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# **Technical Brief for the Newly Revised STRONG INTEREST INVENTORY® ASSESSMENT**

## **Content, Reliability, and Validity**

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The *Strong Interest Inventory*<sup>®</sup> assessment is one of the most widely used measures of vocational interests in the United States. It has been used in educational settings, public institutions, and private organizations for nearly 80 years. The *Strong* underwent a major revision over the past few years. Among other goals, the revision was designed to

- Shorten the instrument
- Add current occupations
- Increase the level of business, technology, and teamwork measures
- Broaden the assessment of work and leisure activities
- Reflect the diversity of the U.S. workforce in the samples obtained

Changes or updates were made to the normative sample, items, response options, General Occupational Themes, Basic Interest Scales, Occupational Scales, Personal Style Scales, and Administrative Indices.

### Normative Sample

Starting with the items on the 1994 version of the *Strong*, a research form was developed to collect data for the revision. A committee of *Strong* experts representing both researchers and practitioners made content and structural changes, and worked to develop the research form. At the end of this process, a 361-item research version of the *Strong* was formalized. In addition, a fairly exhaustive set of demographic and biodata items was developed to enable description and understanding of the final sample obtained. Additional occupation-specific questions were developed for each of the targeted occupation groups included in the sampling efforts. The research form was available in both printed and online formats and required approximately one hour to complete.

The General Representative Sample (GRS) replaced the General Reference Sample in this revision. The new sample consisted of an equal number of women and men from the U.S. workforce and accurately represented the distribution of racial and ethnic groups in the United States. Non-white groups represented approximately 30 percent of the total sample of 2,250 employed adults. When compared to the

2000 Census (25 percent non-white) and reports from the U.S. Department of Labor, Bureau of Labor Statistics (16.5 percent non-white), the GRS more than sufficiently represented racial and ethnic groups in the United States. The new GRS was also diverse with respect to its representation of the world of work. It consisted of working adults from more than 370 separate occupations. GRS respondents averaged 35 years of age with more than 9 years of experience in their respective occupations. They reported working an average of 41 hours per week.

### Items and Response Options

Two parts of the 317-item 1994 *Strong* inventory were eliminated in the revision, and the associated items were either deleted or adapted for use in other sections. The revised edition has six sections rather than eight. Of the original 317 items, 192 are included in the revision. The 99 new or modified items bring the total items on the revised *Strong* assessment to 291.

Item response options underwent two changes. First, to make the assessment easier to use and understand, all response options were converted to Likert-type responses. Second, the prior 3-point response option was expanded to a 5-point response option for all the items on the inventory. Figure 1 illustrates the use of the 5-point response option with icons for Strongly Like, Like, Indifferent, Dislike, and Strongly Dislike. This change resulted in increased reliability and precision of measurement and decreased length of the inventory and its scales.

#### SECTION 3 - ACTIVITIES

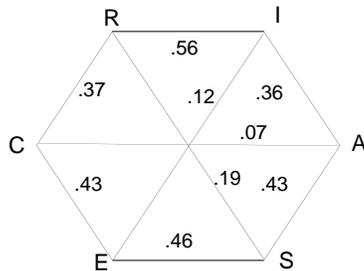
As you did for the occupations and subject areas, indicate how interested you are in each of the activities listed. Give the first answer that comes to mind.

- 154  SL  L  I  D  SD Making a speech
- 155  SL  L  I  D  SD Doing research work
- 156  SL  L  I  D  SD Writing reports

**Figure 1.** Sample of Revised Item Format

## General Occupational Themes

The revised General Occupational Themes (GOTs) were broadened to account for changes in the workplace in the last decade, especially the use of computers and technology. The Conventional Theme, for example, was expanded to include programming and working with software, while the Realistic Theme was broadened to include working with computer hardware.



**Figure 2.** Sample of GOT Inter-scale Correlations

It is important to note, however, that these revisions have not altered the basic configuration of the GOTs, as shown in Figure 2, and that their meanings remain consistent for counseling use, theory, and research. The new item format and careful item selection resulted in improved Cronbach's alphas (a measure of reliability) for five of the six GOTs, with the Realistic Theme remaining consistent at .93. All six revised GOTs possessed alphas of at least .91, and test-retest reliabilities improved slightly as well (see Table 1). When the individuals in the GRS were scored on the 1994 and revised GOT scales, the median correlation for parallel scales was an impressive .95. The revised GOTs also produced a familiar pattern of inter-scale correlations in accordance with Holland's hexagonal calculus (see Figure 2).

