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MONOGRAPH

Personal Globe Inventory: Measurement of the Spherical Model of Interests and Competence Beliefs

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The Personal Globe Inventory (PGI) evolved from the exploratory work on the spherical structure of interests (Tracey, 1997a; Tracey & Rounds, 1996a,b) and measures activity preferences, activity competence beliefs, and occupational preferences. The PGI is a viable instrument that mirrors information provided by many instruments but also includes greater complexity and flexibility. This monograph describes the inventory, examines its reliability and construct validity, discusses options for profiling inventory results, interprets five illustrative profiles, and suggests directions for future research. © 2002 Elsevier Science

The Personal Globe Inventory (PGI) is a new interest inventory that uses a different structural model of interests from that typically used in the literature. The spherical model used in the PGI enables a more complete description of interests and incorporates most of the current reigning model within the interest domain. This monograph presents the structure of the PGI, provides some initial psychometric support for the model and the scales, and illustrates the utility of the instrument through some example profiles. Given the centrality of the structure to the instrument, the major structural models in the field are reviewed first, and then the PGI is described.

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Structure of Interests

The interest model of Holland (1973, 1985a, 1997) has dominated the field of vocational psychology and the practice of interest assessment for the past 30 years. He proposed that there are six basic interest types (Realistic, Investigative, Artistic, Social, Enterprising, and Conventional, hereafter collectively referred to as RIASEC) and that these six types also describe environmental variance. This model provided a very easy metric with which to match individuals to their optimal jobs as first proposed by Parsons (1909). Beyond positing six types, Holland proposed that the types existed in a hexagonal structure with each type at one of the nodes. The proximity between types on the hexagon reflected the degree of similarity. This model has so captured the field that virtually all interest inventories (and now some self-efficacy inventories) provide RIASEC scores. There have been some contrary views about the structure of interests, yet clearly Holland's is the reigning model.

Gati (1991) proposed a competing model for the structure of interests in positing that the six RIASEC types could be better described as a hierarchical cluster. Tracey and Rounds (1993) conducted a meta-structural analysis using 104 different RIASEC correlation matrices covering a total sample size of 47,268 individuals. They compared the fit of Holland's hexagon model, which they described as a circumplex (borrowing Guttman's [1954] term), to Gati's hierarchical model. Their results demonstrate that, especially for U.S. samples, Holland's circumplex model was a superior representation of the RIASEC data. This result was found across age groups (high school and older), gender, and instruments. There was less of a clear trend for non-U.S. samples. A subsequent meta-analysis by Rounds and Tracey (1996) examined the same two structures again, but this time in U.S. ethnic samples and non-U.S. samples. They found that in neither of these groups was Holland's model as strongly supported as it was for U.S. majority (or ethnicity unspecified) samples. In this analysis, Gati's hierarchical model fit the international data better than did Holland's model. Moreover, neither model fit the U.S. ethnic samples well. Day and Rounds (1998) examined the fit of Holland's model to a large, representative single sample of U.S. ethnic groups and found support for the fit of Holland's model to these groups. Obviously, a one-sample examination is limited, yet the fit of Holland's model to U.S. data is strong for general samples but less clear for ethnic samples.

Another model for the structure of interest (more complementing of than competing with that of Holland) was posited by Prediger (Prediger, 1982, Prediger & Vansickle, 1992). Given that Holland's hexagon existed in two dimensions, Prediger used two dimensions to characterize the plane on which the hexagon rests. He proposed that interests and environments could be characterized by two bipolar dimensions. The People/Things dimension characterizes the differences between Social and Realistic on opposite sides of the hexagon. The Data/Ideas dimension characterizes the differences between Enterprising and Conventional (on the Data side) and between Investigative and Artistic (on the Ideas side). Prediger and Vansickle (1992) provided an excellent summary on the utility of their two-dimensional model of interests. In a meta-structural analysis, Rounds and Tracey (1993) found support for many of Prediger's claims. They found that there

are two dimensions underlying Holland's circle and that any orientation of these dimensions is appropriate. Given that Prediger tied his dimensions to occupations, his is perhaps the preferred orientation because it facilitates examination of individuals and environments using commensurate constructs.

Tracey and Rounds (1995, 1996a,b) subsequently explored the structure of interests using preference responses to a broad variety of occupational titles. In this series of studies, they found two results that led to their reassessment of the structure of interests. First, Tracey and Rounds (1995) examined the placement of item responses around the interest circle and found that the items were uniformly arranged around the circle. If Holland's six types were true distinct types, then the items would cluster around six nodes. Given the uniform distribution around the circle, slicing of the circle into any number of types would be equally viable. Given this, they proposed using eight types[1] instead of six, arguing that it characterizes the circle more completely and fits better with Prediger's dimensional representation. They found that their eight-type model fit the data very well, perhaps even better than did the six-type model. This finding of arbitrariness of scales was combined with their second main finding of three dimensions, not two, underlying interest data. These three dimensions then served as the basis of their model development.

Tracey and Rounds (1996a,b) found support for the presence of three dimensions: two corresponding to Prediger's (1982) People/Things and Data/Ideas dimensions and a third dimension of prestige. Prestige, also called status (Holland, 1985b), occupational level (Campbell, 1971; Strong, 1943), level of training (Holland 1985a), and level of difficulty and responsibility (Roe, 1956), has been an important construct in the literature. The occupational perceptions literature always finds that prestige is one of the most prominent factors that people use in evaluating different occupations (Coxon & Jones, 1978; Crites, 1969; Hodge, Siegel, & Rossi, 1964; Plata, 1975; Reeb, 1974; Trieman, 1977). Roe (Roe, 1956; Roe & Klos, 1969) and Gottfredson (1980) have focused their models around the explicit incorporation of prestige. However, such focus and recognition of the centrality of prestige has not been translated into interest assessment. Although there have been scales for status or prestige included in some past interest inventories (e.g., Holland, 1985b; Strong, 1943), it has not typically been incorporated as a prominent factor. Tracey and Rounds (1996b) found support for the importance of prestige as a major dimension in interest data and then examined how it could be modeled with the other two dimensions. Given these three dimensions, Tracey and Rounds then constructed 24 scales, called the Inventory of Occupational Preferences (IOP), to represent different points on the sphere created by these three

[1] The eight-type model here hearkens back to Roe's (Roe, 1956; Roe & Klos, 1969) eight-type model (Service, Business Contact, Organization, Technology, Outdoors, Science, General Cultural, and Arts and Entertainment). Although there is some similarity in content of Roe's eight types and the eight types used in the PGI (e.g., Business Contact and Managing, Outdoors and Nature/Outdoors), there is also fairly different content in many of the PGI scales. Furthermore, the ordering of the PGI eight type scales and Roe's scales differs. Tracey and Rounds (1994) found that Roe's ordering of her scales did not fit the data from several instruments. So, the eight-type model adopted here is different from Roe's in both content and ordering.

dimensions and evaluated the plausibility of this model. They found support for the spherical structure of interests over several different samples of college and high school students.

In a critique of the spherical structure article, Prediger (1996) asserted that the presence of prestige could be a function of item type in that only with occupational titles would this be evidenced. To address this point and also to examine the structure of self-efficacy in terms of its correspondence to the spherical structure, Tracey (1997b) subsequently evaluated the spherical structure by examining activity preference and activity competence estimate items. He created scales in a manner similar to that done by Tracey and Rounds (1996b) and called them the Preference Inventory (PI). He found that both activity preference scales and competence estimate scales were well fit by the spherical structure. Furthermore, Tracey, Watanabe, and Schneider (1997) found support for the spherical structure of interests using the IOP in a Japanese sample. Given this support for the spherical structure of interests across item type and culturally different samples, the PGI was constructed to enable a more formal and standardized assessment of the model.

The spherical model posited by Tracey and Rounds (1996a,b) and the slightly different one proposed by Tracey (1997b) were characterized by an expansion beyond Holland's six types. Instead of six types being characterized by the People/Things and Data/Ideas dimensions, eight types were created. The spatial relation of the eight types with Holland's six types and Prediger's two dimensions is depicted in Fig. 1.

The incorporation of the added high- and low-prestige scales into a sphere is depicted in Fig. 2. This is a version of the early sphere. The top of Fig. 2 represents

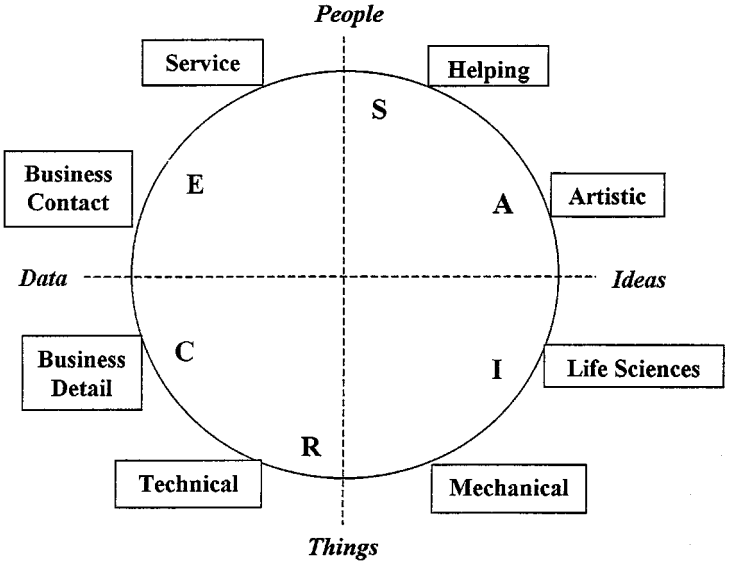

FIG. 1. Graphic representation of the eight early basic interest level types (shown in boxes), the six RIASEC types (shown inside the circle), and Prediger's two dimensions (marked by dotted lines).

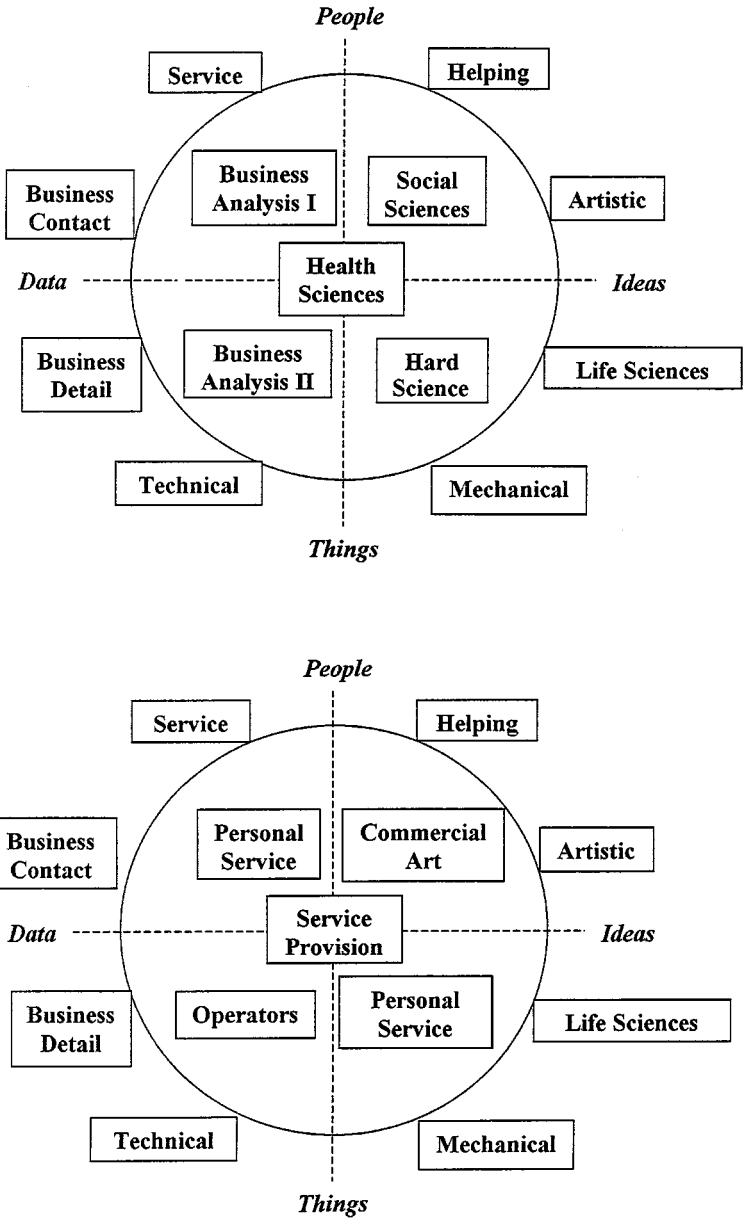

FIG. 2. Early spherical structure of interests. Top depicts upper half (higher prestige), and bottom depicts lower half (lower prestige).

the upper hemisphere, looking down at the north pole of high prestige (i.e., Health Sciences). The bottom of Fig. 2 represents the bottom hemisphere, looking up at the south pole of low prestige (i.e., Service Provision). The equator represents the familiar general interest circle, which is the same plane occupied by Holland's RIASEC types. In this representation, proximity represents degree of similarity between scales.

There were several problems with both of the initial measures, the IOP (Tracey & Rounds, 1996b) and the PI (Tracey, 1997b). Both measures had overlapping items (i.e., some items loaded on two scales) and scales, there were varying numbers of items per scale, there were some similarly named scales even though they occupied different parts of the sphere, there was some inconsistent content within the scales, and the activities used in the PI varied between the preference scoring and the competence scoring. Also, the content and scale names varied somewhat across instrument, so there was no uniform structure being represented. These scales were more valuable as research and heuristic tools than as standardized inventories. The PGI was constructed to obviate these scoring issues as well as to bring all three item types into one structure. In addition, it was desirable to create RIASEC scales to allow for multiple interpretation options.

PGI DEVELOPMENT

The data sets used in the IOP (Tracey & Rounds, 1996b) and PI (Tracey, 1997b) development were again used to create improved scales for the PGI. Each of the three item types (occupational preferences, activity preferences, and activity competence beliefs) was examined separately using principal components analysis, principal factor analysis, and multidimensional scaling. It was expected that all methods would generally agree, and the subsequent results from these methods were very similar. As described in Tracey and Rounds (1996b), a principal axis factor analysis or principal components analysis of data of this sort yields a prominent general factor, characterized by uniformly high positive loadings on all items, as the first factor. Rounds and Tracey (1993) noted that such a general factor has been viewed as bias (and thus needing to be controlled), as nuisance (and thus having little meaning), or as substantive (and thus needing to be interpreted). Current research has demonstrated that the general factor (or overall elevation of a profile) has not been found to carry any substantive or biasing information (e.g., Prediger, 1998) and so can be ignored. Thus, the second, third, and fourth factors were of concern because these carried substantive information. The loadings for each item were converted into polar coordinates. Whereas Tracey and Rounds (1996b) used only pairs of dimensions in their creation of scales, I used a more precise procedure in the establishment of the PGI wherein all three dimensions were used simultaneously. These polar coordinates located each item in three-dimensional space created by factors 2, 3, and 4. Distance from the center represented the communality of the item (or how much variance was being accounted for), whereas the angular displacement carried information about where in three-dimensional space the item fell.

