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Test description:

PGI **Personal Globe Inventory**

Tracey, T. J. G. (2021)

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1. Test Concept

1.1 Theoretical Background

The *Personal Globe Inventory (PGI)* is designed to measure vocational and educational interests to assist in the choice of a career or educational majors, as well as for exploring potential hobbies or avocational activities. The goals of the PGI are (a) to teach the user about his or her interests, (b) to stimulate career exploration by presenting appropriate careers and majors that he or she might not have considered previously, and (c) confirm current career choices. The instrument is based on the Personal Globe model, which is inclusive of traditional measures (i.e., Holland's [1997] RIASEC types and Prediger's [1983] People/Things and Data/Ideas dimensions), but adds the dimension of prestige to form a more differentiated representation of the interest domain. The PGI is novel in that it also includes an assessment of self-efficacy in addition to the assessment of interests. Therefore, the PGI mirrors extant measures, in terms of information provided, but goes further in providing additional information. The scales from the PGI are matched to over 900 occupational titles and 450 educational majors to assist in decision making.

1.2 Test Procedure

The extended PGI contains three different sets of items: 108 occupation preference, 113 activity preference, and 113 activity competence items. The regular PGI contains only the 113 activity preference items, to which users respond using a seven-point scale (1 = *very strongly dislike* to 7 = *very strongly like*), and 113 activity competence items, to which users respond using a seven-point scale (1 = *unable to do* to 7 = *very competent*) to rate perceived competence. Given that Tracey (2002) found that the different scale types were equally valid, the regular PGI, omitting the occupation preference items, was adopted as the standard.

The PGI is based on the Personal Globe model wherein interests and self-efficacy estimates can be described using a three-dimensional spherical structure (i.e., globe) defined by *People* versus *Data*, *Ideas* versus *Data*, and *Prestige*. The regular PGI and extended PGI have 18 scales distributed equally over this globe: eight basic interest scales (Social Facilitating, Managing, Business Detail, Data Processing, Mechanical, Nature/Outdoors, Artistic, and Helping), five high prestige scales (Financial Analysis, Social Science, Science, Business Systems, and Influence), and five low prestige scales (Basic Service, Personal Service, Construction/Repair, Quality Control, and Manual Work). The spacing of these globe scales are presented in Figure 1, with more similar scales in closer proximity. In addition, weighted geometric composites of the 18 spherical scales are used to construct the RIASEC scales, Prediger's four poles of People, Things, Data, and Ideas, and three summary dimensional scales (People vs. Things, Data vs. Ideas, and Prestige), resulting in 31 scales. These 31 scales are calculated for both interests and self-efficacy separately, thus, resulting in 62 scales. Finally, there is an interest-self-efficacy discrepancy score, which provides information on the profile similarity of the interests and self-efficacy scores (i.e., congruence of interests and self-efficacy). As a check on validity, there are two validity scales provided (forced response and repeated items). For more information, see file *Manual of PGI*.

1.3 Interpretation Mode

First, the raw scores for each scale have to be calculated (see file *PGI Scoring template*). All scores are presented in T score format based on combined gender norms as well as same gender norms.

The score profile (combined interest and self-efficacy) is compared to the O*NET listing of occupations. The match of the PGI profile to each occupation is listed using a similarity score (100 = perfect match; 0 = very poor match). The similarity of each of the 1,000 O*NET occupations is presented in rank order. A similar procedure is used to map the PGI onto majors. Specifically, the over 250 majors listed in the National Center for Educational Statistics Classification of Instructional Program (CIP) taxonomy are presented. Finally, the PGI and PGI-Short provide matches to the 16 Career Clusters created by the Office of Vocational and Adult Education (OVAE) because this system is used in some educational programs.