Theme	Alpha	Test-Retest
Realistic	.93	.92
Investigative	.92	.89
Artistic	.95	.92
Social	.93	.88
Enterprising	.91	.95
Conventional	.91	.84

**Table 1.** GOT Reliability Estimates in GRS

## Basic Interest Scales

The Basic Interest Scales (BISs) underwent extensive revision for the second time since their introduction to the *Strong* in 1968. All BISs were updated, including some name changes, to measure more contemporary specific interests. The revised *Strong* contains a total of 30 BISs, up from 25 scales in 1994. This includes 10 new scales, including Protective Services, Research, and Entrepreneurship. Four outdated scales, such as Data Management, were removed completely. The number of items per scale was reduced to 6–12 items, down from 5–21 items per scale in 1994. The median reliability estimate of internal consistency (Cronbach's alpha) for the 30 BISs was .87, identical to that for the 25 BISs from 1994. Initial validity studies of the 30 BISs showed that as a group they explained 68–78 percent of the variance in broad occupational groups and 92–93 percent of the variance in college major groups. The BISs discriminated these groups in predictable and meaningful ways. Table 2 summarizes the updates to the Basic Interest Scales from 1994 to 2004.

## Occupational Scales

An extensive data collection effort was undertaken to update the occupations represented on the revised *Strong*. The total number of Occupational Scales (OSs) was increased to 244 from the 211 in the 1994 version of the instrument, with emphasis on technology- and business-related occupations. The revised *Strong* contains 244 OSs: 122 pairs with separate scales for women and men for each occupation. One of the goals of the revision was to encourage clients to explore a wide range of occupations, including those that might previously have been dominated by one gender. The fact that there are OSs for both women and men for every occupation communicates the appropriateness of these occupations for both genders.

The median test-retest reliability for the revised OSs was .86 for 244 scales across an interval of 2–7 months, with the middle 50 percent of OSs between .82 and .89. The number of participants for the 2–7 month interval was 99. The median test-retest reliability on a smaller sample of 40 respondents was .89 for an interval of 2 months, with the middle 50 percent of scales between .85 and .91, which is similar to the results for the

2004 BIS	1994 BIS	Change to 2004 BIS				
		New Scale	Name Change	Merged 2 Scales	Separated 2 Scales	No Change
Mechanics & Construction	Mechanical Activities		X			
Computer Hardware & Electronics	n/a	X				
Military	Military Activities		X			
Protective Services	n/a	X				
Nature & Agriculture	Nature Agriculture			X		
Athletics	Athletics					X
Science	Science					X
Research	n/a	X				
Medical Science	Medical Science					X
Mathematics	Mathematics					X
Visual Arts & Design	Applied Arts		X			
Performing Arts	Music/Dramatics		X			
Writing & Mass Communication	Writing		X			
Culinary Arts	Culinary Arts					X
Counseling & Helping	Social Service		X			
Teaching & Education	Teaching		X			
Human Resources & Training	n/a	X				
Social Sciences	n/a	X				
Religion & Spirituality	Religious Activities		X			
Healthcare Services	Medical Service		X			
Marketing & Advertising	n/a	X				
Sales	Sales					X
Management	Organizational Management		X			
Entrepreneurship	n/a	X				
Politics & Public Speaking	Law/Politics Public Speaking		X	X	X	
Law	Law/Politics		X		X	
Office Management	Office Services		X			
Taxes & Accounting	n/a	X				
Programming & Information Systems	n/a	X				
Finance & Investing	n/a	X				

**Table 2.** Summary of Additions and Changes to Basic Interest Scales

Administrative Assistant	ESL Instructor	Recreation Therapist
Chiropractor	Financial Analyst	Rehabilitation Counselor
College Instructor	Financial Manager	Retail Sales Representative
Computer & IS Manager	Firefighter	Sales Manager
Computer Scientist	Geographer	Technical Sales Representative
Computer Systems Analyst	Network Administrator	Technical Support Specialist
Editor	Operations Manager	Top Executive
Engineering Technician	Production Worker	Urban & Regional Planner

**Table 3.** Summary of New Occupational Samples on the *Strong*

four samples reported in the 1994 *Strong* manual. The median Q statistic (a measure of effectiveness in separating occupational samples from the GRS) on the 244 OSs was 1.53 (45 percent overlap), with the middle 50 percent falling between 1.30 (52 percent overlap) and 1.79 (37 percent overlap) and 90 percent of the scales falling between 1.15 (57 percent overlap) and 2.12 (29 percent overlap). To be included on the revised *Strong*, an OS was required to have a Q statistic of 1.00 or better.

The most notable difference between the 1994 *Strong* assessment and the revised version is in the length of the Occupational Scales. The 1994 OSs averaged 46 items, while the revised OSs average 28. It is noteworthy that an average decrease in scale length of 18 items resulted in only modest decreases in average reliability or concurrent validity. The scales that contained the fewest items were female Retail Sales Representative, Computer Systems Analyst, Military Officer, and Elementary School Teacher, and male and female Travel Consultant. Even with a relatively small number of items, two of these six scales had Qs greater than 1.50. All of the 244 OSs on the revised *Strong* possessed at least a one standard deviation separation between the occupational and reference samples as measured by Tilton's Q. Table 3 lists the occupational samples that were newly collected for this revision.