The IOP (Tracey & Rounds, 1996b) and PI (Tracey, 1997b) were developed by examining the angular locations and communalities and selecting those items that were closest to desired points on the circle and had high communality. To develop the PGI, a more precise procedure was adopted whereby an algorithm was constructed that selected items that minimized the Euclidean distance (thus taking account of angular displacement and communality simultaneously and uniformly) in three-dimensional space from the desired points. The desired points were 18 equally spaced points placed around the outside of the sphere (8 around the equator, 5 above the equator, and 5 below the equator). Items selected were those that had high communality and in the direction of the desired spot. The best six items for each of the 18 points were selected to comprise the scales. The only added constraint on item selection was to have identical items for both of the activity formats (preference and competence). So, the best six items that were common across these analyses were kept for the activity scales. This procedure resulted in 18 scales of six items each for the activity preferences, the activity competence beliefs, and the occupational preferences. The composition of these scales was somewhat different from that of the original scales of the IOP and PI. Each PGI item loaded on only one scale, and there were no scale overlaps with respect to placement on the sphere.

The content label for each scale was determined by examining the item content and then comparing this content to Rounds's (1995) catalog of general and basic interest factors, which is based on the major factor analytic studies of interest preferences (Guilford, Christensen, Bond, & Sutton, 1954; Droege & Hawk, 1977; Jackson, 1977; Kuder, 1977; Rounds & Dawis, 1979). Thus, the labels were selected to match terms used in the literature and also terms that would be consistent across item type. The specific spherical scales of the PGI and their descriptions are presented in Table 1. As can be seen, the PGI labels changed somewhat from the IOP and PI versions.

The PGI thus consists of 18 separate scales that represent three dimensions of the structure of interests: People/Things, Data/Ideas, and Prestige. These 18 scales are distributed equidistant from the origin of the three dimensions, forming a sphere or globe. The spatial representation of these 18 interest scales is depicted in Fig. 3. The proximity of the interest types represents their similarity. As in Fig. 2, the top half of Fig. 3 represents the top hemisphere of the PGI globe, looking down at the north pole of high prestige. The bottom of Fig. 3 represents the bottom hemisphere, looking up at the south pole of low prestige. The equator represents the familiar general interest circle, which is the same plane as that occupied by Holland's RIASEC types.

Weighted geometric composites of the 8 general scales (those at the equator) were used to construct RIASEC scales. Because the RIASEC scales and Prediger's 4 poles (People, Things, Data, and Ideas) occupy the same two-dimensional plane as do the 8 basic scales of the PGI globe, it is possible to weight the scales based on their geometric properties to form composites that represent the RIASEC scales and Prediger's bipolar dimensions. A depiction of the PGI 8 basic scales, the PGI

TABLE 1
Eighteen Spherical Scales of the Personal Globe Inventory

Basic Interest Areas

1. Social Facilitating

Interest in working with other people and includes activities such as selling, assisting, and providing information or administering such services. Occupations related to this area include social service director, personnel director, publicity director, salesperson, travel agent, and aerobics instructor.

2. Managing

Interest in managing and planning the major activities of business or organizations and includes activities such as processing information; problem solving and decision making; forecasting and planning ahead; communicating to others; organizing, coordinating, and supervising others; and persuading. Occupations related to this area include office manager, department store manager, sales clerk, sales manager, and hotel manager.

3. Business Detail

Interest in accounting, assessing, estimating, advising, and budgeting. Occupations related to this area include financial analyst, bank examiner, cost estimator, and certified public accountant.

4. Data Processing

Interest in the use of mathematics and systems for the analysis and interpretation of data and for clarifying and solving technical problems. Occupations related to this area include electrical engineer, computer programmer, and microelectronic technician.

5. Mechanical

Interest in understanding how machinery works and designing, installing, and maintaining machinery. Machinery includes large engines to machine tools. Occupations related to this area include airplane mechanic, auto mechanic, avionics technician, chemical engineer, and machinist.

6. Nature/Outdoors

Interest in applying knowledge of the life sciences to plants and animals. Occupations related to this area include ecologist, forester, oceanographer, naturalist, fish and game warden, and veterinarian.

7. Artistic

Interest in visual, performing, and literary arts. Occupations related to this area include sculptor, musician, composer, poet, playwright, and author.

8. Helping

Interest in helping relationships with people from all age groups and includes activities such as liking to teach, provide for, support, and counsel others. Occupations related to this area include speech therapist, school counselor, social worker, child care worker, family therapist, and educational psychologist.

Higher Prestige Interest Areas

9. Social Sciences

Interest in helping others solve medical and psychological problems in a personal manner. Occupations related to this area include clinical psychologist, psychiatric caseworker, pediatrician, and family physician.

10. Influence

Interest in leading and directing people in business, politics, and science through activities such as liking to influence people's behavior through persuasion. Occupations related to this area include scientific research director, research scientist, surgeon, physicist, and astronomer.

11. Business Systems:

Interest in writing and designing programs and systems and in applying this knowledge to business and finance. Occupations related to this area include business computer specialist, business programmer, system analyst, and computer consultant.

TABLE 1—*Continued*

12. Financial Analysis:
Interest in working directly with customers on their finances. Occupations related to this area include budget consultant, business management analyst, market research analyst, personal investment analyst, consumer affairs director, and stockbroker.

13. Science
Interest in studying phenomena, conducting research, and developing knowledge in biological, physical, and behavioral sciences. Occupations related to this area include biologist, anthropologist, earth scientist, geologist, and chemist.

Lower Prestige Interest Areas

14. Quality Control
Interest in checking and protecting the quality and safety of products, materials, and services. Occupations related to this area include locksmith, bridge inspector, building inspector, and high school shop teacher.

15. Manual Work:
Interest in operating machinery or vehicles and attendant services and working in occupations that have minimal training requirements. Occupations related to this area include maid, meter reader, window cleaner, ride attendant, cloakroom attendant, and bus driver.

16. Personal Service
Interest in activities offering help to people in everyday transactions and includes activities such as serving others food and drink, giving them information, helping them to buy clothes, and seeing to their comfort. Occupations related to this area include flight attendant, sightseeing guide, waiter/waitress, travel guide, and personal shopper.

17. Construction/Repair
Interest in working outdoors, working with one's hands building structures, and operating or repairing machines. Occupations related to this area include bulldozer operator, crane operator, tree pruner, construction worker, roofer, and building contractor.

18. Basic Services
Interest in selling products and services, greeting people, making reservations, renting equipment, and cleaning. Occupations related to this area include receptionist, hotel clerk, hair stylist, mail clerk, escort, and secretary.

RIASEC types, and Prediger's 2 bipolar dimensions is presented in Fig. 4. This figure demonstrates the similarity of the different representations of interests in two-dimensional space. The PGI is unique in that it can yield scale scores on all of these various representations of interests: 18 spherical scales, 8 basic interest scales, 6 RIASEC interest scales, and Prediger's 2 bipolar dimensions.

PGI DESCRIPTION

The PGI consists of two forms, based on item type, that can be used together or apart. One part consists of 108 occupational titles whereby the respondents are to rate the extent to which they like each occupation using a 7-point scale (1 = *very strongly dislike*, 7 = *very strongly like*). The other part of the PGI consists of 113 activities (108 tied to the spherical scales and 5 exploratory items) whereby the respondents respond twice, using a 7-point scale (1 = *very strongly dislike*, 7 = *very strongly like*) to rate the extent to which they like each occupation and

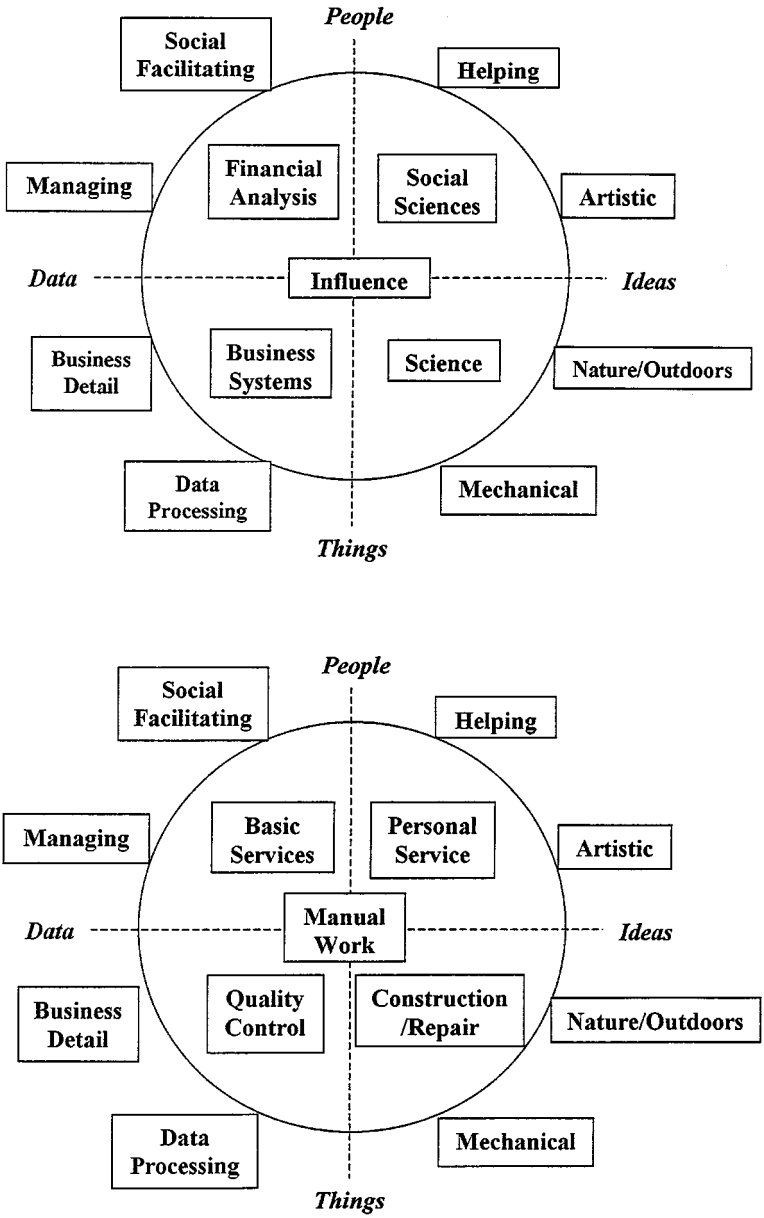

FIG. 3. Spherical structure of the 18 Personal Globe Inventory scales. Top depicts upper half (higher prestige), and bottom depicts lower half (lower prestige).

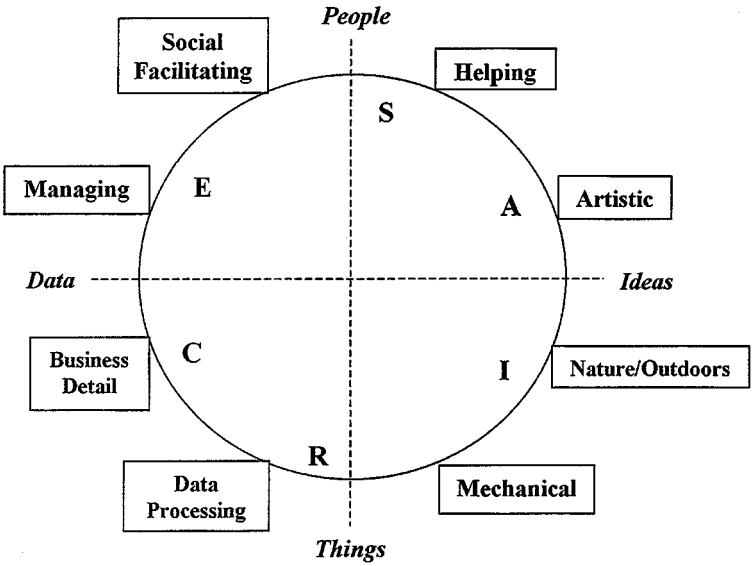

FIG. 4. Graphical representation of basic interest level of the Personal Globe Inventory. Eight types are shown in boxes. Six Holland types are shown inside the circle. Prediger's two dimensions are marked by dotted lines.

then again using a 7-point scale (1 = *unable to do*, 7 = *very competent*) to rate their perceived competence. Because the format could affect responses, two versions of the activities part were created: one where each activity was responded to twice together, first for liking and then for competence, and another where all activities were rated for liking prior to rating all of the same activities for competence. Both versions were administered (in balanced order) to a career exploration class ($N = 22$) over a 2-week span. The two versions correlated highly (and in a similar magnitude to the test reliability estimates provided later). Furthermore, respondents were much happier in completing the version that gave each activity only once and that asked them to rate both liking and competence than in completing the version where they rated each separately. As a result, the format selected for use was that in which each activity is presented and then the respondent rates liking and competence before moving on to the next item.

The two parts (occupational titles and activities) are generally administered together, but it is possible to administer either the occupational titles part or the activities part alone. Because they provide very similar scales, it might be desirable to give only one for brevity.

PGI Scales and Scoring

Scales. Six items comprise each scale for each of the item types (activity preferences, activity competence beliefs, and occupational preferences). The means of the six items are used to represent each of the 18 spherical scales of the PGI. So, 18

spherical scales are created separately for the occupational preference section, the activity preference section, and the activity competence belief section for a total of 54 spherical scales. To represent the combined scales across the three sets of 18 spherical scales, a set of 18 composite scores is calculated by taking the means of each scale across the three item types. In addition, weighted geometric composites of the 18 spherical scales are used to construct the RIASEC scales, Prediger's 4 poles (People, Things, Data, and Ideas), and 3 summary dimensional scales (People vs Things, Data vs Ideas, and Prestige). The People/Things and Data/Ideas scales are scored in such a manner that high scores are associated with the first pole listed (e.g., high scores on People/Things reflect greater interest in people than in things). In addition, 4 other scales are calculated (People, Things, Data, and Ideas), and these are only the weighted composites created before they are combined into the two-dimensional scores. So, a total of 31 composite scales are provided (18 spherical scales, 6 RIASEC scales, 3 dimensional scales, and the 4 scales that were used to create the People/Things and Data/Ideas dimensional scales). An example of the profile of scores provided by the PGI is presented in Table 2.

Each of these 31 scales is reported in five different ways. First, and perhaps the major scoring method, is the normed composite score reported in T score units relative to a sample of college and high school students described below. This composite score consists of the mean of the activity liking, activity preference, and occupational preference scales. Second, a same-gender normed score is provided for each of the 31 composite scales. Then separate normed scores are provided for, third, the activity liking scales and, fourth, the activity competence scales. Fifth, the instrument provides raw scores for each of the 31 scales. Thus, the interpreter can focus on a variety of normed, same-gender normed, and raw scores for use. All of these scores (except the raw scores) are listed in Table 2.

Validity items. Some versions of the PGI contain two types of validity checks: forced response and repeated items. The forced response is a filler item inserted midway through the instrument and requests that the respondent mark a "4" for that item. If a response other than 4 is encountered, then it is possible that the individual was not carefully attending to the items. There is also repetition of two items at the end of the instrument. If these items are not responded to in a similar manner (i.e., where the mean difference across the items is greater than 1.5 scale points), then it might be appropriate to ask questions about the respondent's mind-set.