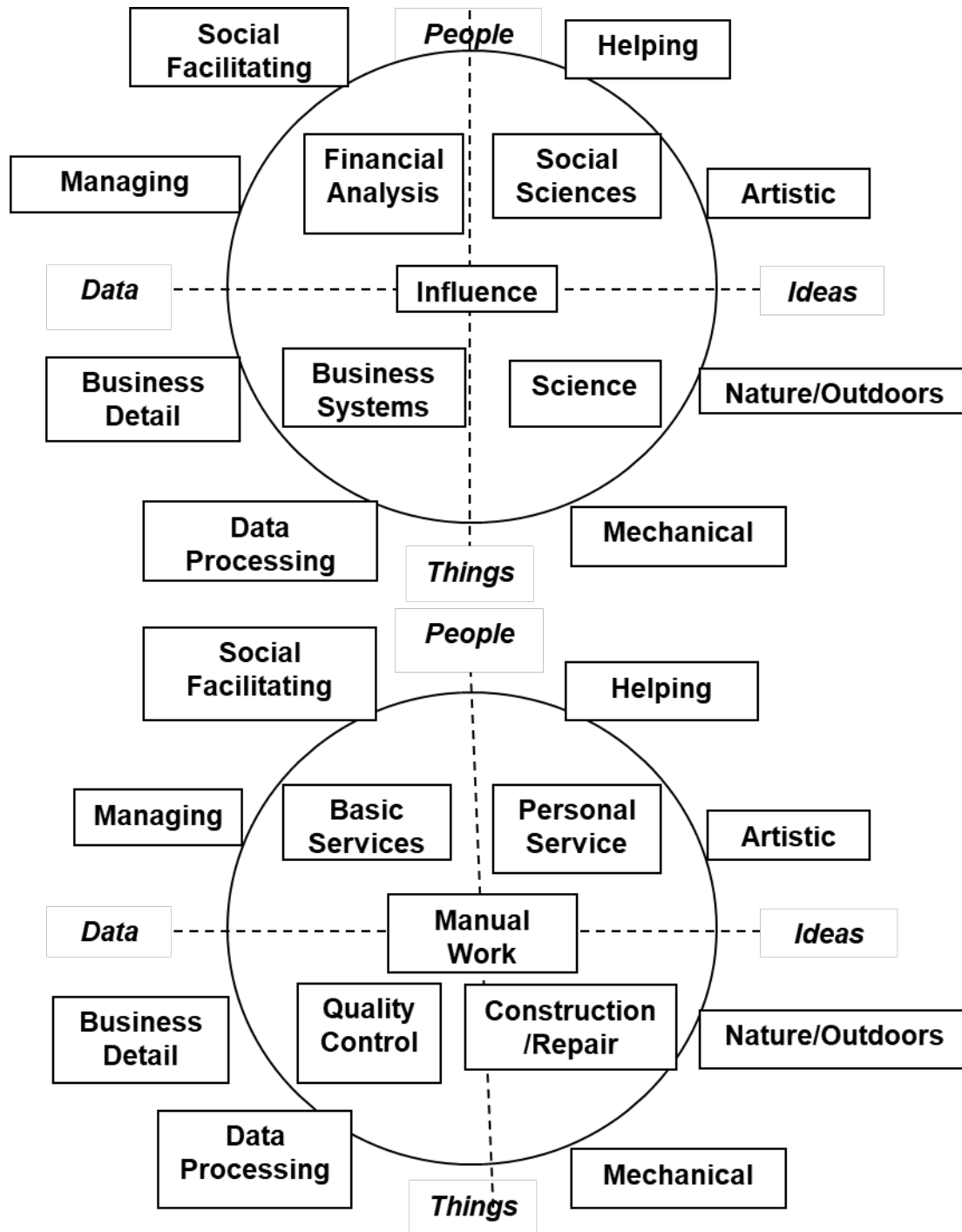


Figure 1. Personal Globe model: Proximity of the interest types represents their similarity.

Top half represents the top hemisphere of the PGI globe, looking down at the north pole of high prestige.

The bottom 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.

1.4 Interpretation Aids

The scoring template can be used for obtaining the raw score of each scale. In addition, the manual describes how to evaluate the scores by a graph (see PGI manual, pp. 10-11). Further, all the occupations listed in the O*NET (over 1,000) and all the college majors listed in the National Center for Educational Statistics Classification of Instructional Program (CIP) taxonomy (over 250) can provide a similarity score for each individual regarding how closely his or her interest profile is matching each major and occupation.

1.5 Interpretation Time

Users take the PGI regular version online, typically because the calculations of all the scale scores are involved and this generally takes 30 minutes. Administering the PGI or the PGI-Short in a paper-and-pencil format is possible if the user is interested only in obtaining the raw scale scores. Completing the regular PGI takes approximately 20-30 minutes, and the PGI-Short takes roughly 10 minutes. Anyone can take the PGI in that there is no special access required, but the test is complex, and having a qualified professional assist with the interpretation would be helpful.

