	-2.9	34.9	32.0	0.0	-1.3	-1.3
S	-1.4	17.2	15.8	0.1	-4.1	-4.0
E	0.6	-7.0	-6.4	0.2	-6.9	-6.6
C	0.5	-6.1	-5.6	0.2	-4.9	-4.7
2-point						
RI	-0.2	2.2	2.0	-0.1	1.0	1.0
RA	-4.7	56.0	51.3	-3.9	55.7	51.9
RS	-0.1	1.3	1.2	-0.5	6.7	6.2
RE	0.8	-9.6	-8.8	0.6	-8.4	-7.8
RC	0.6	-7.6	-7.0	0.4	-5.4	-5.0
IR	0.2	-2.6	-2.4	0.2	-3.5	-3.2
IA	-4.5	53.4	48.9	-3.3	47.7	44.4
IS	-2.0	23.8	21.8	-0.7	9.8	9.1
IE	-0.2	2.4	2.2	0.0	-0.4	-0.4
IC	-0.1	1.4	1.3	-0.2	2.5	2.3
AR	-4.7	56.0	51.3	-2.4	35.2	32.8
AI	-1.5	18.2	16.7	-0.4	5.3	4.9
AS	-3.0	35.7	32.7	-1.7	24.2	22.5
AE	-0.5	5.7	5.2	-0.1	1.5	1.4
AC	-2.0	23.9	21.9	-2.2	32.2	29.9
SR	-0.7	7.9	7.2	-1.0	14.0	13.1
SI	-0.8	9.8	9.0	-0.4	5.4	5.0
SA	-1.1	13.7	12.6	-1.2	17.3	16.1
SE	-0.4	5.1	4.7	-0.4	6.3	5.8
SC	-0.7	8.9	8.2	-1.6	22.5	21.0
ER	0.0	0.0	0.0	0.0	-0.4	-0.4
EI	-4.0	47.8	43.8	-3.0	43.2	40.2
EA	-3.9	46.3	42.4	-3.2	45.5	42.3
ES	0.8	-10.1	-90.3	0.6	-8.3	-7.7
EC	-0.1	1.5	1.4	-0.1	2.0	1.8
CR	0.1	-1.6	-1.5	-0.3	4.5	4.2
CI	-2.0	23.9	21.9	0.0	0.0	0.0
CA	-2.6	31.6	29.1	0.0	0.0	0.0
CS	0.6	-6.8	-6.2	0.5	-7.8	-7.2
CE	0.2	-2.2	-2.0	0.3	-4.6	-4.3

in some areas, such as Enterprising job categories (namely, the Enterprising-Social occupations) are particularly problematic. This category includes a variety of managerial occupations, including airport, hotel and motel, and financial institution managers.