Interest–competence difference. A few special scales are also used as part of the PGI. There is some debate about the degree to which competence and interest items are similar or different in that they correlate quite highly and have similar structure (Tracey, 1997b) but also have been found to have incremental validity above that provided by interests alone (Donnay & Borgen, 1999; Tracey & Hopkins, 2001). It is thus not always clear whether to represent interest and self-efficacy information as a sum or separately. In the PGI, both types of scales are reported separately and aggregated, but to aid in interpretation, a *liking–competence difference index* is provided. This index is the mean of the squared sum of the differences between interest scores and competence scores on all 18 spherical scales. The magnitude

TABLE 2
Personal Globe Inventory Technical Score Profile

Scale	T scores			
	Composite	Same sex (norm)	Liking	Competence
Spherical scales				
Social Facilitating	40	43	43	38
Managing	42	45	40	50
Business Detail	50	53	43	57
Data Processing	65	67	61	67
Mechanical	61	61	56	63
Nature/Outdoors	70	75	70	69
Artistic	62	64	63	58
Helping	49	52	49	76
Social Sciences	60	62	56	62
Influence	56	59	49	60
Business Systems	50	52	44	57
Quality Control	49	51	47	52
Manual Work	50	50	48	51
Personal Service	37	40	40	37
Financial Analysis	50	52	44	56
Science	63	65	60	63
Construction/Repair	53	53	49	56
Basic Service	40	42	44	40
Liking–Competence				
Basic Interest	56	57		
High Prestige	79	79		
Low Prestige	54	54		
Six types				
Realistic	61	61		
Investigative	70	75		
Artistic	62	64		
Social	46	49		
Enterprising	41	44		
Conventional	60	63		
Four types				
People	46	50		
Things	64	66		
Data	48	51		
Ideas	67	70		
Dimensional				
People/Things	34	36		
Ideas/Data	59	59		
Prestige	61	62		

of this difference is compared relative to the magnitude of the norm group so that the test interpreter can see whether a respondent reports a considerable or minimal difference in interests versus competence. This interest–competence difference score is calculated separately for (a) the general 8 type scales (those around the equator), (b) the 5 higher prestige scales, and (c) the 5 lower prestige scales.

The example profile in Table 2 contains these three interest–competence difference scores. The normed liking–competence difference score thus provides an easily grasped indication of how different the interests and competencies are on any one profile.

Graphical presentation of profile. A major innovation provided in the PGI is the use of a single aggregate vector and circular graph to describe a profile. This presentation was borrowed from the interpersonal personality area, and specifically it is the format used in the Interpersonal Adjective Scales (Wiggins, 1995). Generally, psychological instruments (interest inventories included) report scores on each scale in a serial or sequential manner. This presentation format is used even if there is an underlying structure to the scales, as is true in RIASEC scales. The RIASEC scales are arranged in a circular manner, yet scores are reported discretely and serially. The translation of the scores to the circular structure is thus made difficult for the user. Given the circular structure of the PGI model (at least as exists in two dimensions), the PGI provides circular graph blanks so that scores can be transposed into a circular format. An example of a circular graph of the PGI scales is provided in Fig. 5. Note that the relation among the scales is apparent from the graph. In addition to the circular graph, there is a vector presented. This vector is the circular mean of the scale scores and takes account of not only the elevation or magnitude of the scale scores but also the angular dispersion. It carries two properties: mean angular placement for any individual profile and its magnitude. The mean angular displacement (i.e., where it points to on the circle) provides a simple summary of one person's whole profile and his or her major area

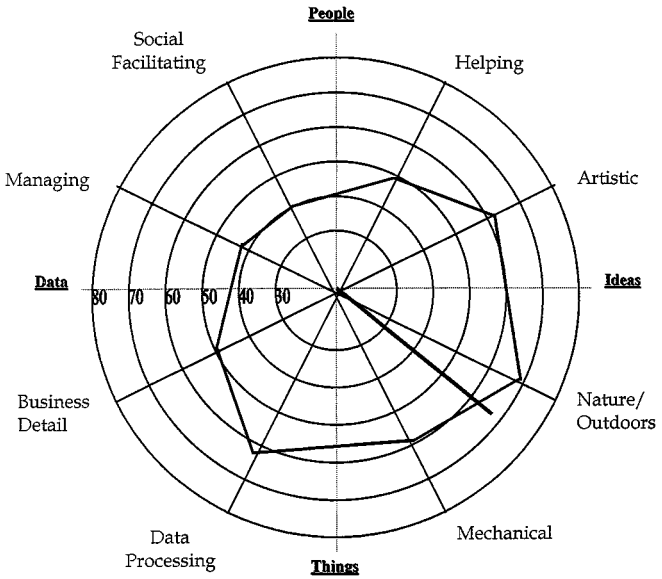

FIG. 5. Example of circular graph and vector score.

of interest. The magnitude (or length of the vector or line) indicates the strength or clarity of that area of interest. High vector lengths indicate very clearly differentiated interests where all interests are in one common direction. For example, in Fig. 5, individual scores are high on Nature/Outdoors, Artistic, Data Processing, and Mechanical and lower on Business Detail, Managing, Social Facilitating, and Helping. The vector between Nature/Outdoors and Mechanical summarizes the major direction of the person's interests, and the vector T score of 67 demonstrates that the pattern is very differentiated (all scales on the Nature/Outdoors and Mechanical side of the circle are high, and those on the other side are low). If the vector length were low, then it would indicate a relatively flat profile where no scales are higher than others, or it would indicate a profile that does not adhere to the circular structure such as where the only two high scales are opposite on the circle (e.g., Nature/Outdoors and Managing) wherein there is no overall direction to the profile. The vector thus provides a succinct graphical representation of the entire circular profile.

The circular graphs and vectors can be generated for the eight general scales; the five higher prestige scales; the five lower prestige scales; the six RIASEC scales; and the four People, Things, Data, and Ideas scales. In addition, if the liking–competence difference scale is found to be high, then graphing and vectors can be done for both the liking scores and the competence scores separately to help compare their similarities and differences. Examples of each of these are provided later.

Occupational match. The PGI also provides information on the most similar occupations to the respondent's profile. To provide a link to easily obtained occupational information, the PGI was tied to the *Occupational Outlook Handbook* (*OOH*) (U.S. Department of Labor, 1996). First, however, the *OOH* occupations had to be scored in a manner commensurate with the PGI spherical structure. Each of the occupations listed in the *OOH* was independently coded on the three PGI dimensions of People/Things, Data/Ideas, and Prestige by three experts in the area of vocational psychology. The raters used a 7-point rating scale for each dimension, and the reliability was estimated using intraclass correlation with $r = .89$, indicating good agreement. The ratings of the experts were averaged and used as the coordinates of each of the *OOH* occupations.

The scores of each PGI respondent's three-dimensional scales were used to find the occupations most similar. The 20 to 30 occupations that are closest (using Euclidean distance) to the respondent's position are reported on the profile. Perfect matches of individual coordinates with occupational coordinates yield scores of 100. As the degree of PGI–occupational match drops, so do the similarity scores. Scores in the 80 to 100 range represent very close matches, scores in the 70 to 80 range indicate moderate matches, and scores below 60 indicate lower levels of matches. An example of the information provided in the occupational similarity portion is presented in Table 3, where there are a variety of good matches provided. The examples presented in Tables 2 and 3, as well as in Fig. 5, all are generated from the same individual.

TABLE 3
Personal Globe Inventory Listing of Similar Occupations

Similarity score	Occupation
95	Dancers and choreographers
94	Actors, directors, and producers
93	Chiropractors
92	Clergy
90	Musicians
89	Respiratory therapists
89	Dieticians and nutritionists
89	Schoolteachers—kindergarten, elementary, and secondary
89	Adult education teachers
88	Rabbis
88	Roman Catholic priests
88	Protestant ministers
87	Psychologists
87	Engineering, science, and data processing managers
87	Podiatrists
86	Special education teachers
85	Physicians
85	Public relations specialists
85	Directors of religious activities and education
85	Social scientists
84	Counselors
84	Speech—language pathologists and audiologists
84	Physician assistants
84	Education administrators
83	Dentists
83	College and university faculty
82	Urban and regional planners
82	Lawyers and judges
82	Physical therapists
82	Reporters and correspondents
82	Optometrists
81	General managers and top executives
81	Economists and marketing research analysts
80	Writers and editors
80	Farm and home management advisers
80	Radio and television announcers and newscasters
80	Occupational therapists
79	Instructors and coaches, sports, and physical Training
79	Marketing, advertising, and public relations managers
79	Registered nurses

Scoring. The PGI thus provides a wealth of information and cannot easily be hand scored. It can be administered either in paper-and-pencil format or in an MS-DOS self-administering and -scoring computer program. Programs to administer and score the PGI, as well as a file for paper versions and profile forms, are

available from the author (http://courses.ed.asu.edu/tracey/index.html). There is also an MS-DOS program that will score data obtained from the paper-and-pencil format.

Attached in the appendices are copies of the paper-and-pencil versions of the PGI. The PGI activities form is provided in Appendix A, and the PGI occupations form is provided in Appendix B. These forms do not contain a background information sheet (e.g., age, grade, sex, ethnicity, occupational aspirations, parents' occupations), and this information should be obtained as part of any administration. Individuals may use these PGI paper-and-pencil forms on the condition that they supply the author with the raw data files of such administrations.

The general scoring template is provided in Appendix C. This template applies to both the PGI activities and PGI occupations forms. The scoring template is useful for research purposes where the user is interested in scale covariation, but it is less useful for individual interpretations because much of the information included in the PGI computer scoring is omitted. There are so many norms used (one set of norms for each of the 31 scales across the five scoring formats) that listing and easy computation of normed scores is precluded. Also, the information regarding occupational match is not included because this also is too lengthy. Finally, the optimal profile information is also not provided in this simple scoring template. So, the scoring template provided gives the researcher most of the information necessary for studying the scales, their structure, their differences across groups, and any relations with other variables or constructs; however, the many aspects of the PGI related to individual test interpretation are not provided because of the complexity involved. Those interested in using the PGI for intervention with individuals should use either the self-administered PC version or the paper-and-pencil version with the PGI scoring program.

Profile flexibility. An added aspect of the PGI is that it makes some recommendations regarding how the information should be portrayed to the test taker. There is an abundance of information that can quickly overwhelm the interpreter as well as the test taker. Based on the profile information, the PGI program will make recommendations about what information should be graphed and highlighted. There are three decision points that affect what material is recommended. The first relates to the presentation (and graphing) of the higher and/or lower prestige scales. If scores are low on the higher and/or lower prestige scales, then the program will recommend against presenting graphic display of these because they are not salient. The second choice point involves the vector magnitude on the eight basic scales. The vector length is an indication of profile differentiation, and if this is low, then the scoring program will suggest presenting the test taker with a simpler graphic presentation of the basic interest circle, for example, the RIASEC scales or the four scales of People, Things, Data, and Ideas. The simpler model may be easier to grasp for individuals who have flat profiles. Finally, if the liking–competence difference index is high, then the program will recommend the separate graphing of interests and competence and not using the aggregate composite score. Examples of all of these are presented in the illustrations later.

Norms

The normative sample is based on a stratified random sample of the larger sample described later in this monograph. The larger sample is a convenience sample obtained over several years. It includes high school students from two moderately sized midwestern cities and college students enrolled in a career development course at a large midwestern state university. Random samples were drawn from the larger sample to have the following characteristics: 300 college students and 200 high school students, evenly divided between males and females in each group, with the ethnic distribution in the overall sample composed of 66% European Americans, 15% African Americans, 9% Asian Americans, 9% Latino Americans, and 1% Native Americans. The sample does characterize those interested in career issues and is fairly representative in several aspects but not in geography.

PSYCHOMETRIC EXAMINATION

The specific questions examined in this study were as follows. First, is the PGI a reliable instrument? Second, does a spherical model accurately represent the PGI? Third, in examining only the equator of the PGI, does a circular structure adequately represent the PGI's eight basic interest scales and Holland's six types? Fourth, are there any gender, age, or ethnicity differences in the structure and means of the PGI scale scores? Fifth, how well do the PGI RIASEC scores relate to the RIASEC scores on the Strong Interest Inventory (SII) and on the Skills Confidence Inventory (SCI)?

Samples and Procedures

These data embody cross-validation samples and are different from those used in the instrument construction phase described above. High school and college samples were used to examine the psychometric properties of the PGI. The high school sample consisted of a total of 375 students (181 male and 194 female; 202 European American, 84 African American, 34 Asian American, 30 Latino American, 8 Native American, 6 other American, and 5 international). The mean age of the high school sample was 16.7 years ($SD = 1.1$). All high school students attended a large public high school in one of two small midwestern cities, with roughly half of the high school students enrolled in a college curriculum and the other half enrolled in a non-college curriculum. A paper version of the PGI was distributed by teachers and completed during class time. There were two validity checks in the high school version of the PGI: one item where the student was requested to fill in option 4 and another where two items were repeated later in the instrument. If students did not fill in the requested option 4, then their profiles were deleted. The early repeated items in a profile were averaged and the late repeated items were averaged, and if the absolute difference between the averaged early items and the averaged late items was greater than 1.5, then the profile was discarded. This double-validity check procedure resulted in the deletion of 41 profiles (none of which was included in the sample totals presented above).

The college student sample consisted of 1,006 students from a large state midwestern university (398 male and 602 female; 650 European American, 151 African American, 89 Asian American, 80 Latino American, 9 Native American, 14 other American, and 7 international). The participants had a mean age of 19.4 years ($SD = 0.9$), and all were enrolled in sections of a career development class offered over a span of several years. This class represented a wide range of the majors across the campus of this university. The students completed the PGI as part of the research participation requirement of the class. The PGI was distributed in class and collected at the next class meeting. In some data collection periods, the college students also completed the SII alone or the SII and the SCI together as part of the class assignments. A total of 427 college students completed the SII alone, and 404 completed both the SII and the SCI. Also, four separate classes were requested to complete the PGI twice, roughly 2 weeks apart. Of the 98 students enrolled in the classes, 95 participated in the test–retest assessment.

PGI scale scores were calculated separately for the three item types (activity preferences, activity competence beliefs, and occupational preferences) as well as for the composites (mean across each of the three item types). All scales were created by using the mean response based on the six items in each item type scale. Scores were considered missing if there were three or more missing values on any individual scale. In this sample, 29 high school and 12 college students had missing data on at least one scale. These individuals were excluded from analysis, and their numbers are not reflected in the totals listed above.

Measures

The SII (Harmon, Hansen, Borgen, & Hammer, 1994) is a 325-item scale to measure vocational interests. It provides three types of scales: general occupational theme (GOT) scales, basic interest scales, and specific occupational scales. Of concern in this study were only the GOT scales (i.e., the RIASEC scales). Extensive psychometric support has been provided (Harmon et al., 1994) with regard to reliability of the GOT scales and the construct and predictive validity of the scales. Rounds and Tracey (1993) demonstrated that the SII GOT scales were among the best with respect to being fit by the circular model.

The SCI (Betz, Borgen, & Harmon, 1996) consists of 60 activity items on which respondents indicate, on a 5-point scale, their confidence in performing (1 = *no confidence*, 5 = *completely confident*). The scales are the means of the items. The SCI yields six skills confidence scale scores corresponding to the six RIASEC types. Reliability and validity information are provided in Betz, Borgen, and Harmon (1996); Betz, Harmon, and Borgen (1996); and Harmon, Borgen, Berreth, Schnauer, and Ward (1996). Donnay and Borgen (1999) demonstrated the incremental validity of using the SCI scales in addition to the SII GOT scales in predicting occupations.

RESULTS

Reliability

Internal consistency estimates (alphas) for each of the separate scales, as well as for the composite scales, are presented in Table 4. As can be seen, the reliability estimates all are relatively high, with the vast majority higher than $r = .80$. This suggests that the item content of the scales is homogeneous. The 2-week test–retest estimates are also presented in Table 4 for the composite scores. All test–retest reliabilities were higher than $r = .77$.

Another examination of reliability involved the assessment of covariation across scale type. The PGI can generate identical scores using its three item types: activity preferences, activity competence beliefs, and occupational preferences. The examination of item type covariation was conducted at the level of the individual scales. For example, do Social Facilitating scores correlate highly across the item types? Is this true for each separate scale? To answer such questions, each of the 31 scale scores was correlated across the three item types. The activity preference scales had a mean correlation of $r = .86$ ($SD = .06$, range = .70–.96) with the similar composite scales. The activity competence belief and occupational preference scales had mean correlations of $r = .85$ ($SD = .07$, range = .71–.93) and $r = .80$ ($SD = .07$, range = .68–.92), respectively, with the similar composite scales. The similar scales using the activity stems (i.e., preferences and competence beliefs) were correlated an average of $r = .82$ ($SD = .09$, range = .61–.89). The correlations of the occupational preferences with the activity scales were mean $r = .75$ ($SD = .09$, range = .58–.84) for preferences and $r = .69$ ($SD = .11$, range = .53–.81) for competence. So, the three different items types have high covariation in scale scores.