1.6 Items

Representative items

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 Ability.

<u>LIKING</u>						
Strongly Dislike	2	3	4	5 Neutral	6	7 Strongly Like
1	2	3	4	5	6	7

<u>COMPETENCE</u>						
Unable to do	2	3	4	5 Moderately	6	7 Very Competent
1	2	3	4	5	6	7

1.7 All Items

Items from the PGI:

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 a 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

2. Administration

2.1 Forms

There are four versions of the PGI: the extended PGI, which is only available on a standalone PC program (available at <https://web.asu.edu/tracey>), the regular PGI and the PGI-Short, each of which are available on the internet (<https://PGI.asu.edu>; currently under repair), and the PGI-Mini. They are available in English, German, Farsi, Chinese, and Japanese among others. The PGI-Short was developed using Item Response Theory (IRT) analysis (Tracey, 2010) and consists of only 40 activity preference and 40 activity competence items. Given its shorter length, the PGI-S does not provide all the scores of the regular PGI. Finally, the PGI-Mini is very

brief (only 20 items) and focuses only on activity preference.

2.2 Application Ages

The test is intended to provide useful information to individuals aged 14 to 30 years relative to selecting majors and occupations or verifying choices that have been made.

2.3 Application Time

No time limit but PGI takes approximately 30 minutes, PGI-Short 10 minutes, and PGI-Mini 3 minutes.

2.4 Material

Manual provides extensive information on underlying theory, empirical support, scales, scoring, and interpretation.

2.5 Instructions

The standardized instruction is given on the testing sheet.

2.6 Administration Prerequisites

The PGI is not recommended for use with adolescents under the age of 14 as there has been no research support on its application to this age group as yet. If one is interested in assessing children and young adolescents, the Inventory of Children's Activities is recommended (Tracey & Ward, 1998).

3. Test construction

The PGI evolved from three different studies on interests. First, Tracey and Rounds (1995) demonstrated that responses to interest items are not clustered into the six RIASEC types posited by Holland (1997). The responses are arranged uniformly around a circle implying that the division of the circle into different slices is arbitrary. Thus, interests can be categorized as valid using eight types or four types (or any other number). Second, Tracey and Rounds (1996) demonstrated that responses to interest items can be described well by three substantive dimensions: Prediger's People/Things, Data/Ideas, and the new dimension of Prestige. The interests can be conceptualized as points in a three-dimensional spherical space (i.e., Personal Globe model; see Figure 2). Finally, Tracey (1997) demonstrated that interests (what people like) and self-efficacy estimates (what people believe they can do successfully) can both be described validly using this same Personal Globe model. This result meant that interests and self-efficacy scores can be compared directly because the same structural model holds for each.

Given these results, Tracey (2002) created the Personal Globe Inventory (PGI) to represent the spherical structure. Tracey developed the PGI empirically from a principal components analysis of a vast set of items representative of the domain of occupations and vocational activities. Each item fell at a point in three-dimensional space, and Tracey formed items into scales based on their proximity to spots on the globe. The equator was comprised of Prediger's People/Things and Data/Ideas dimensions and could be represented using Holland's RIASEC scales equally spaced around the circle on these two dimensions. However, Tracey thought six sections was

too broad a representation, which led to types that were too inclusive to defy intuitive understanding (e.g., the meaning of Realistic, Investigative, Enterprising, or Conventional is not at all obvious to new test users). To obtain a more finely tuned representation and one that was more intuitively clear, Tracey used an eight-type model and formed the items that clustered around the eight equally spaced points on the circle into scales. He based the resulting scale names on item content (i.e., Social Facilitating, Managing, Business Detail, Data Processing, Mechanical, Nature/Outdoors, Artistic, and Helping). The graphic representation of the spatial relations among the two dimensions and eight types versus six types is presented in Figure 3.