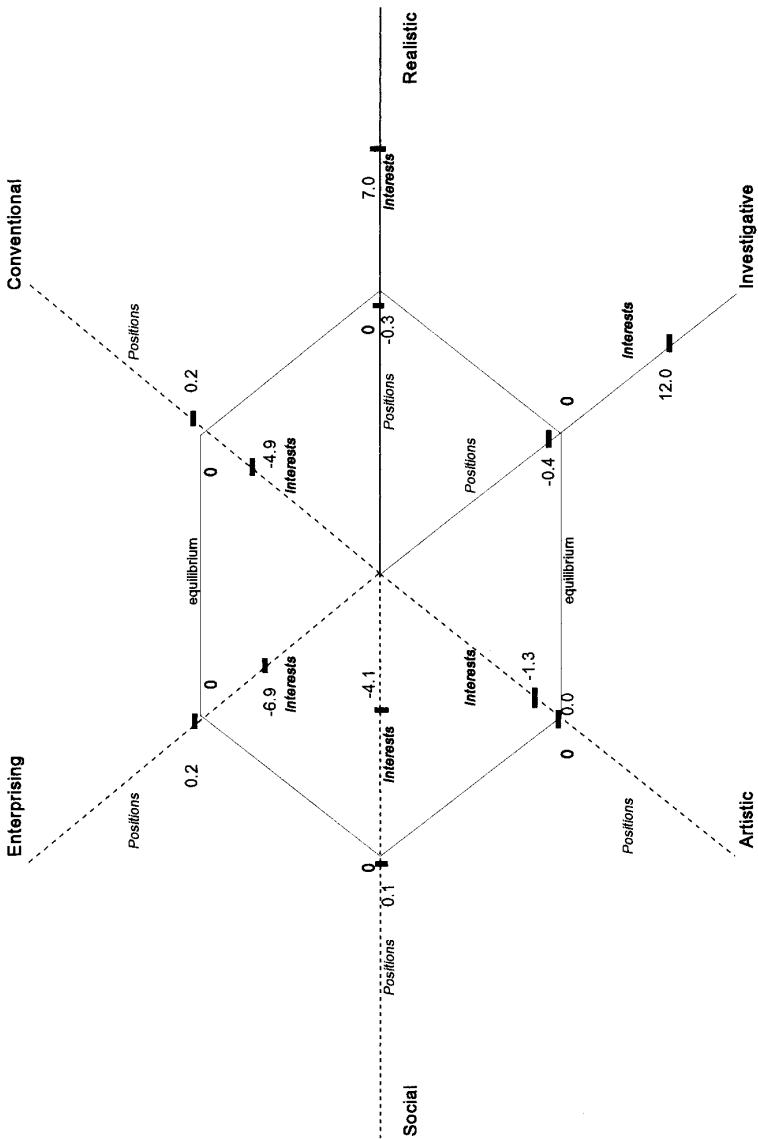


FIG. 1. Hexagonal representation of standardized deviates along the six Holland dimensions.

It is clear that Realistic type jobs (those which tend to involve concrete and practical activity with machines or tools) represent an area where interest is lacking in high school students, but that this is not the case for working adults. However, it can be seen that Enterprising and Conventional categories represent a lack of interest for both samples. While Enterprising occupations involve working with people in a supervisory or persuasive way, Conventional

TABLE 2
Standardized Deviates for 1-Point and 2-Point Codes for Adult Male and Female Samples

Holland codes	Adult males			Adult females		
	Existing positions	Normative interests	Total <i>SD</i>	Existing positions	Normative interests	Total <i>SD</i>
1-point						
R	-0.2	6.8	6.6	0.0	2.3	2.3
I	-0.2	8.0	7.8	-0.2	9.8	9.6
A	0.0	-1.1	-1.1	0.0	-0.7	-0.7
S	0.1	-3.5	-3.3	0.0	-2.2	-2.2
E	0.2	-5.8	-5.6	0.1	-3.7	-3.6
C	0.1	-4.1	-4.0	0.1	-2.6	-2.6
2-point						
RI	-0.2	3.9	3.7	0.1	-2.0	-1.9
RA	-2.8	63.3	60.4	-2.6	49.8	47.2
RS	-0.5	10.2	9.8	0.0	0.2	0.2
RE	0.2	-3.6	-3.4	0.4	-8.0	-7.5
RC	0.1	-2.9	-2.8	0.2	-4.6	-4.3
IR	0.0	-1.1	-1.1	0.2	-3.6	-3.4
IA	-2.2	50.0	47.8	-2.4	46.1	43.7
IS	-0.5	11.4	10.9	-0.2	3.3	3.1
IE	0.0	0.0	0.0	0.0	-0.6	-0.5
IC	0.0	0.8	0.7	-0.1	2.6	2.5
AR	-1.7	38.7	37.0	-1.7	32.6	30.9
AI	0.0	-0.5	-0.5	-0.4	7.3	6.9
AS	-0.6	12.9	12.3	-1.1	21.6	20.5
AE	0.0	0.0	0.0	-0.1	1.9	1.8
AC	-1.0	22.4	21.4	-2.0	37.7	35.7
SR	-0.4	8.2	7.8	-0.6	11.7	11.0
SI	0.0	1.1	1.0	-0.3	6.2	5.9
SA	-0.1	3.0	2.9	-1.1	20.1	19.1
SE	0.0	-0.7	-0.7	-0.5	8.8	8.3
SC	-0.1	2.8	2.7	-1.4	27.3	25.8
ER	-0.1	1.7	1.6	0.1	-2.0	-1.9
EI	-2.6	59.2	56.5	-1.4	26.6	25.2
EA	-1.7	38.7	37.0	2.6	49.8	47.2
ES	0.2	-4.4	-4.2	0.4	-7.1	-6.7
EC	-0.1	2.4	2.3	0.0	0.5	0.5
CR	-0.2	4.1	3.9	-0.1	2.4	2.3
CI	0.0	0.0	0.0	0.0	0.0	0.0
CA	0.0	0.0	0.0	0.0	0.0	0.0
CS	0.2	-5.0	-4.8	0.3	-5.9	-5.6
CE	0.1	-3.0	-2.9	0.2	-3.6	-3.4