As an added check on similarity among the three item types, the reliability of individual profiles across the three item types was assessed. Instead of correlating individual scales as above, the profile scores of each individual were correlated across item type. For example, person A's scores on all 31 activity preference scales were correlated with his or her 31 scores on the activity competence belief scales. What results is an index of overall profile agreement across the different item types at the level of the individual. The mean profile correlations of the activity preference scales with the activity competence and the occupational preference scales were $r = .87$ ($SD = .10$, range 4 = .64–.99) and $r = .83$ ($SD = .12$, range = .57–.91), respectively. The mean profile correlation between the activity competence and occupational preference scales was $r = .78$ ($SD = .10$, range = .58–.90). Clearly, the reliability of the PGI scales is strong whether examined separately by item type or collectively as a composite score.

Structural Validity

The validity of the instrument was examined according to several questions. First, in examining only the equator of the PGI, does a circular structure adequately represent the PGI's eight basic interest scales and Holland's six types? Second,

TABLE 4
Internal Consistency and Test–Retest Stability Estimates of Reliability for the Interest, Competence, Occupation, and Composite Subscales

Scale	Internal consistency[a] (alpha)				Two-week test–retest[b] (*r*)
	Interest	Competence	Occupation	Composite	Composite
Eight basic interest scales					
Social Facilitating	.69	.80	.81	.88	.83
Managing	.77	.83	.87	.91	.85
Business Detail	.74	.89	.81	.95	.82
Data Processing	.75	.85	.88	.93	.88
Mechanical	.78	.84	.81	.93	.85
Nature/Outdoors	.79	.82	.89	.92	.83
Artistic	.80	.78	.92	.94	.82
Helping	.80	.86	.86	.93	.81
Five higher prestige scales					
Social Sciences	.83	.88	.90	.94	.79
Influence	.85	.88	.89	.89	.80
Business Systems	.82	.88	.88	.91	.78
Financial Analysis	.85	.88	.90	.90	.81
Science	.86	.89	.90	.93	.83
Five lower prestige scales					
Quality Control	.87	.90	.88	.88	.81
Manual Work	.88	.88	.88	.94	.78
Personal Service	.89	.90	.91	.95	.77
Construction/Repair	.91	.90	.91	.93	.81
Basic Services	.92	.92	.89	.90	.80
Six basic interest scales					
Realistic	.85	.87	.89	.93	.84
Investigative	.81	.85	.88	.93	.85
Artistic	.86	.89	.90	.95	.83
Social	.86	.89	.92	.94	.80
Enterprising	.85	.92	.91	.95	.82
Conventional	.92	.91	.91	.95	.80
Four basic interest scales					
Things	.88	.90	.92	.95	.83
Ideas	.89	.90	.89	.94	.84
People	.88	.89	.88	.95	.85
Data	.88	.90	.90	.96	.81
Three dimensional scales					
People/Things	.94	.94	.93	.97	.88
Data/Ideas	.91	.95	.95	.96	.86
Prestige	.93	.96	.94	.97	.82

[a] $N = 1{,}381$ across both high school and college samples.
[b] $N = 95$ college students.

how well are the PGI six types of RIASEC scores related to the similar RIASEC scales of the SII and the SCI? Third, does a spherical model accurately represent the PGI data?

The fit of the eight basic interest scales (those from the equator) from the PGI to a circular model was examined using the randomization test of hypothesized order relations (Hubert & Arabie, 1987; Rounds, Tracey, & Hubert, 1992) as implemented by the computer program RANDALL (Tracey, 1997a). This test involves specifying the order predictions of the circular model (i.e., correlations between adjacent scales are greater than correlations between scales one step removed from adjacent, which in turn are greater than correlations between scales two steps removed from adjacent, which in turn are greater than correlations between scales that are opposite on the circle) and then determining how well these predictions fit the actual correlation matrix. In an eight-type circular model, there are a total of 288 different order predictions. The fit of the model to the data is compared to the fit of the model to all of the permutations of the data matrix rows and columns. The ratio of the number of permutations that have equal or better fit to the data divided by the total number of permutations provides an exact test of model data fit. In addition, a correlation of model–data fit, the correspondence index (*CI*), is provided for interpretation. The *CI* ranges from -1.0 (indicating perfect misfit with none of the order predictions met), to 0.0 (indicating that 50% of the order predictions were met), to $+1.0$ (indicating that all order predictions were met). A *CI* value of .50 would indicate that 75% of the predictions were met and that 25% were violated.

The randomization test was conducted separately on the college and high school samples and also by gender within each sample, and the results are summarized in Table 5. The fit of the eight-type circular model to the data was significant for all samples ($p = .0004$), indicating that in each examination the circular model fit the data significantly. The *CI* values were very high in the high school ($CI = .82$) and college ($CI = .93$) total samples. *CI* values were also high in each of the gender breakdowns (*CI*'s of .75 and .67 for high school females and males, respectively, and .94 and .88 for college females and males, respectively).

To examine whether there were differences in fit across age, separate randomization tests of the *difference* in fit across samples (as described in Tracey, 1994) were conducted. The difference randomization test is similar to the randomization test used above except that the superior fit of the model to one data set over the other is examined relative to the distribution obtained by the random relabeling of the data matrices. None of the p differences was significant across age (p differences were .22, .09, and .07 for the difference in model fit across age for the total, female, and male samples, respectively). A similar test was conducted within age samples but across gender to evaluate whether there were significant differences in fit attributable to gender. The p values of this gender difference test were not significant in either the high school ($p = .40$) or college ($p = .44$) sample. So, the fit of the circular model to the eight type scales was good, and there were no differences in the fit between the college and high school samples or across gender.

TABLE 5
Summary of the Results for the Randomization Test of Hypothesized Circular Order Relations across Age and Gender

Sample	All	Females	Males	Female versus male
		Eight Basic Interest Scales		
High school sample				
N	375	194	181	
Predictions made	288	288	288	
Predictions met	262	252	241	
p	.0004	.0004	.0004	.40
CI	.82	.75	.67	.03
College sample				
N	1,006	390	602	
Predictions made	288	288	288	
Predictions met	279	280	271	
p	.0004	.0004	.0004	.44
CI	.93	.94	.88	.02
High school versus college				
CI difference	–.05	–.18	–.19	
p difference	.22	.09	.07	
		Six Basic Interest Scales		
High school sample				
N	375	194	181	
Predictions made	72	72	72	
Predictions met	65	62	61	
p	.02	.02	.02	.48
CI	.80	.72	.69	.01
College Sample				
N	1,006	390	602	
Predictions made	72	72	72	
Predictions met	68	69	63	
p	.02	.02	.02	.39
CI	.89	.92	.75	.03
High school versus college				
CI difference	–.03	–.19	–.08	
p difference	.38	.07	.28	
		Spherical Model (18 scales)		
High school sample				
N	375	194	181	
Predictions made	9,472	9,472	9,472	
Predictions met	7,245	7,355	7,198	
p	.0000	.0000	.0000	.48
CI	.53	.55	.52	.01
College sample				
N	1,006	390	602	
Predictions made	9,472	9,472	9,472	
Predictions met	7,558	7,762	7,520	
p	.0000	.0000	.0000	.42
CI	.60	.64	.59	.02
High school versus college				
CI difference	–.04	–.05	–.03	
p difference	.40	.39	.45	

The fit of the six-type circular model to the PGI RIASEC scales was assessed in an identical manner. The six-type circular model yields 72 order predictions, and the fit of these predictions to the PGI RIASEC data are summarized in Table 5. Significant fit of the model to the data was found in each sample group (total high school, female high school, male high school, total college, female college, and male college all had p's $= .02$ and high CI values of .69–.92 with a mean of .80). None of the tests of differences in fit across age (total, females only, and males only) was significant, nor were the tests of differences across gender in either the high school or college sample significant. To better understand the magnitude of these CI values, the U.S. benchmark circular model fit obtained by Tracey and Rounds (1993) on 77 American samples of RIASEC data was $CI = .65$ ($SD = .20$), and the value for 31 male samples was $CI = .60$ ($SD = .19$) and for 31 female samples was $CI = .69$ ($\underline{SD} = .16$). The values obtained in this study all were above the benchmark mean U.S. values obtained in Tracey and Rounds's (1993) meta-analysis of structure. So, the PGI RIASEC scales also were well fit by the circular model and equally so across age and gender.

To evaluate the much more complete spherical model, the 18 spherical scales of the PGI were examined using the randomization test of hypothesized order relations with respect to the extent to which they could be adequately described by the proposed spherical model presented in Fig. 3. The number of predictions yielded by the spherical model was 9,472. The results of the application of the spherical model predictions to the samples are also summarized in Table 5. The spherical model was found to fit significantly in each of the samples ($p < .00001$). The CI values ranged from .52 to .60 and were similar in magnitude to those obtained by Tracey and Rounds (1995) and Tracey (1997b). The test of difference in fit across age yielded no significant differences (p's of .40, .39, and .45 for the total, female, and male comparisons, respectively). There were also no differences in fit between the genders in the high school ($p = .48$) and college ($p = .42$) samples. The sphere fit the PGI data significantly and equally across age and gender.

The above analyses were also conducted on scale scores provided by each of the item types. So, the 8-scale model, the 6-scale RIASEC model, and the 18-scale spherical model all were examined for the activity preferences alone, the activity competence beliefs alone, and the occupational preferences alone. The results are virtually identical to those above, and for economy of space they are not presented in tabular form. All statistical evaluations came out similarly, and the CI values were generally similar $\pm .10$ relative to the numbers presented in Table 5. There was a trend for the two activity scales to generally have higher CI values than those found in the occupational scales as manifested in greater values in each examination and significant differences in roughly half of the cases. So, the separate item type scales were fit by the circular and spherical models as well as by the composite scales, and among the three types of scales, the activity scales appeared to be better fit than the occupational scales.

So, with respect to structural validity, the PGI demonstrated that it could be well described using the circular representation for the 8 and 6 equator scales and for the 18 spherical scales. There were no structural differences found across age or gender in any of the examinations, supporting the representation of the scales and their use with high school and college students of both genders.

This support for the structural representation of the PGI might not apply to members of underrepresented groups. The structure could apply only to those in the majority, which would call into question its use with other groups. Rounds and Tracey (1996), in a meta-analysis of RIASEC measures, demonstrated that the circular model fit non-U.S. and U.S. ethnic minority samples less well than it fit predominantly majority U.S. samples. To examine whether there are structural differences across ethnicity, randomization tests identical to those conducted above were done except that subsamples of the different ethnic groups were used. These ethnic-specific evaluations of structure are presented in Table 6. For the high school sample, only the total European American and African American samples were examined because the sample sizes were too small in the Asian American and Latino American samples to yield reliable correlation matrices. All groups were examined in the college sample except Native Americans, whose numbers were too small.

For the eight type scales, all tests were significant. Each group was fit significantly by the circular structure of the eight scales (all p's $= .0004$), and the *CI* values all were fairly high (range $= .80$–$.95$). A test of the difference between the most different *CI* values (Latino American college students with a *CI* of .80 and European American college students with a *CI* of .95) was not significant ($p = .07$). So, the eight type circle fit the data, and there were not any apparent differences in fit across ethnicity.

The six-type examination yielded similar results. The circle fit the RIASEC data significantly (all p's $= .02$), and *CI* values ranged from .61 to .89. The difference in fit was assessed between the samples that had the most extremely different levels of model–data fit, specifically the college European Americans ($CI = .86$) and the college Latino Americans ($CI = .61$). The circular model was found to fit these two samples to a significantly different level ($p = .05$). However, this difference could be due to the relatively small Latino college sample ($n = 80$). The difference between the Latino and European American samples disappeared when the larger, combined high school and college samples were examined (*CI*'s of .83 and .67, respectively, $p = .14$). So, there appears to be support for the presence of the circular structure for the RIASEC scales across ethnicity.

Rounds and Tracey (1996) provided some benchmark *CI* values garnered from 20 different U.S. ethnic samples that aid in interpretation of these results. They found that the mean *CI* value on RIASEC measures for U.S. ethnic populations was .54 ($SD = .22$). The *CI* values for all of the RIASEC examinations with ethnic populations in this study were above this mean value and had z scores (relative to the distribution provided by Rounds & Tracey) ranging from .32 for the Latino American college student sample to .82 for the Asian American combined sample.

TABLE 6
Summary of the Results for the Randomization Test of Hypothesized Circular Order Relations across Ethnicity

Sample	All	European American	African American	Asian American	Latino American
			Eight Basic Interest Scales		
High school sample					
N	375	202	84		
Predictions made	288	288	288		
Predictions met	262	265	257		
p	.0004	.0004	.0004		
CI	.82	.84	.78		
College sample					
N	1,006	650	151	89	80
Predictions Made	288	288	288	288	288
Predictions Met	279	281	275	264	259
p	.0004	.0004	.0004	.0004	.0004
CI	.93	.95	.91	.83	.80
Combined high school and college sample					
N	1,381	852	235	123	110
Predictions Made	288	288	288	288	288
Predictions Met	275	275	269	268	260
p	.0004	.0004	.0004	.0004	.0004
CI	.91	.91	.87	.86	.81
			Six Basic Interest Scales		
High school sample					
N	375	202	84		
Predictions made	72	72	72		
Predictions met	65	64	60		
p	.02	.02	.02		
CI	.80	.78	.67		
College sample					
N	1,006	650	151	89	80
Predictions made	72	72	72	72	72
Predictions met	68	67	59	60	58
p	.02	.02	.02	.02	.02
CI	.89	.86	.64	.67	.61
Combined high school and college sample					
N	1,381	852	235	123	110
Predictions made	72	72	72	72	72
Predictions met	67	66	61	62	60
p	.02	.02	.02	.02	.02
CI	.86	.83	.70	.72	.67
			Spherical Model (18 Scales)		
High school sample					
N	375	202	84		
Predictions made	9,472	9,472	9,472		
Predictions met	7,245	7,284	7,146		
p	.0000	.0000	.0000		
CI	.53	.55	.51		

TABLE 6—*Continued*

Sample	All	European American	African American	Asian American	Latino American
College sample					
N	1,006	650	151	89	80
Predictions made	9,472	9,472	9,472	9,472	9,472
Predictions met	7,558	7,589	7,504	7,452	7,298
p	.0000	.0000	.0000	.0000	.0000
CI	.60	.60	.58	.57	.54
Combined high school and college sample					
N	1,381	852	235	123	110
Predictions Made	9,472	9,472	9,472	9,472	9,472
Predictions Met	7,597	7,522	7,258	7,356	7,235
p	.0000	.0000	.0000	.0000	.0000
CI	.60	.59	.53	.55	.53

The mean *z* value was .59. The values obtained here are equal to or larger than those found in the literature.

Finally, the fit of the sphere to the 18 PGI scales was evaluated by ethnicity. Each sample was significantly fit by the spherical model (all p's $< .00001$), and the *CI* values vary minimally (range = .51–.60). The results of the structural tests by ethnicity provide support for the structural validity of the PGI when applied to the three major U.S. ethnic groups of African American, Asian American, and Latino American students.