Following this, Tracey (2002) created five high prestige scales (four spaced equally around the Tropic of Cancer and one at the North Pole) and five low prestige scales (four spaced equally around the Tropic of Capricorn and one at the South Pole). He labeled the four scales at the Tropic of Cancer *Financial Analysis*, *Social Science*, *Science*, and *Business Systems*, with *Influence* existing at the North Pole. The four scales around the Tropic of Capricorn were *Basic Service*, *Personal Service*, *Construction/Repair*, and *Quality Control*, with *Manual Work* at the South Pole. Tracey spaced the 18 Globe scales equally on the spherical surface of the interest space. Given this structure, the scales more proximate are more highly related, and those more distal are less related. Given these spatial relations, Tracey was able to construct Holland's six RIASEC scales from geometrically weighted composites of the octant scales. Tracey used an identical procedure in the creation of the scales for the self-efficacy items. The PGI presents all scores for all 31 scales separately for interests and self-efficacy, as well as for the combination. Generally, the combination is used in the summary.

Tracey (2010) developed the PGI-Short using item response theory (IRT). He examined the responses to the activity items and selected the best items to form a very brief version. Tracey designed the brief version only to provide scale scores for the basic interest circle (i.e., octant scores, Holland's six types, and the four types), as well as a simple high prestige and low prestige score. Tracey deleted the remaining high and low prestige scores. In addition, the IRT method enabled an examination of differential item functioning (DIF) of each item across gender. None of the selected items demonstrated a pattern of DIF. Therefore, the PGI-Short provides a good representation of the basic interest circle with the addition of two prestige scales only.

Finally, Tracey developed the PGI-Mini in 2016 to provide a very brief assessment of interests. He selected the best items from the activity preference scales of the PGI-Short using IRT. The scale is only 20 items and yields the same scores as the PGI-Short; the PGI-Mini scores pertain only to interests. There are no self-efficacy items.

4. Criteria

4.1 Objectivity

Objectivity regarding implementation is given by standardized instruction. Evaluation and interpretation can be considered objective due to scoring aids and norms (T-score units; mean = 50, $SD = 10$).

4.2 Reliability

Internal consistency estimates of each scale ranged from $\alpha = .88$ to $\alpha = .95$ for the composite scales, and two week test-retest reliabilities ranged from $r = .77$ to $r = .86$ (Tracey, 2002) for the regular PGI scales. The PGI-Short was found to have internal consistency estimates ranging from $\alpha = .88$ to $\alpha = .96$ for the composite scales, and two week test-retest reliabilities ranging from $r = .76$ to $r = .86$ (Tracey, 2010). The PGI Mini is extremely brief (e.g., some scales have only two items), but its internal consistency is good considering the length (ω 's = .62-.91).

4.3 Validity

Structural validity

The Personal Globe model, like Holland's model of six interest types, is based on the circular arrangement of the scales. Scales on the basic interest circle are arranged uniformly around the circle, with more similar scales closer to each other and more dissimilar ones more distant or opposite. A crucial demonstration of the validity of the instrument is the extent to which this circular structure holds in different samples. If the circular structure does not hold, then the underlying assumptions about the test, the meaning of the scales, and the basis of interpretation are inappropriate. To examine the validity of the circular model, each type of scale was examined for the extent to which it could be validly described using a circular model, by means of the randomization test of hypothesized order relation (Hubert & Arabie, 1987; Tracey, 1997b). This test provides an inferential statistic indicating the significance of any departure in circular fit from chance as well as correlation of model-data fit (correspondence index, CI). The CI ranges from -1.0 to +1.0. A CI value of +1.0 indicates that the data perfectly fit the circle. A CI value of .00 indicates that the fit is roughly 50-50, and a value of -1.0 indicates that there is no fit to a circular structure.

The results of the randomization test demonstrated that the circular ordering of the scales was supported in both high school and college samples, across gender, and across all of the major U.S. ethnic groups. Indeed the fit of the PGI scales had CI values as great as, or greater than, the U.S. fit benchmark presented by Rounds and Tracey (1996), which indicates that the PGI fit the theoretical circular model as well, or better than, existing RIASEC measures. The lack of differences in fit across age, gender, and ethnicity indicate that the model fits each group well and equally and provides support for use of the measure in cross-group examinations.