### Personal Style Scales

The Personal Style Scales were introduced to the *Strong* in 1994. The revision aimed to maintain

the quality of the original scales while exploring additional personal style dimensions in the set of inventory items. The revised *Strong* resulted in five Personal Style Scales: Work Style, Learning Environment, Leadership Style, Risk Taking, and Team Orientation.

The Team Orientation scale was one of several constructs identified in the factor structure of the items and considered for inclusion on the inventory as a new scale. It was included because it appeared to have the greatest combination of psychometric quality and potential for use in counseling practice. Internal consistency reliabilities (Cronbach's alphas) in the GRS were high for each of the five scales. Alphas ranged from .87 for the Learning Environment and Leadership Style scales to .82 for the Risk Taking scale (see Table 4).

Personal Style Scale	Number of Items	Cronbach's Alpha
Work Style	29	.85
Learning Environment	41	.87
Leadership Style	16	.87
Risk Taking	10	.82
Team Orientation	9	.86

**Table 4.** Reliability Estimates for Personal Style Scales in the GRS

	WS	LE	LS	RT	TO
Work Style	--	.03	.38	-.20	.32
Learning Environment			.49	.11	.20
Leadership Style				.38	.55
Risk Taking					.24
Team Orientation					--

**Table 5.** Summary of Personal Style Scale Inter-scale Correlations

With the addition of the Team Orientation scale, there are now five measures of preferences for living and working on the *Strong*. The two poles on the new scale are: “Accomplishes tasks independently” and “Accomplishes tasks as a team.” The most significant question about the new Team Orientation scale was its relationship to other scales on the *Strong* assessment, particularly the Work Style scale.

The five PSSs (Table 5) showed slight to moderate inter-scale correlations and no coefficients greater than .55, suggesting that each scale was probably adding something unique to the assessment. For instance, the Team Orientation scale emphasized teamwork and shared goals, in contrast to the more general introversion-extroversion dimension measured by the Work Style scale. The correlation between these two scales was a very reasonable .32.

While all Personal Style Scales were updated, the other significant change was in the content of the Risk Taking scale, previously called Risk Taking/Adventure. As the name change notes, this scale was revised to emphasize different types of risk-taking behavior, including emotional, financial, and physical risks. Examples of items added to the revised Risk Taking scale include “Making risky commitments,” “Investing money in the stock market,” and “Taking a chance on a new business idea.”

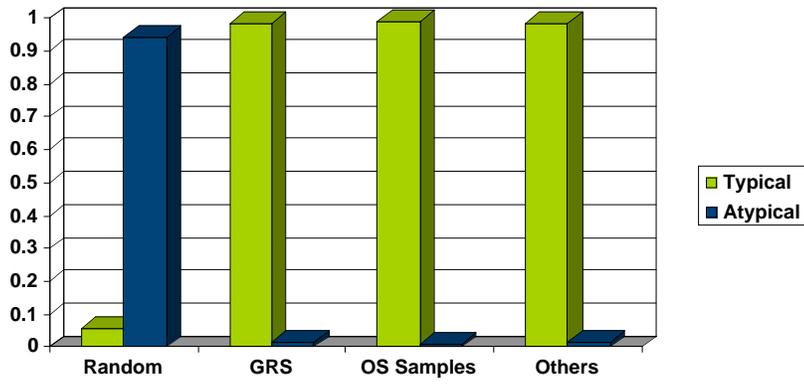
### Administrative Indices

The infrequency index included on the 1994 version of the *Strong* was eliminated in the

revision. Found to be ineffective in identifying truly problematic profiles, it was replaced by the typicality index. This index attempted to automate the process of identifying random or atypical response profiles. The computation of the typicality index relied on consistency of responses to items included in the *Strong* assessment. Twenty-four pairs of items that were highly correlated with each other in the GRS were used to construct the typicality index. Example item pairs include Accountant/Accounting, Poet/Poetry, and Stockbroker/Trading stocks. A point was added to the typicality index score for each pair where the responses were in the same direction. The range of possible scores for the typicality index was 0–24. Scores of 17 or higher on the typicality index were considered to be reflective of consistent responding to the inventory. In initial studies, the typicality index appeared to flag nearly 95 percent of cases in simulated random data files and 1–2 percent of actual inventory administrations (see Figure 3).

### Conclusion

The *Strong* has developed a loyal following of users over the years, probably due, at least in part, to a commitment on the part of everyone associated with it since its introduction, beginning with E. K. Strong, Jr., to updating and improving the inventory. This presentation highlighted some of the more salient updates resulting from the recent revision. Additional detail is forthcoming, and it is hoped that scholars and practitioners will continue to research the implications of these updates.



**Figure 3.** Percent of Typical vs. Atypical Typicality Index Results in Four Samples