As was the case with the general examination of model–data fit, the same analyses across ethnicity were performed on the scales of each of the item types (activity preferences, activity competence beliefs, and occupational preferences). The results are highly similar to those listed in Table 6 and so are not included here. In each case, similar inferential conclusions were made, and again there was a slightly better fit of the model to the activity scales (either preferences or competence beliefs) than to the occupational preference scales. However, overall, each scale type mirrored the results above.

Generalizability of Means

Given that the structure of the PGI's various scales adhered to the proposed models and that this adherence was generally consistent across subgroups of gender, age, and ethnicity, the conclusion that scales have similar meaning across groups and examination of mean differences makes conceptual sense. The mean differences across gender, age (high school sample vs college sample), and ethnicity were examined in separate sets of scale scores: the 18 spherical scales and the 6 RIASEC scales combined with the 3 dimensional scales. The 4 scales of People, things, Data, and Ideas are linear composites of other scales and thus could not be analyzed in a multivariate analysis of variance (MANOVA) with these other scales. Given their high similarity to the 2 dimensional scales of People/Things and Data/Ideas, these 4 scales were not examined here.

The mean differences on the 18 spherical composite scales (i.e., 8 basic interest scales, 5 higher prestige scales, and 5 lower prestige scales) across gender, ethnicity (European American, African American, Asian American, or Latino American), and sample (high school vs college) were examined using a three-way MANOVA. All main effects were significant, gender $F(18, 1292) = 6.54$, $p < .05$, ethnicity $F(54, 3882) = 4.57$, $p < .05$, sample $F(18, 1292) = 7.03$, $p < .05$, but none of the interactions was significant, Gender $\times$ Ethnicity $F(54, 3882) = 0.83$, $p > .05$, Gender $\times$ Sample $F(18, 1292) = 1.35$, $p > .05$, Ethnicity $\times$ Sample $F(54, 3882) = 1.19$, $p > .05$, Gender $\times$ Ethnicity $\times$ Sample $F(54, 3882) = 0.34$, $p > .05$. The results of the post hoc univariate analyses on the significant main effects of gender, ethnicity, and sample are summarized in Table 7 along with the group differences in means. Significant ethnicity effects were followed up using Scheffé t tests.

With respect to gender differences, males scored higher on Business Detail, Data Processing, Mechanical, and Nature/Outdoors, whereas females scored higher on Social Facilitating, Artistic, and Helping. There were no differences on Managing across gender. For the high prestige scales, females scored higher on Social Sciences, whereas males scored higher on three of the remaining four scales (Influence, Financial Analysis, and Science). There were no gender differences on Business Systems. For the low prestige scales, females had higher scores on Quality Control and Personal Service, whereas men had higher scores on Manual Work, Construction/Repair, and Basic Services.

The sample differences on the 18 spherical scales had the college sample higher on the higher prestige scales and the high school sample higher on the lower prestige scales. These differences reflect what would be expected in examining the occupational aspirations of these two samples. For the 8 basic scales, the college students were found to have higher means on Social Facilitating, Managing, Business Detail, and Helping. There were no sample differences on the remaining 4 scales.

With regard to ethnicity, there were differences on all eight basic interest scales except Business Detail and Mechanical. African Americans had higher scores on Social Facilitating than did the other groups, and Latino and European Americans scored higher than Asian Americans. African and Latino Americans scored higher than European and Asian Americans on Artistic. African, European, and Latino Americans all scored higher than Asian Americans on Helping. European Americans scored highest on Managing, followed by African and Latino Americans, who scored significantly higher than Asian Americans. Asian Americans scored higher than the other groups on Data Processing, followed by European Americans, who scored significantly higher that African and Latino Americans.

Regarding the higher prestige scales, there were no differences found across ethnicity on Influence and Business Systems. There were differences on the other three scales. On Social Sciences, European and African Americans scored significantly higher than Latino Americans, who in turn scored higher than Asian Americans. On Financial Analysis, European and Asian Americans scored significantly higher than Latino and African Americans. Finally, Asian Americans scored significantly

higher than the other groups on Science, followed by European Americans, who scored significantly higher than Latino and African Americans.

The lower prestige scales had only two of the five scales with significant differences across ethnicity. Asian and Latino Americans scored significantly higher than European and African Americans on Personal Service. All of the other groups scored significantly higher than Asian Americans on Construction/Repair.

The Gender × Ethnicity × Sample MANOVA on the RIASEC and dimensional scales also had significant main effects for gender, $F(9, 1301) = 5.59$, $p < .05$, for ethnicity, $F(27, 3909) = 4.38$, $p < .05$, and for sample, $F(9, 1301) = 4.24$, $p < .05$, but none of the interaction terms was significant, Gender × Ethnicity $F(27, 3909) = 1.14$, $p > .05$, Gender × Sample $F(9, 1301) = 1.89$, $p > .05$, Ethnicity × Sample $F(27, 3909) = 0.59$, $p > .05$, Gender × Ethnicity × Sample $F(27, 3909) = 0.22$, $p > .05$. The summary of the post hoc univariate analyses is also reported in Table 7.

With regard to the gender differences, males scored higher than females on the Realistic and Investigative scales and scored lower on the Social, Enterprising, and Conventional scales. Such a pattern in gender differences is fairly common in RIASEC measures (Hansen, 1978). The dimensional scores showed differences on two of the three scales. Females scored higher than males on People/Things (with higher scores indicating endorsement of people over things). Males scored higher than females on prestige. There were no differences on the Data/Ideas dimensional scale across gender.

College students were found to have higher Social and Enterprising scale scores than were high school students, but otherwise there were no significant sample differences on the RIASEC scales. For the three dimensional scales, college students scored higher on People/Things and Prestige, whereas high school students scored higher on Data/Ideas (with higher scores indicating a preference for data over ideas).

For the six RIASEC scales, there were significant ethnicity differences on four of the scales across ethnic groups. There were no differences across ethnicity on the Enterprising and Conventional scales. On the Realistic scale, Latino and European Americans scored significantly higher than Asian and African Americans. On the Investigative scale, Asian Americans scored significantly higher than European Americans, who in turn scored significantly higher than Latino and African Americans. On the Artistic scale, African and Latino Americans scored significantly higher than European and Asian Americans. Finally, on the Social scale, African and Latino Americans scored higher than European Americans, who in turn scored higher than Asian Americans.

The dimensional scores yielded differences on People/Things and Prestige but not on Data/Ideas. On People/Things, African Americans scored higher than Latino Americans, who in turn scored higher than European Americans, who in turn scored higher than Asian Americans. On Prestige, European and Asian Americans scored higher than Latino and African Americans.

So, there were mean differences across most of the PGI scales, and generally these differences match previous research or naive expectations regarding gender

TABLE 7
Summary of post hoc Analyses of Variance Results for the Personal Globe Inventors Scales across Gender, Ethnicity, and Sample

Scale	Gender[a]		Sample[a]		Ethnicity[b]	
	F	Significantly different groups[c]	*F*	Significantly different groups[c]	*F*	Significantly different groups[c]
			Eight Basic Interest Scales			
Social Facilitating	7.88**	F > M	19.49**	COL > HS	9.33**	Afr > Lat, Eur > As
Managing	1.14		15.20**	COL > HS	4.34**	Eur > Afr, Lat > As
Business Detail	4.32*	M > F	7.66**	COL > HS	1.99	
Data Processing	26.26*	M > F	1.30		16.64**	As > Eur > Afr, Lat
Mechanical	36.04**	M > F	2.52		2.20	
Nature/Outdoors	11.15**	M > F	1.02		11.11**	Eur, Afr, Lat > As
Artistic	4.04*	F > M	3.44		6.31**	Afr, Lat > Eur, As
Helping	11.14**	F > M	18.55**	COL > HS	16.36**	Afr, Eur, Lat > As
			Five Higher Prestige Scales			
Social Sciences	9.38**	F > M	15.22*	COL > HS	4.29**	Eur, Afr > Lat > As
Influence	4.31*	M > F	24.89*	COL > HS	2.30	
Business Systems	3.05		10.31*	COL > HS	2.15	
Financial Analysis	18.79**	M > F	16.17*	COL > HS	5.29**	Eur, As > Lat, Afr
Science	14.09**	M > F	19.39*	COL > HS	13.10**	As > Eur > Lat, Afr
			Five Lower Prestige Scales			
Quality Control	6.99**	F > M	11.30**	HS > COL	2.26	
Manual Work	9.52**	M > F	14.29**	HS > COL	2.30	
Personal Service	6.96**	F > M	8.32**	HS > COL	6.29*	As, Lat > Eur, Afr
Construction Repair	22.04**	M > F	5.22*	HS > COL	5.30*	Eur, Afr, Lat > As
Basic Service	5.00*	M > F	12.18**	HS > COL	2.06	

			Six Basic Interest Scales			
Realistic	25.19**	M > F	0.96		5.35**	Lat, Eur > As, Afr
Investigative	9.22**	M > F	1.03		12.32**	As > Eur > Lat, Afr
Artistic	2.13		1.05		3.00*	Afr, Lat > Eur, As
Social	21.39**	F > M	13.98*	COL > HS	6.95**	Afr, Lat > Eur > As
Enterprising	11.11**	F > M	19.09*	COL > HS	1.09	
Conventional	20.15**	F > M	2.49		2.29	
			Three Dimensional Scores			
People/Things	32.65**	F > M	11.31**	COL > HS	22.26**	Afr > Lat > Eur > As
Data/Ideas	1.09		5.34*	HS > COL	0.55	
Prestige	9.18**	M > F	14.55**	COL > HS	6.11**	Eur, As > Lat, Afr

Note. COL, college student sample; HS, high school sample; F, females; M, males; Eur, European American; Afr, African American; As, Asian American; Lat, Latino American.

[a] $df = 1, 1309$.

[b] $df = 3, 1309$.

[c] Scores are presented in order of highest means to lowest means. The greater than symbol (>) indicates which groups are significantly different from which other groups.

* $p < .05$.

** $p < .01$.

and sample differences. Females scored higher on scales focusing on people, whereas males scored higher on scales focusing more on things and prestige. College students scored higher on more people-oriented scales and higher prestige scales, whereas high school students scored higher on lower prestige scales and data over ideas. There were several differences in means across the various ethnic groups. However, there were no interactions among gender, ethnicity, or sample in any of the mean examinations.

Content Validity

To examine content validity, the PGI RIASEC scales were correlated with the similar RIASEC interest scales from the SII and the SCI. These correlations are presented in Table 8. As can be seen, the correlations all were fairly high. Some

TABLE 8
Correlations of SII and SCI Scale Scores with PGI RIASEC Scores for the College Sample

Scale	SII	SCI
N	831	404
PGI Interest		
Realistic	.77	.58
Investigative	.69	.53
Artistic	.75	.55
Social	.68	.53
Enterprising	.65	.49
Conventional	.65	.56
PGI Competence		
Realistic	.52	.77
Investigative	.55	.76
Artistic	.59	.86
Social	.49	.79
Enterprising	.45	.75
Conventional	.48	.80
PGI Occupation		
Realistic	.59	.65
Investigative	.61	.64
Artistic	.60	.75
Social	.58	.70
Enterprising	.57	.59
Conventional	.53	.58
PGI Composite		
Realistic	.73	.73
Investigative	.72	.66
Artistic	.77	.75
Social	.69	.63
Enterprising	.69	.67
Conventional	.63	.71

Note. SII, Strong Interest Inventory; SCI, Skills Confidence Inventory; PGI, Personal Globe Inventory.

of the largest correlations were between the PGI interest scales and the SII scales (mean $r = .70$) and between the SCI and the PGI competence scales (mean $r = .79$). The PGI interest scales correlated highly with the SII scores and also correlated highly, albeit not as highly, with the SCI scores. A similar but reversed pattern was found for the PGI competence scales and the SCI scales, with the highest relations between the SCI scales and the PGI competence scales, but still all were high. These results are not surprising given that the SII measures interests and the SCI measures competence beliefs. The existence of these high correlations among the interest scales and among the competence scales supports the validity of their measuring some separate content. The PGI composite scores correlated well with both the SII scales (mean $r = .71$) and the SCI scales (mean $r = .68$). So, at least with respect to the RIASEC scores, the PGI scores corresponded well with those of the SII and the SCI.

Summary and Discussion of Psychometric Examination

The reliability estimates of the PGI scales all are very strong. Internal reliability estimates of the composite scores, as well as those generated on the separate item types (activity preferences, competence beliefs, and occupational preferences), all are excellent. The test–retest estimate demonstrates good stability over a 2- to 3-week period. Certainly, more work on longer term stability is needed. However, these results mirror or are better than those of prominent instruments that do have more established stability.

The results demonstrated strong support for the structural validity of the PGI in any of its scoring methods. In the examination of the basic interest scales (the equator of the sphere) using either the eight types or the six types, a very good fit was found with respect to the fit of the circular model to the data. Indeed, the fit for the eight-type model was found to be excellent, and the fit for the six-type model was found to be very good, exceeding levels found for other RIASEC measures. The excellent fit of the circumplex model to eight basic interest scales was also demonstrated by Gurtman and Pincus (in press) using structural equation techniques. Furthermore, the spherical model was found to fit the data well, supporting its use. There were no differences in fit of the various models (circular or spherical) across either gender or sample, attesting to the similarity of meaning ascribed to the scales between males and females and between high school students and college students.

Furthermore, the support for the equivalence of structure across different ethnic groups was good. The one difference that did exist vanished when a larger sample size was examined. So, unlike the conclusions of Rounds and Tracey (1996), who found that the structural validity of the circular model of RIASEC measures was not as good for ethnic U.S. samples, the results of this study do support the structure of these PGI scales with ethnic Americans.

Rounds and Tracey (1996) also found that the circular model did not fit non-American samples well either. Although there was no examination of the structural validity of the PGI with non-American cultures, Tracey et al. (1997) found strong

support for the circular and spherical models in a Japanese sample using an earlier version of the occupational preference scales (the IOP). Certainly, more research is needed on the cross-cultural invariance of the instrument; however, initial evidence supports the conclusion that the PGI is well described by the six-type circular RIASEC structure, the eight-type basic interest circular structure, and the spherical structure across a wide variety of samples.

Given the support for the structural invariance of the PGI across groups, the mean scores of the groups were examined (because it makes little conceptual sense to examine mean differences if the meaning ascribed to the scales varies across groups). In general, the results support those results obtained in research with other instruments on the presence of gender, sample (high school vs college), and ethnic differences. As noted, people-oriented scales are higher for females, and things-oriented scales are higher for males. Similar findings have been found in other scales (e.g., Betz, Borgen, & Harmon, 1996; Hansen, 1978; Harmon et al., 1994; Tracey & Hopkins, in press). The sample differences appear largely to reflect the composition of the two groups. College students generally have higher aspirations than do high school students, if only because college students have decided to go on with their educations. High school samples contain many students who will not continue on with their educations. So, the fact that college students obtained higher scores on the higher prestige scales and lower scores on the lower prestige scales supports the validity of the prestige dimension.

There were many mean differences in PGI scores across different ethnic groups. This result also mirrors similar differences found using other scales (e.g., Carter & Swanson, 1990; Sue & Kirk, 1972, 1973; Tracey & Hopkins, 2001; Yura, 1986). The implication of such mean differences is unclear. They could reflect differences in the environments of different ethnic groups. Some examples of this view are represented by the literature on barriers to career exploration and decision making (McWhirter, 1997; Swanson & Tokar, 1991a,b) and on the lack of role models (Gade, Fuqua, & Hurlburt, 1984; Martin, 1995). Another view is that such mean differences should not exist and that their presence signals a biased instrument (e.g., Carter & Swanson, 1990). Clearly, the presence of structural differences indicates that instruments are being interpreted differently and that, consequently, scores cannot be compared. But if no structural differences exist, as is true here for the PGI, then different groups are interpreting the items in a similar manner and just scoring at different levels. Do these mean differences reflect underlying differences in the environment, culture, or test bias? Such issues are important and require further exploration.