The structural validity of the PGI-Short was examined because it varied across age and gender with respect to fit to the circular model. The PGI-Short fits the data well and did not differ in fit from that obtained using the longer PGI (Tracey, 2010). Like the results with the longer PGI, the PGI-Short fit each ethnic group well, and the values were above those yielded elsewhere for Holland type measures. Finally, examination of the structural fit of the PGI-Mini was strong, with CI values far exceeding those of the RIASEC benchmark, even for such a short scale (Tracey, 2016).

A unique aspect of the PGI is the extensive validity support for international applications. The PGI has been adapted and translated for use in many countries, and there is similar and strong published validity support for the structure in Ireland (Darcy, 2004), Croatia (Sverko, 2008), Serbia, (Hedrih, 2008), China (Long, Adams, & Tracey, 2005), Caribbean (Wilkins, Ramkissoon, & Tracey, 2013), Iran (Akbarzadeh, 2010), Turkey (Vardarli, Özyüre, Wilkins-Yel, & Tracey, 2016), Germany (Etzel, Nagy, & Tracey, 2016), and Japan (Long, Watanabe, & Tracey, 2006; Tracey, Watanabe, & Schneider, 1997). Likewise, Caulum, Tracey, Gresham, &

McCarty (2011) validated the PGI in Singapore, and the PGI has been used as a required part of the career planning curriculum for every secondary student in Singapore. Although the results have not been published, there is also validity support for Slovenia, Macedonia, Turkey, France, Italy, Hong Kong, Malaysia, Germany, Philippines, and Portugal. Overall, there is strong structural support for the scales in the U.S. and internationally.

Concurrent validity

To examine the concurrent validity of the scale, the PGI RIASEC scales were correlated with General Occupational theme (GOT) scales from the Strong Interest Inventory (SII, Harmon et al., 1994), which assesses interests, and the scales from the Skills, Confidence Inventory (SCI, Betz et al., 1996). The correlations ranged from $r = .65$ to $r = .77$ for similar interest scales and $r = .75$ to $r = .80$ for the self-efficacy scales, which demonstrated good support for the scales. Sodano (2011) found that work values are well represented in the PGI scales, which support the value and applicability of the PGI further.

Predictive validity

A key reason for the application of interest tests is that the greater the match of one's interests to one's environment (e.g., occupation or major), the greater the career outcomes (e.g., certainty, satisfaction, performance, tenure/persistence). When using the PGI to match interest profiles to majors, the greater the match, the greater the career choice certainty (Durr & Tracey, 2009; Tracey & Tao, 2018). Leung et al. (2014) found that the PGI profiles were able to discriminate among high school students areas of study, as well as students' academic performance.

Bias

As noted above, there is support for the structural equivalence of the PGI across gender, age, ethnicity, and country. Thus, there is demonstrated strong support for use of the instrument with different groups. A key issue in interest measurement is the gender difference on the People-Things dimension (Realistic vs. Social), where the vast majority of women score high on People and men on Realistic. In a meta-analysis, Su, Rounds, and Armstrong (2009) found that this gender effect has an average Cohen's d of .93, which is huge. A hotly debated issue pertains as to the meaning of such differences (e.g., such differences perpetuate the current differences in occupational membership). The PGI has a People/Things gender difference of only $d = .29$, which is among the lowest of all current RIASEC measures (Tracey, 2016). Therefore, there is less gender difference in the PGI than in other instruments. Finally, the PGI-Short and PGI-Mini demonstrated that there was no differential item functioning across gender (Tracey, 2010).

4.4 Norms

The PGI, the PGI-Short, and the PGI-Mini are normed using a representative sample of high school and college students (ages ranging from 16-24, with a mean of 20.5). This sample contained 500 men and 500 women and was generated to represent the 2010 U.S. census with respect to ethnicity. The instrument reports all scores in T score units (mean = 50, SD = 10) relative to the total norm group and relative to the same sex norm group. The tests can also be used with raw scores.

5. Applications

The PGI can be used as a research tool to investigate interests and also as a counseling tool to help individuals understand their interests and use these in occupation and major selection.