jobs typically involve things, numbers, or machines. However, both Enterprising and Conventional occupations are designed in an effort to meet organizational goals or standards. The fact that the United States has fallen behind

its industrial counterparts (i.e., Japan and Germany) in the quality movement of the last two decades may be attributable to a lack of interest and hence competence in these goal-oriented occupations. In order for the United States to regain worldwide competitiveness, then, it is imperative to raise interest levels in related occupations.

While Conventional and Enterprising jobs exhibit a lack of interest relative to the number of existing positions, we find the opposite with respect to other occupational categories. For example, for high school students, Social, Artistic, and Investigative jobs represent those occupations with an excess of interest relative to existing positions, while, for adults, Investigative and Realistic jobs represent high-interest categories. It can be seen that the adult sample, when broken down by gender, exhibits very similar discrepancy patterns.

The results indicate a lack of Person-Environment Fit with respect to some individual interests and existing positions. However, the fact that high school norms differ from those of the adult sample (and in some categories produce opposite results) is evidence that interests can change throughout the lifespan. There are apparent implications for both job candidates and businesses who are recruiting, as well as for career counselors and educational curricula. While the results of the study suggest that job candidates may be well served to reexamine their career orientations to better align themselves with the demands of the job market, recruiting firms could be advised to support projects that will help develop a labor force that is more suited to the job arena. Businesses should perhaps support high schools and guidance/career counselors in recognizing the needs of the market. Career counseling might focus on specific occupations within broader career areas that have been slated as high growth. In this regard, math and computer science, personal services, health assessment and services, and protective services have been recognized as the fastest growing occupational areas in the United States (National outlook, 1993) and may deserve special attention.

One limitation of this study is that the occupations extracted from the MLR may not represent an exhaustive list of existing positions in the United States. It is, however, the official list of occupations as identified by the U.S. Bureau of Labor Statistics.

This study sets up a framework for moving closer to full employment and for greater job satisfaction. Future research might also expand on Prediger's (1982) model in order to further link the DOT concepts of data/ideas and things/people to occupational availability. In this way, research might provide greater clarity for career counseling. Furthermore, the SDS is used in its original form in other English-speaking countries and has also been translated into 21 languages. Many of the publishers in these various countries produce accompanying manuals with similar data on norms. Thus, there is a wealth of opportunity for cross-cultural and comparative research of this nature.

In conclusion, this paper has provided evidence of a lack of fit between individual interest and occupational demand in the United States in some

specific occupational categories. The inability to locate qualified applicants is a problem shared by corporations and educational systems, as well as by members of the labor pool themselves. It has been estimated that as many as 23% of new hires leave their jobs within one year due to a lack of Person–Environment Fit (Bretz, Ash, & Dreher, 1989). A concerted effort to reshape the interests and skills of the American labor force is clearly necessary as we enter the next century. Our ability to meet this demand requires a much better understanding of the complex relations among individual interests, skills, and the demand for labor.

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