Test publishers rarely include information on mean differences across ethnicity. The presentation of mean differences across ethnicity, where they exist, is needed because it provides a context to help interpret scores of individuals from different ethnic groups. Given that separate norms are not constructed by ethnic group, it is important that mean differences be highlighted so that appropriate interpretations can be made. One of the few manuals that does examine mean differences across ethnic groups is the SII (Harmon et al., 1994). Although Harmon et al. (1994, p. 267) did not conduct any statistical evaluations of differences across ethnicity

(if they had done so, then they probably would have found significant differences), they did examine the relative magnitude of the differences and concluded that there were no substantial mean differences across ethnicity in the SII GOT scales. The effect sizes of the differences found in the current study are very similar to the effect sizes found in Harmon et al. (1994). The mean differences obtained using the PGI mirror those found in other instruments.

The PGI RIASEC scales were found to correlate highly with the RIASEC scales in both the SII and the SCI. Both of these instruments are among the more respected ones, and such evidence of content similarity supports the construct validity of the PGI.

Overall, very similar results were obtained relative to reliability, structural properties, and content validity across the three different item types. The various analyses of the separate scales agreed highly with the analyses conducted on the composite scales. Such results indicate that it is plausible to consider reducing the item pool in some cases without loss of information or accuracy by deleting one or more of the item types. Although the three item types looked very similar in their results, there was a slight superiority for the two activity scales over the occupational preference scales. This difference between activity and occupation item types could be related to the greater familiarity of the respondents with the activities and therefore greater accuracy of rating. Occupational titles involve a great many implied activities. It is not always clear how respondents rate so many activities simultaneously, and respondents often are not familiar with the activities involved in many occupations. With regard to the PGI scales, the omission of the occupational items may save test takers time and not have any deleterious effects. The general similarity, and perhaps superiority, of the activity scales relative to the occupational scales, especially with respect to the occupational scales, runs counter to the expectations of some researchers (e.g., Prediger, 1996) who thought that prestige would manifest itself only in occupational preference items and not in activity items. The current results, and those of Tracey (1997b), refute this claim.

Although these results support the construct validity of the PGI, several cautions must be noted. First, although the sample is diverse and representative in many aspects (e.g., gender, schooling level, major, socioeconomic status, ethnicity), it is restricted with respect to geography (all students are midwesterners in one specific area). A more nationally representative sample is needed to better evaluate the instrument. Furthermore, the norm group is comprised of high school and college students who express some career concerns. It could be argued that such a norm group is inappropriate for individuals who do not have career concerns. However, such a norm group could also be argued to be the most appropriate for use with individuals who are manifesting interest concerns, specifically those for whom career inventories are used and designed. Thus, the PGI scale norms provided in this study are similar to the population of individuals most likely to use interest inventories.

However, the greater specification of the interest scales (eight types vs six types and inclusion of high- and low-prestige scales) could also make the PGI appropriate for use with older individuals, those currently employed, or those newly

unemployed who may be seeking new careers or positions. The incorporation of norms for these populations would increase the applicability of the PGI.

Another concern is that there is no support provided for the predictive validity of the PGI. It could be argued that because it relates well with the SII and the SCI, extrapolations using predictive validity for those instruments could be made. However, the PGI provides many more scales, and relevant questions should focus not only on establishing the predictive validity of the PGI scales but also on establishing the relative predictive validity if the sphere is used versus the eight basic interest scales versus the six RIASEC scales. Given the greater specification of the added scales, focus should be placed on evaluating the relative merits of the different models of representing the data. Given the support for the instrument, several inventory profiles are presented below to facilitate interpretation and to provide an example of how the instrument can be used and how it is unique.

SAMPLE INTERPRETATIONS

Five examples illustrate the variety of ways in which the PGI can be used. Clearly, more in-depth interpretations can and should be provided to clients, yet the brief descriptions provided here indicate the flexibility of the instrument.

Example 1: Female, Age 21 Years

The eight scale scores (Fig. 6) show that the respondent is oriented toward people, with Helping and Social Facilitating being her highest scores (both T scores around 60). Her Artistic T score is slightly lower at 55. Her Managing T score is 50. The other scales all are quite low. This pattern clearly shows a preference for activities involving other people. The vector also demonstrates this pattern, pointing

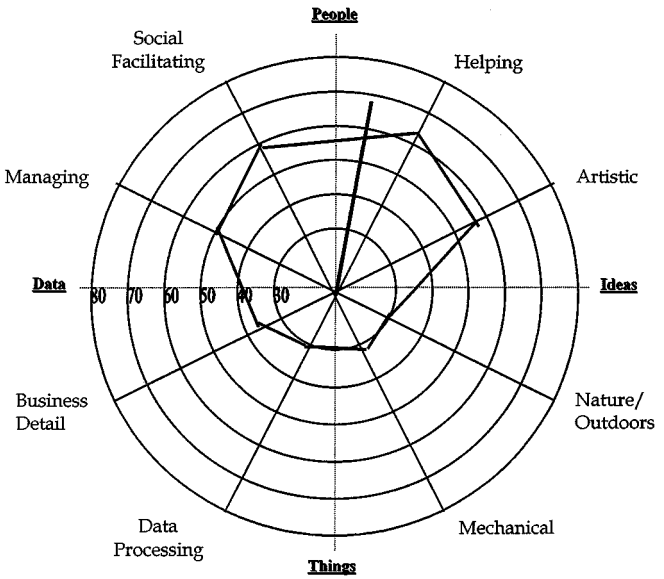

FIG. 6. Circular graph and vector score for example 1 eight basic interest types.

toward the People side and only slightly toward the Ideas side. This profile is fairly straightforward, and the information provided is similar to that provided by most instruments that report Holland's RIASEC scales (except here there are eight scales instead of six). This woman does not show any preference for either high or low prestige, as demonstrated in her scores listed in Table 9 (so it is not

TABLE 9
Personal Globe Inventory Technical Score Profile for Example 1

Scale	T scores			
	Composite	Same sex (norm)	Liking	Competence
Spherical scales				
Social Facilitating	58	50	57	56
Managing	49	52	50	46
Business Detail	37	41	36	38
Data Processing	34	43	34	37
Mechanical	34	39	37	30
Nature/Outdoors	30	35	30	31
Artistic	55	51	58	54
Helping	63	54	62	66
Social Sciences	56	47	61	51
Influence	51	55	54	50
Business Systems	37	39	31	45
Quality Control	38	42	30	46
Manual Work	35	36	35	35
Personal Service	51	47	50	53
Financial Analysis	41	46	40	42
Science	40	49	40	40
Construction/Repair	30	37	29	32
Basic Service	30	25	25	35
Liking–Competence				
Basic Interest	49	50		
High Prestige	51	50		
Low Prestige	48	49		
Six types				
Realistic	34	44		
Investigative	30	42		
Artistic	55	51		
Social	60	52		
Enterprising	50	54		
Conventional	35	42		
Four types				
People	60	52		
Things	34	44		
Data	41	45		
Ideas	45	52		
Dimensional				
People/Things	67	65		
Ideas/Data	48	49		
Prestige	52	53		

TABLE 10
Personal Globe Inventory Listing of Similar Occupations for Example 1

Similarity score	Occupation
88	Social and recreation workers
85	Human services work
85	Recreation workers
84	Social workers
84	Clergy
83	Teachers, librarians, and counselors
82	Adult education teachers
81	Counselors
80	School teachers
77	Special education teachers
75	Psychologists
74	Urbana and regional planners
73	Registered nurses
72	Respiratory therapists
72	Dental hygienists'
71	Dispensing opticians
70	Electroneurodiagnostic technologists
70	Emergency medical technicians
68	Licensed practitioner nurses
67	Medical record technicians
65	Occupational therapists
65	Physical therapists
64	Physician assistants
62	Recreational therapists
62	Speech—Language pathologists and audiologists
61	Personnel, training, and labor relations specialists
60	Managers
58	Social scientists
57	Economists and marketing research analysis
57	Dentists
56	Optometrists
54	Physicians
53	Pharmacists
52	Librarians

represented), nor were there any major differences between her liking responses and her competence responses (so neither is represented). The list of similar occupations is presented in Table 10. There are several that are fairly similar to the individual's interests, with each involving very social and helping aspects (e.g., social worker, human services work).

Example 2: Male Age 21 Years

This profile is more complex than that in example 1 because there were several added pieces of information deemed relevant for this test taker. First, the interest circle (Fig. 7) and the listing of scores (Table 11) show a clear preference for

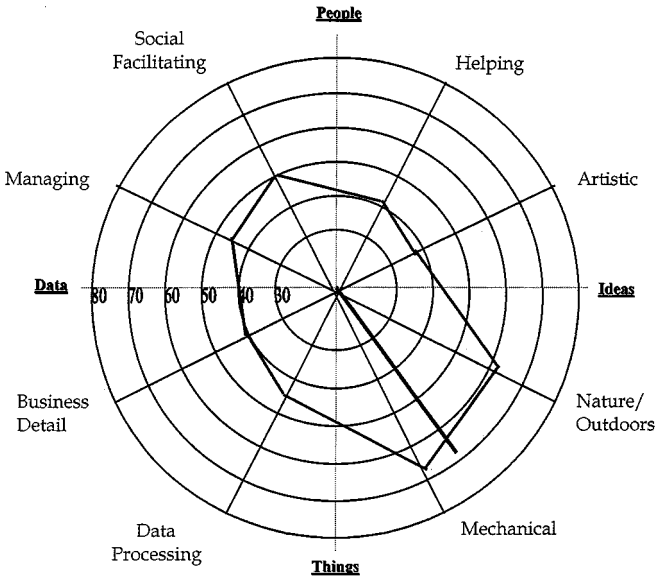

FIG. 7. Circular graph and vector score for example 2 eight basic interest types.

Nature/Outdoors and Mechanical activities. These are the only two scales with T scores greater than 50. The vector clearly indicates the direction of these interests and their strength (a fairly even balance between working with Things and Ideas, very much in line with many physical science and engineering occupations) (Table 12).

The respondent scored high on Prestige (66), and thus the five high-prestige scale scores are depicted in Fig. 8. This individual is very interested in Science and Influence (high prestige). This presents a picture of a fairly ambitious individual with Science interests. The high-prestige interests involving finances (Business Systems and Financial Analysis) were clearly rejected. Using the Prestige scales results in a more clearly defined picture of the interests for this individual.

This individual also had a large discrepancy between his liking responses and his competence responses, indicating that he sees the two as fairly different (Table 11). The difference between liking and competence was manifest for him in the high-prestige scales. Figure 9 is a graphical depiction of the liking and competence scores of the high-prestige scales. The main difference is in his assessment of his desire for influence and his lack of perceived competence. This discrepancy needs to be discussed with this individual because it could cause considerable disappointment in his future in that he might rule our interesting positions for which he could develop his influencing skills. Obvious interventions could be directed at helping him to increase his sense of competence or helping him to reevaluate his interest in influencing occupations. The information presented to this individual is much more complex than it was for the individual in example 1 because his responses included important variance that needed to be represented.

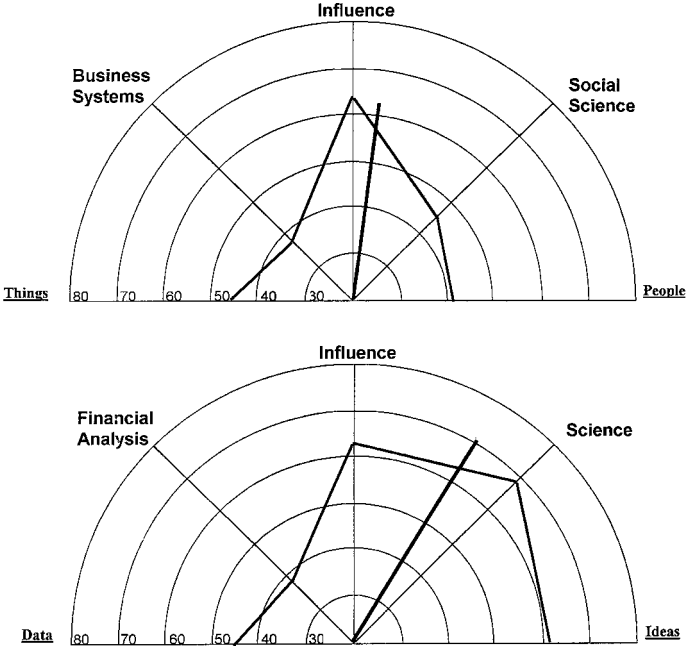

FIG. 8. Graphs and vectors for higher prestige scales for example 2.

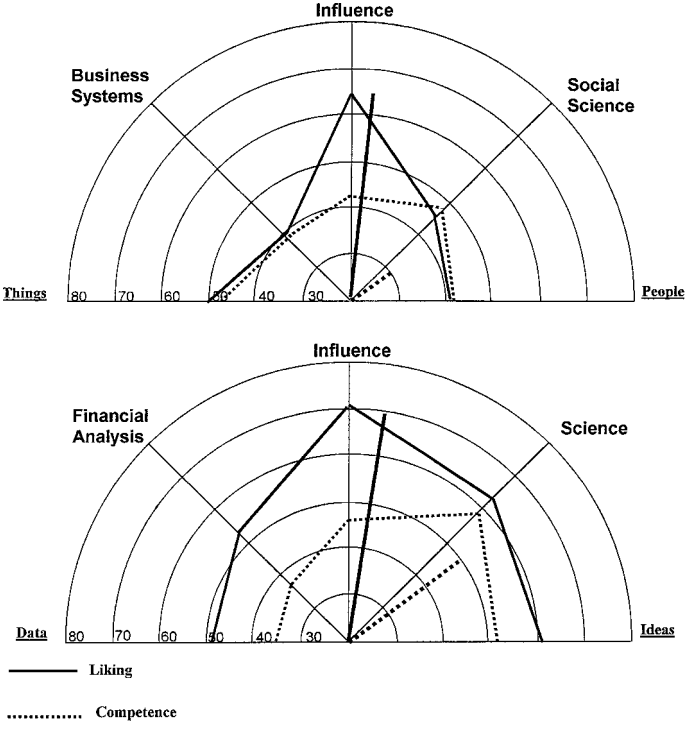

FIG. 9. Graphs and vectors for higher prestige scales for example 2 using liking and competence separately.