6. Abstract

The PGI and the PGI-Short are administered on the web site (<https://PGI.asu.edu>; under repair) and the reports vary across the two versions. Because the PGI is longer and has more scales, there is a greater amount of information presented. There are over 121 different scale scores reported in the regular PGI:

- 18 scales of the Personal Globe (liking and competence combined) scored using general sample norm and using same sex norms;
- 18 scales of the Liking responses;
- 18 scales of the Competence responses;
- 18 (Liking and Competence combined) raw scores;
- The four general scales of *People*, *Things*, *Data*, and *Ideas* (using both general norms and same sex norms);
- The six Holland RIASEC types (Realistic, Investigative, Artistic, Social, Enterprising, and Conventional) and scores (both using general sample norms and same sex norms);
- The dimensional scores of the interest globe: *People* vs. *Things*, *Data* vs. *Ideas*, and *Prestige* scores (both using general sample norms and same sex norms);
- The difference between Liking scores and Competence scores (both using general sample norms and same sex norms); and
- Validity scales (liking; competence; difference).

These scores are available on a technical information page for those who desire this information. However, more generally, this number of scores is too large to be helpful to most users. The relevant scores are presented graphically to enable the user to understand the meaning better. Given the circular and spherical arrangement of the scales, circular graphs are used to portray the results. The PGI is unique in that the reports generated are tailored to each individual test taker using their responses. Specifically, information is tailored based on the differentiation of the profile. Most people get their interests graphed on the octant graph. This is the major graph provided to users. However, some users do not differentiate much among the different items, so these people who do not indicate large differences in the different interest types are presented with a simpler graph of only four types (People, Things, Data, and Ideas) because this matches how they view the world better. Prestige scores (the top and bottom of the Personal Globe model) are graphed only if an individual score above a T score of 60 on Prestige (for scales above the equator) or below a T score of 40 on Prestige) for scores below the equator. Most individuals score in the middle (T scores of 40-60) on Prestige and are, thus, stating that prestige is not especially defining for them so their scores are not graphed. Finally, although interest scores have been found to agree highly with competence perceptions (i.e., we are generally good at things we like), this is not always so. For an individual who has an unusual lack of agreement between the interest profile and the competence profile (i.e., T score greater than 60), these two profiles are graphed so that the user can see, more clearly, where the interests and competence perceptions do not align. Therefore, there are many different uniquely defined presentations of results based on the user's item responses. An asset of the PGI is that, although it is thorough, the report is adapted to each user. If a user wants to examine all the

scores, there is a presentation on the *All Scores* page. Finally, on the All Scores page, there are three validity scales provided to determine whether the user was attending to the items. There are two “Mark 4 here” items to determine whether the user can respond appropriately. In addition, four items are repeated to enable an examination of response consistency. Tracey (2016) provided examples of the different profile formats and how to interpret them in the PGI Manual, which is available on the web site.

The PGI provides a match of the profile to each of the over 950 occupations in the O*NET system, over 450 academic majors, and the 16 Career Clusters created by the Office of Vocational and Adult Education (OVAE).

Users take the PGI-Short online, but given the different content, it does not report as much information. The PGI-Short yields fewer scale scores, and the main difference is the omission of all the high and low prestige scale scores, except the high prestige (north pole) and low prestige (south pole) scale scores. The PGI-Short has only 81 total scores reported for each test taker. The presentation of information is similar to that used for the PGI and provides the same occupation, major, and cluster match.

The PGI-Mini is intended for a quick administration, used most easily as a paper-and-pencil measure, and utilizing both standardized scores or raw scores.

The PGI takes advantage of computer scoring by presenting individually tailored reports. Given that the Personal Globe model is not familiar to all users, using the assessment might take a bit of familiarity for professionals to become used to it. However, it is a more general version of the RIASEC model with which most professionals are familiar. If practitioners prefer, they have access to RIASEC scores in the report. The PGI uses scales and scores that new test takers will understand more easily.

7. Evaluation

The Personal Globe model is an empirically derived model that incorporates the prevailing models of interest but also offers new features. The PGI is an instrument that incorporates current models and scales (e.g., Holland’s RIASEC types and Prediger’s People/Things and Data/Ideas) but expands on these to include prestige and self-efficacy assessments. Use of the PGI has been demonstrated to have very sound reliability and validity support that exists across gender, ethnicity, age, and nationality. In addition, there is less gender bias than found in competing interest scales. The PGI is available free and online (PGI.asu.edu) or by download and provides an individually tailored profile report to each individual. The PGI has three different formats (PGI, PGI-Short, and PGI-Mini) that vary in length and complexity.

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