TABLE 11
Personal Globe Inventory Technical Score Profile for Example 2

Scale	T score			
	Composite	Same sex (norm)	Liking	Competence
Spherical scales				
Social Facilitating	40	45	40	40
Managing	44	45	42	47
Business Detail	42	40	40	45
Data Processing	47	45	40	52
Mechanical	70	60	72	68
Nature/Outdoors	63	56	69	59
Artistic	37	40	40	35
Helping	43	50	45	40
Social Sciences	53	57	54	56
Influence	65	60	72	43
Business Systems	48	45	48	45
Quality Control	35	33	33	37
Manual Work	28	28	25	30
Personal Service	31	35	29	33
Financial Analysis	38	32	35	40
Science	68	60	72	67
Consruction/Repair	40	35	40	41
Basic Service	30	35	30	31
Liking–Competence				
Basic Interest	60	59		
High Prestige	66	66		
Low Prestige	44	43		
Six types				
Realistic	60	57		
Investigative	63	60		
Artistic	37	45		
Social	42	49		
Enterprising	44	44		
Conventional	45	44		
Four types				
People	42	46		
Things	46	40		
Data	44	40		
Ideas	62	60		
Dimensional				
People/Things	35	37		
Ideas/Data	40	40		
Prestige	66	65		

Example 3: Female, Age 18 Years

This is an undifferentiated profile. There is no clear interest pattern demonstrated in the eight scale scores (Table 13), so the four more molar scales are presented (Fig. 10). This individual has a slight, but not pronounced, preference for people. This is a profile of someone who has not specifically thought out what she likes

TABLE 12
Personal Globe Inventory Listing of Similar Occupations for Example 2

Similarity score	Occupation
88	Biological and medical scientists
85	Aerospace engineers
84	Electrical and electronics engineers
83	Chemical engineers
82	Health services managers
82	Physicians
81	Architects
80	Engineering, science, and data processing managers
77	Civil engineers
76	Physical scientists
76	Geologists and geophysicists
76	Meteorologists
75	Physicists and astronomers
74	Industrial engineers
73	Mechanical engineers
72	Metallurgical, ceramic, and materials engineers
71	Mining engineers
71	Nuclear engineers
69	Petroleum engineers
69	Podiatrists
65	Veterinarians
60	Landscape architects
54	Life scientists
54	Agricultural scientists
53	Foresters and conservation scientists

or who might not have had enough experience to help develop her interests. However, her Prestige score reveals a more differentiated profile. Her Prestige score was low (T score = 40, listed in Table 13), indicating that she has preferences for lower status activities, and as such, the five lower prestige occupations are presented (Fig. 11). She demonstrates a differential pattern of interests, with Personal Service and Basic Service being her highest scores. By incorporating Prestige, the interest pattern of this individual becomes more explicit, and much more specific information about occupations can be provided than was possible using just her basic interest scores. As can be seen from her listing of similar occupations presented in Table 14, there are several occupations that are good matches to her interests.

Example 4: Male, Age 17 Years

This is a very undifferentiated profile in which there are no clear patterns of difference among the eight basic interest scales (Table 15), so the more molar four scales are represented (Fig. 12). The individual has a slight tendency toward Things and less so toward Data. General interventions aimed at helping him to

TABLE 13
Personal Globe Inventory Technical Score Profile for Example 3

Scale	T scores			
	Composite	Same sex (norm)	Liking	Competence
Spherical scales				
Social Facilitating	60	55	60	60
Managing	62	53	61	62
Business Detail	52	56	50	54
Data Processing	53	54	50	54
Mechanical	45	50	45	46
Nature/Outdoors	42	47	42	43
Artistic	52	52	50	54
Helping	55	50	57	53
Social Sciences	34	29	36	30
Influence	35	33	39	32
Business Systems	45	44	48	43
Quality Control	38	40	35	40
Manual Work	52	55	50	54
Personal Service	63	60	67	60
Financial Analysis	42	45	44	40
Science	31	35	32	30
Construction/Repair	35	40	38	33
Basic Service	55	52	50	59
Liking–Competence				
Basic Interest	45	47		
High Prestige	55	54		
Low Prestige	44	45		
Six types				
Realistic	49	52		
Investigative	42	47		
Artistic	52	52		
Social	57	53		
Enterprising	59	52		
Conventional	52	56		
Four types				
People	62	57		
Things	46	50		
Data	52	53		
Ideas	45	49		
Dimensional				
People/Things	55	53		
Ideas/Data	52	54		
Prestige	40	42		

explore these basic interest types should be used. There are no clear prestige or liking–competence discrepancy patterns (Table 15), so these were not presented. The presentation of similar occupations (Table 16) indicates that there are few occupations that are similar to the interest pattern of this individual. Given this

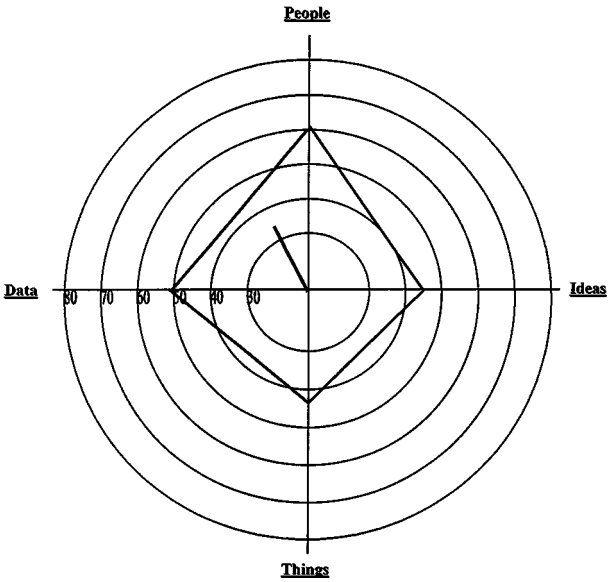

FIG. 10. Circular graph and vector score for example 3 four basic interest scores.

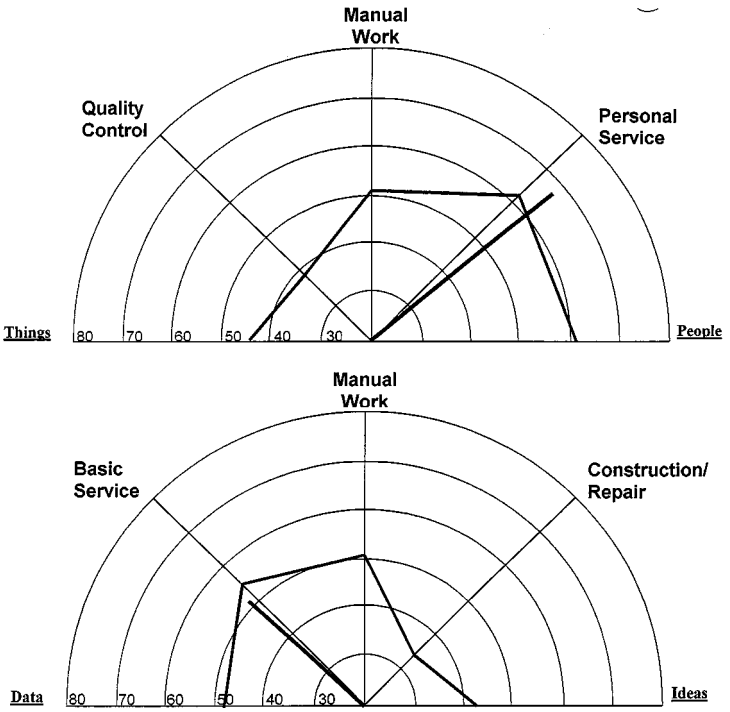

FIG. 11. Graphs and vectors for lower prestige scales for example 3.

TABLE 14
Personal Globe Inventory Listing of Similar Occupations for Example 3

Similarity score	Occupation
87	Cashiers
87	Travel agents
86	Retail sales workers
85	Preschool teachers and child care workers
85	Flight attendants
84	Barbers and cosmetologists
83	Homemaker—Home health aides
80	Janitors and cleaners and cleaning supervisors
80	Private household workers
79	Counter and rental clerks
77	Interviewing and new accounts clerks
76	Reservation and transportation ticket agents
75	Secretaries
75	Stenographers and medical transcriptionists
74	Teachers' aides
74	Information clerks
73	Hotel and motel desk clerks
71	Nurses' aides and psychiatric aides
71	Occupational therapy assistants and aides
70	Mail clerks and messengers
70	Library assistants and bookmobile drivers
69	Telephone operators
68	Dental assistants
67	Medical assistants
66	Physical therapy assistants and aides
62	Chefs, cooks, and other kitchen workers
62	Food and beverage service workers
61	Correctional officers
61	Firefighting occupations
60	Guards
60	Police, detectives, and special agents
59	Private detectives and investigators
58	Insurance agents and brokers
58	Manufacturers' and wholesale sales representatives
57	Service sales representatives

very undifferentiated profile, it seems most appropriate to focus on the four basic scales as a first step to explore his interests and the salience of the work role.

Example 5: Male, Age 37 Years

The basic interest profile (Table 17) is one of someone who is interested in a broad set of activities, with high scores (T scores greater than or equal to 50) on Social Facilitating, Helping, Artistic, Nature/Outdoors, and Mechanical (Fig. 13). Only

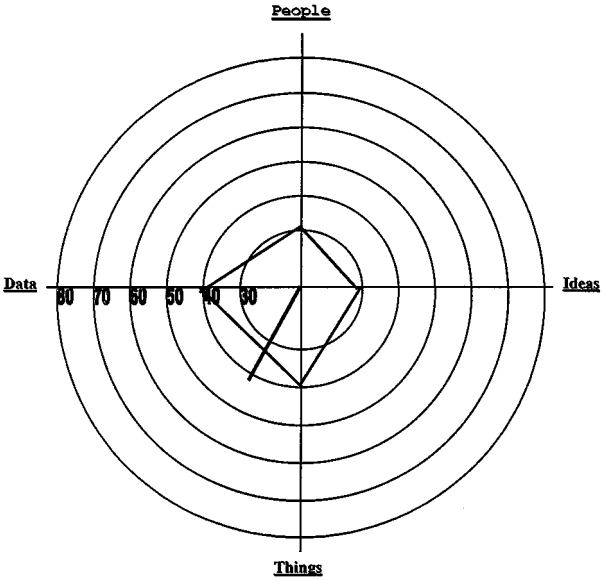

FIG. 12. Circular graph and vector score for example 4 four basic interest scores.

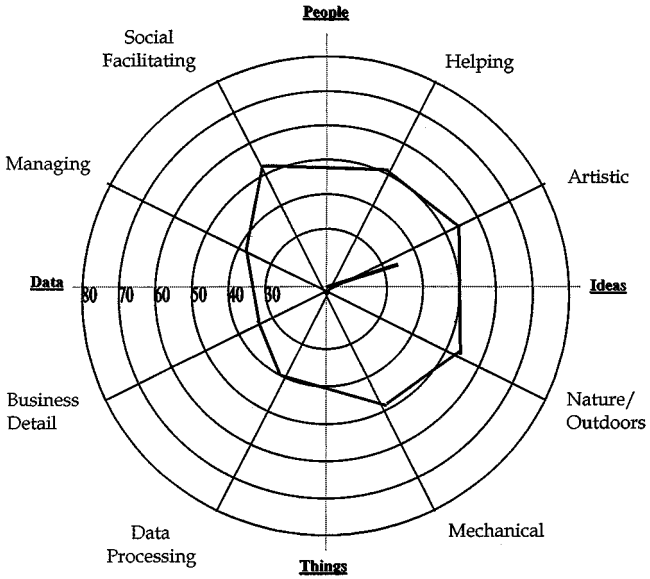

FIG. 13. Circular graph and vector score for example 5 eight basic interest scores.

TABLE 15
Personal Globe Inventory Technical Score Profile for Example 4

Scale	T scores			
	Composite	Same sex (norm)	Liking	Competence
Spherical scales				
Social Facilitating	30	33	30	30
Managing	36	36	35	37
Business Detail	40	39	42	37
Data Processing	44	42	44	45
Mechanical	42	40	42	43
Nature/Outdoors	30	28	28	24
Artistic	25	25	28	24
Helping	34	38	30	38
Social Sciences	47	49	45	49
Influence	48	45	48	48
Business Systems	43	43	43	44
Quality Control	42	40	40	44
Manual Work	40	40	38	42
Personal Service	47	47	45	49
Financial Analysis	42	40	44	40
Science	40	37	42	35
Construction/Repair	49	45	51	47
Basic Service	39	41	37	40
Liking–Competence				
Basic Interest	44	45		
High Prestige	48	48		
Low Prestige	51	60		
Six types				
Realistic	43	42		
Investigative	30	28		
Artistic	25	25		
Social	32	37		
Enterprising	37	38		
Conventional	42	42		
Four types				
People	32	37		
Things	43	40		
Data	40	40		
Ideas	28	27		
Dimensional				
People/Things	42	44		
Ideas/Data	55	60		
Prestige	45	46		

Managing, Business Detail, and Data Processing are low. The listing of similar occupations provided in Table 18 gives a comparable picture with a mix of helping, nature and scientific professions. However, there is a clear pattern of differences between the liking and competence items (Table 17), so these scores are represented

TABLE 16
Personal Globe Inventory Listing of Similar Occupations for Example 4

Similarity score	Occupation
70	Computer programmers
65	Drafters
65	Computer scientists and systems analysts
64	Statisticians
62	Accountants and auditors
62	Engineering technicians
60	Library technicians
59	Paralegals
58	Science technicians
58	Inspectors and compliance officers
57	Actuaries
52	Broadcast technicians
51	Underwriters
50	Budget analysts
50	Bank tellers
49	Clerical supervisors and managers
48	Computer and peripheral equipment operators
47	Municipal clerks
47	Proofreaders and copy markers
46	Real estate clerks
45	Statistical clerks
43	Industrial engineers
42	Mechanical engineers
41	Metallurgical, ceramic, and materials engineers
40	Mining engineers
39	Nuclear engineers
38	Petroleum engineers
37	Court clerks
33	Credit clerks and authorizers
32	Credit analysts
32	Tax examiners, collectors, and revenue agents
31	Pharmacy technicians
31	Title examiners and searchers
30	Mathematicians
30	Operations research analysts
30	Veterinary technicians

graphically (Fig. 14). This individual sees himself as liking Artistic, Helping, and Social Facilitating activities and sees himself as not being especially competent in these same activities. The opposite pattern emerges on Nature/Outdoors and Mechanical activities, where he sees himself as competent but does not like these activities. This individual's broad interest pattern reflects his very different pattern for likes and competence. This individual would need to work on finding a people interest or an artistic interest that uses his mechanical and outdoor skills. Or, if these two very different domains cannot be combined, then perhaps he should search for two separate domains to express each, for example, the skills as an occupation

TABLE 17
Personal Globe Inventory Technical Score Profile for Example 5

Scale	T scores			
	Composite	Same sex (norm)	Liking	Competence
Spherical scales				
Social Facilitating	53	56	56	40
Managing	37	38	45	34
Business Detail	34	33	33	35
Data Processing	42	40	36	53
Mechanical	50	47	41	61
Nature/Outdoors	56	54	46	62
Mechanical	50	47	41	61
Helping	52	55	58	38
Social Sciences	59	62	59	59
Influence	59	57	60	58
Business Systems	50	48	47	53
Quality Control	47	45	53	50
Manual Work	40	40	40	40
Personal Service	41	41	42	38
Financial Analysis	50	47	52	47
Science	59	55	58	59
Construction/Repair	42	40	40	44
Basic Service	40	42	40	41
Liking–Competence				
Basic Interest	65	66		
High Prestige	57	57		
Low Prestige	48	48		
Six types				
Realistic	47	44		
Investigative	56	54		
Artistic	56	58		
Social	59	62		
Enterprising	40	39		
Conventional	41	39		
Four types				
People	59	62		
Things	47	44		
Data	35	32		
Ideas	61	60		
Dimensional				
People/Things	55	57		
Ideas/Data	65	40		
Prestige	57	55		

and the liking as an avocation. However, given the different pattern of likes and competence, this individual would probably not be satisfied in very technical, less people-oriented positions. Although the technical competence would prove helpful, the liking of these activities is low.

TABLE 18
Personal Globe Inventory Listing of Similar Occupations for Example 5

Similarity score	Occupation
88	Engineering, science, and data processing managers
87	Life scientists
85	Agricultural scientists
85	Communications and transportation managers
84	Farm and home management advisers
82	Veterinarians
82	Veterinarian technicians
82	Camera and photographic equipment repairs
81	Biological and medical scientists
81	Foresters and conservation scientists
80	Social scientists
80	Economists and marketing research analysts
76	Psychologists
75	Residential counselors
74	Urban and regional planners
71	Reporters and correspondents
71	Writers and editors
70	Schoolteachers
70	Designers
70	Photographers and camera operators
69	Social and recreation workers
68	Human services work
65	Recreation workers
65	Social workers
62	Teachers, librarians, and counselors
62	Adult education teachers
61	Archivists and curators
61	College and university faculty
60	Counselors
60	Clergy
58	Optometrists
58	Special education teachers
57	Librarians
57	Recreational therapists
56	Registered nurses
52	Respiratory therapists
52	Speech—Language pathologists and audiologists
52	Occupational therapists
51	Pharmacists
51	Physical therapists
49	Physician assistants

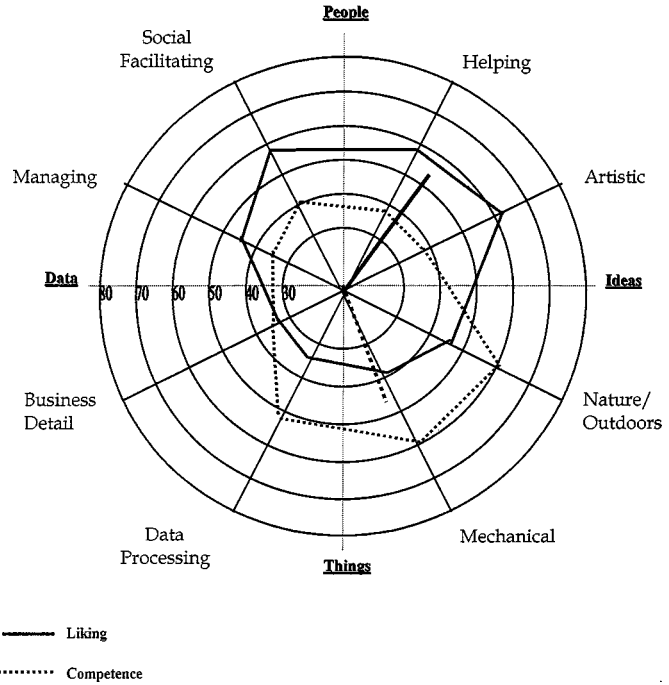

FIG. 14. Circular graph and vector score for example 5 with liking and competence scores represented separately.

SUMMARY

The PGI incorporates a new, more general model of interests and competences as well as an innovative, individualized interpretive profile. Initial work presented here supports its reliability and validity across gender, educational level, and ethnicity. The greater specification of the basic interest circle from six to eight types provides more narrow-band or specific interest scores, which may prove useful to those with more clearly defined interests. However, the model is sufficiently broad and inclusive to provide information using less specific interest scales (both six and four types). These more broad-band scales may be more appropriate for individuals who have less clearly defined interests. The spherical model of the PGI is thus flexible enough to incorporate most of the interest models used currently.

Furthermore, the explicit incorporation of prestige helps to make the instrument more broadly applicable to many individuals. In general, the few times that prestige has received attention in interest assessment, it has been either through inclusion of ancillary scales (e.g., Holland, 1985b; Strong, 1943) or in the development of scales focusing exclusively on lower prestige interests and occupations (e.g., Clark & Campbell, 1965; Johansson, 1975). The PGI explicitly incorporates this important dimension as a major aspect of the model and thus provides an instrument applicable to a wide range of prestige interests.

Gottfredson (1996) posited that the explicit incorporation of the prestige dimension with the basic interest circle could lead to more thorough examinations of some core tenets of vocational psychology such as the person–environment congruence hypothesis. Spokane (1985) and Assouline and Meir (1987) demonstrated that congruence of interests and environment is moderately related to satisfaction and persistence. However, others have argued that such a position is overstated (e.g., Tinsley, 2000). Gottfredson (1996) proposed that this congruence–occupational outcomes relation may be moderated by prestige. Individuals with higher prestige interests may more motivated by intrinsic rewards, and so congruence would be more salient to them. The explicit incorporation of prestige in many of the research questions in vocational psychology could be beneficial.

The PGI incorporates several innovations in profile interpretation that have never been used in interest assessment: specifically, the circular representation and vector scores and the individually adapted output presentation. The incorporation of the circular model facilitates user grasp of the model. The PGI is also an initial attempt to adapt the interpretation to the specific test taker but producing specific profile graphics based on the individual's responses. The inclusiveness of the PGI model allows for many options for score reporting. Clearly, the complexity could be overwhelming (Hansen, 1996), but the incorporation of flexible and individualized profile presentations greatly reduces this complexity. Individualized presentations enable particular profiles that "best" match the client's needs. Other inventories present identical information to all clients. Given the uniformity of presentation of most inventories, simplicity of the model and measure is a necessary asset. By moving away from a uniform profile, more complexity in the underlying model is permitted. The PGI is a complex model with many possibilities, and a flexible presentation format enables the complexity to be an asset.

However, given the focus on variable and flexible information presentation depending on profile characteristics, it is important to evaluate the utility of such individualized interpretation formats. Do they help the user to understand it better? Do they lead to more exploration or greater certainty of choice? With the increasing use of computers to administer and score instruments, there is an increased probability of having not only variable item sets administered (as is traditionally true in computer adaptive testing) but also variable output presentation of information.

Future research directions should involve both the psychometric and the presentational properties of the PGI. Clearly, there is a need to develop more representative norms, and there also is a need to examine predictive validity and the long-term stability of results. Presentational plans are focused on increasing the user-friendliness of the PGI. Several aspects of this are to better use graphics with the program so that the individual will have all graphs generated on the screen instead of needing to do the graphs by hand on forms provided. Another innovation would be to present the occupations as points in three-dimensional space on a computer screen and to have the individual point and click on those that are near him or her in space and have this linked to an information source about that career. Finally, the development of an entirely Web-based version of the PGI is being

planned. The PGI has promise with respect to its own merits and also as a model or stimulus for future, more flexible models of interest assessment.

APPENDIX A

Personal Globe Inventory: Activities

Please look at the following list of activities and respond to each twice—once regarding how much you *like* the activity and once regarding your *ability* or *competence* to do the activity. Use the scales listed below to rate Liking and Competence.

Linking						
Strongly dislike			Neutral			Strongly like
1	2	3	4	5	6	7

Competence						
Unable to do			Moderately competent			Very competent
1	2	3	4	5	6	7

Liking	Competence	
_____	_____	1. Greet people when entering a business
_____	_____	2. Oversee a hotel
_____	_____	3. Prepare financial reports
_____	_____	4. Oversee a data analysis group
_____	_____	5. Install electrical wiring
_____	_____	6. Categorize different types of wildlife
_____	_____	7. Write poetry
_____	_____	8. Help others
_____	_____	9. Seat patrons at a restaurant
_____	_____	10. Sell goods to others
_____	_____	11. Estimate costs of new procedures
_____	_____	12. Repair computers
_____	_____	13. Oversee building construction
_____	_____	14. Write a scientific article
_____	_____	15. Sculpt a statue
_____	_____	16. Help children with learning problems
_____	_____	17. Interview people for a survey
_____	_____	18. Manage an office
_____	_____	19. Maintain office financial records
_____	_____	20. Manage an electrical power station
_____	_____	21. Design electronics systems
_____	_____	22. Teach science
_____	_____	23. Paint a portrait
_____	_____	24. Study people's behavior
_____	_____	25. Sell clothes to others
_____	_____	26. Oversee sales
_____	_____	27. Prepare insurance reports
_____	_____	28. Write computer programs for business
_____	_____	29. Repair airplanes

30. Draw medical illustrations
31. Write a play
32. Teach people to dance
33. Escort people through a television studio
34. Organize office records
35. Keep records of stock sales
36. Write computer programs
37. Inspect construction sites for safety
38. Chart stars
39. Draw cartoons
40. Teach others cooking
41. Do gift wrapping at a store
42. Operate an office copy machine
43. Establish a business accounting procedure
44. Analyze survey maps
45. Assemble precision optical instruments
46. Study wildlife
47. Write novels
48. Supervise children in a nursery
49. Help others with marriage problems
50. Write legal documents
51. Sell stocks and bonds
52. Guard buildings
53. Drive a truck
54. Polish others' fingernails
55. Examine financial records of businesses
56. Conduct chemical experiments
57. Repair cars
58. Serve food in a cafeteria
59. Help others with speech difficulties
60. Give lecture to large groups
61. Oversee a bank
62. Check progress of a factory order
63. Drive a bus
64. Style hair
65. Examine finances
66. Cure medical ailments
67. Grind metal pieces
68. Run a vacuum cleaner
69. Assist those with mental problems
70. Study the effects of elections
71. Manage a department store
72. Keep track of inventory
73. Carry and load containers
74. Cook large food orders
75. Study causes of stock market fluctuations
76. Study genetics
77. Install mufflers on cars
78. Wash clothes
79. Study juvenile delinquency
80. Set up social programs
81. Counsel others about financial investments

_____	_____	82. Use a radio to dispatch repairers
_____	_____	83. Drive a taxi
_____	_____	84. Train dogs
_____	_____	85. Consult with others about how to run a business
_____	_____	86. Conduct scientific experiments
_____	_____	87. Operate a bulldozer
_____	_____	88. Sell pets to people
_____	_____	89. Help others with personal problems
_____	_____	90. Help others find employment
_____	_____	91. Provide financial counseling
_____	_____	92. Inspect landfill sites
_____	_____	93. Operate a woodworking machine
_____	_____	94. Groom pets
_____	_____	95. Plan a business budget
_____	_____	96. Study the shifts in the earth
_____	_____	97. Operate a crane
_____	_____	98. Sell hot dogs at a sporting event
_____	_____	99. Help others with hearing disorders
_____	_____	100. Defend people in court
_____	_____	101. Administer loans
_____	_____	102. Inspect automobiles
_____	_____	103. Smooth wood furniture with sandpaper
_____	_____	104. Model clothes
_____	_____	105. Analyze financial records
_____	_____	106. Study plants
_____	_____	107. Cut down trees
_____	_____	108. Rent fishing equipment
_____	_____	109. Work with people
_____	_____	110. Work with things
_____	_____	111. Work with ideas
_____	_____	112. Work with data
_____	_____	113. Work in high-prestige activities

APPENDIX B

Personal Globe Inventory: Occupations

Below you will find many different occupations. For each occupation, choose the number from 1 (*strongly dislike*) to 7 (*strongly like*) that describes how you feel about doing that kind of work. Do not worry about whether you woud be good at doing the job or whether you have the skills to do the work. Think only about *how much you like or dislike the work*. Please place your response to the space to the left of each occupation and respond to all occupations.

Strongly dislike			Indifferent			Strongly like
1	2	3	4	5	6	7

__1. Social service director	__2. Bank teller
__3. Financial analyst	__4. Power station director
__5. Airplane mechanic	__6. Ecologist
__7. Sculptor	__8. School counselor

__9. Personnel director
__10. Office manager
__11. Bank examiner
__12. Electronics technician
__13. Auto mechanic
__14. Forester
__15. Musician
__16. Speech therapist
__17. Publicity director
__18. Department store manager
__19. Banker
__20. Microelectronics technician
__21. Avionics technician
__22. Oceanographer
__23. Composer
__24. Social worker
__25. Sales (clothes)
__26. Sales clerk
__27. Cost estimator
__28. Electrician
__29. Chemical engineer
__30. Naturalist
__31. Poet
__32. Child care worker
__33. Travel agent
__34. Sales manager
__35. Certified public accountant
__36. Electrical engineer
__37. Chemical lab technician
__38. Fish and game warden
__39. Playwright
__40. Marriage and family therapist
__41. Aerobics instructor
__42. Hotel manager
__43. Accounting clerk
__44. Electronics assembler
__45. Machinist
__46. Veterinarian
__47. Author
__48. Educational psychologist
__49. Clinical psychologist
__50. Scientific research director
__51. Business computer specialist
__52. Bricklayer
__53. Maid
__54. Flight attendant
__55. Budget consultant
__56. Social scientist
__57. Bulldozer operator
__58. Receptionist
__59. Psychotherapist
__60. Research scientist
__61. Business computer programmer
__62. Locksmith
__63. Meter reader
__64. Sightseeing guide
__65. Business management analyst
__66. Biologist
__67. Crane operator
__68. Hotel clerk
__69. Pediatrician
__70. Surgeon
__71. Business programmer
__72. Bridge inspector
__73. Window cleaner
__74. Waiter/Waitress
__75. Market research analyst
__76. Anthropologist
__77. Tree pruner
__78. Hair stylist
__79. Family physician
__80. Geneticist
__81. System analyst
__82. Pipe fitter
__83. Ride attendant
__84. Bartender
__85. Personal investment analyst
__86. Earth scientist
__87. Construction worker
__88. Mail clerk
__89. Sociologist
__90. Physicist
__91. Computer operator
__92. Building inspector
__93. Coatroom attendant
__94. Travel guide
__95. Consumer affairs director
__96. Geologist
__97. Roofer
__98. Escort
__99. Psychiatric caseworker
__100. Astronomer
__101. Comptuer consultant
__102. High school shop teacher
__103. Bus driver
__104. Personal shopper
__105. Stockbroker
__106. Chemist
__107. Building contractor
__108. Secretary

APPENDIX C

Template for Producing Raw Scores for Each Scale (activity preferences, activity competence beliefs and occupational preferences)

Scale	Scoring
1. Social Facilitating	i1 + i9 + i17 + i25 + i33 + i41
2. Managing	i2 + i10 + i18 + i26 + i34 + i42
3. Business Detail	i3 + i11 + i19 + i27 + i35 + i43
4. Data Processing	i4 + i12 + i20 + i28 + i36 + i44
5. Mechanical	i5 + i13 + i21 + i29 + i37 + i45
6. Nature/Outdoors	i6 + i14 + i22 + i30 + i38 + i46
7. Artistic	i7 + i15 + i23 + i31 + i39 + i47
8. Helping	i8 + i16 + i24 + i32 + i40 + i48
9. Social Sciences	i49 + i59 + i69 + i79 + i89 + i99
10. Influence	i50 + i60 + i70 + i80 + i90 + i100
11. Business Systems	i51 + i61 + i71 + i81 + i91 + i101
12. Quality Control	i52 + i62 + i72 + i82 + i92 + i102
13. Manual Work	i53 + i63 + i73 + i83 + i93 + i103
14. Personal Service	i54 + i64 + i74 + i84 + i94 + i104
15. Financial Analysis	i55 + i65 + i75 + i85 + i95 + i105
16. Science	i56 + i66 + i76 + i86 + i96 + i106
17. Construction/Repair	i57 + i67 + i77 + i87 + i97 + i107
18. Basic Service	i58 + i68 + i78 + i88 + i98 + i108
19. People	.924 ∗ (Scale8 + Scale1) + 383 ∗ (Scale2 + Scale7)
20. Things	.924 ∗ (Scale4 + Scale5) + .383 ∗ (Scale3 + Scale6)
21. Data	.924 ∗ (Scale2 + Scale3) + .383 ∗ (Scale1 + Scale4)
22. Ideas	.924 ∗ (Scale7 + Scale6) + .383 ∗ (Scale5 + Scale8)
23. Realistic	Scale5
24. Investigative	Scale6
25. Artistic	Scale7
26. Social	(2 ∗ Scale8 + Scale1)/3
27. Enterprising	(2 ∗ Scale2 + Scale1)/3
28. Conventional	(2 ∗ Scale4 + Scale3)/3
29. People/Things	Scale19 − Scale20
30. Ideas/Data	Scale22 − Scale21
31. Prestige	(2 ∗ Scale10 + .71 ∗ (Scale15 + Scale11 + Scale9 + Scale16) − 2 ∗ Scale13 − .71 ∗ (Scale12 + Scale17 + Scale14 + Scale18))/2

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