

# Validity of 2004 SII: Gender and Ethnicity Effects

**Nancy A. Schaubhut**      **David A.C. Donnay,**  
CPP, Inc.

**Courtney E. Gasser**      **Fred H. Borgen**  
Iowa State University

The *Strong Interest Inventory*<sup>®</sup> assessment has specific content measures, the Basic Interest Scales (BISs), as well as general content measures, the General Occupational Themes (GOTs), which measure the six Holland (1997) RIASEC themes. The validity of these scales has been well studied over the years (Harmon, Hansen, Borgen, & Hammer, 1994). With a newly revised Strong assessment, it is important to begin studying the validity of the revised and new content scales. Using samples of college students (N = 1,652) and working adults (N = 1,192), we examined the value of the BISs and GOTs in predicting both college major and occupational group. Results showed increases in explanatory power when the BISs were added to the GOTs. Additionally, scale means were explored by gender and ethnicity to demonstrate generalizability of the GOTs and BISs, as well as important group differences.

With a history of nearly 80 years, the *Strong Interest Inventory*<sup>®</sup> has frequently been revised to keep it useful in a changing world. In 2004, the latest revision of the Strong will be completed, substantially updating the 1994 *Strong Interest Inventory*<sup>®</sup> (Harmon, Hansen, Borgen, & Hammer, 1994). A large number of new items were written for the revision to reflect contemporary work life including technology and business, yielding a number of useful new scales.

This study presents the initial validity data on 36 content scales of the newly revised Strong assessment. These scales are the six General Occupational Themes (GOTs) and the 30 Basic Interest Scales (BISs). We have illustrated the kinds of validity studies currently being conducted on the 2004 databases of college students and working adults. Validity generalization of the 2004 scales across gender and ethnicity is specifically addressed.

In the past decade, several validity studies have been conducted on the scales of the 1994 Strong. Donnay and Borgen (1996) used multivariate methods to show the concurrent validity for predicting occupation of the three kinds of content scales, the GOTs, BISs, and the Personal Style Scales (PSSs). Using similar methods, Olsen (1996) showed that the overall validity of these scales is similar for women and men. Similarly, Lattimore and Borgen (1999) found comparable validity for the GOTs across five racial/ethnic groups.

In previous validity studies, scales of the 1994 Strong have been shown to predict educational aspirations, to distinguish among college majors and occupational plans, and to relate to personality dimensions (Borgen & Lindley, 2003). Rottinghaus, Lindley, Green, and Borgen (2002) demonstrated the substantial role of some Strong scales in predicting educational aspirations. The validity of the 1994 Strong for predicting college major was examined by Isaacs, Borgen, Donnay

and Hansen (1997), and by Ralston, Borgen, Rottinghaus, and Donnay (in press).

These previous studies of the validity of the 1994 Strong, often with large national samples of working adults, have enhanced our knowledge of interests and careers, and they have paved the way for similar studies with the newly revised Strong assessment. Many of these studies will now be extended to the new Strong, where we will look at its overall validity, and its validity generalization across gender and ethnicity. The 2004 databases contain many valuable criterion variables for this purpose, such as college major and occupation.

With the addition of ten new content scales on this revision of the Strong, it again becomes important to examine the validity of these and the other content scales on the inventory. The ten new BISs are Computer Hardware & Electronics, Protective Services, Research, Human Resources & Training, Social Sciences, Entrepreneurship, Marketing & Advertising, Finance & Investing, Programming & Information Systems, and Taxes & Accounting.

Within the employed adult sample there was an opportunity to explore equivalence of these content scales in terms of gender and ethnicity. The findings demonstrate that the scales' validity can be generalized across gender and ethnic groups in most instances.

## Method

### *Participants*

*College Sample.* A national sample of 1,652 college students (1,234 women, 418 men), representing a varied set of 31 college majors, responded to a research version of the Strong assessment. They also provided information about their major field of study,

which was used as criterion in this study. Average age of the students was 22.83 (SD = 6.3), and they were reasonably ethnically diverse (66% Caucasian, 9% African American, 5% Hispanic, 7% Asian, 13% other).

*Employed Adult Sample.* A national sample of 1,192 employed adults (833 women, 359 men), who can be classified into 19 different occupational groups, completed a research version of the Strong assessment, including demographic questions. The occupational variable was used as a criterion in this study. This particular sample was very ethnically diverse (38% Caucasian, 32% African American, 13% Hispanic, 17% Asian), and average age was 33.72 (SD = 9.5).

*Measures.* 6 GOTs and 30 BISs of the newly revised Strong assessment were examined. During the Strong assessment revision, a factor analysis was used as guidance for updating the GOTs and BISs. The six GOTs are Realistic, Investigative, Artistic, Social, Enterprising, and Conventional. The enhanced item pool permitted 30 contemporary measures of specific interests, including the 10 new scales.

*Analyses.* Multivariate discriminant function analyses were run separately to predict 31 majors in the college sample and 22 occupational groups in the working adult sample, from three sets of variables: the six GOTs, 30 BISs, and the GOTs and BISs combined. As shown in Table 1, the GOTs alone explained 69% of the variance in the college sample and 34% in the employed adult sample. The BISs alone accounted for 93% in the college sample, 68% in the employed adult sample. When taken together, GOTs and BISs explained 94% of variance in the college sample, 73% in the employed adult sample. These results, along with the leave one out classification,

or jackknife approach to cross-validating classifications from functions, can also be seen in Table 1.

Mean scores were also calculated for the GOTs and BISs for several different groups in order to evaluate generalizability. Using the employed adult sample, these scores

Table 1. Discriminant Function Results for Separate and Combined Predictor Sets Examining College Major, and Occupational Classification

Sets of Scales	Wilks's $\Lambda$	1- $\Lambda$	# of Discriminant Functions	Hit Rate	
				Original Group	Cross-Validated
College Majors ( $n=1,652$ )					
6 GOTs	.310	.690	6	23.2%	21.7%
30 BISs	.066	.934	30	38.7%	29.1%
BISs+GOTs	.056	.944	30	41.6%	29.4%
Occupational Groups ( $n=1,201$ )					
6 GOTs	.658	.342	6	22.6%	20.0%
30 BISs	.320	.680	18	32.1%	21.4%
BISs+GOTs	.274	.726	18	35.1%	21.6%

Note: College Majors  $k=31$ ; Occupational Groups  $k=19$ .

were compared across men and women, and across four ethnic groups (Caucasians, African Americans, Asians, and Hispanics). The results for gender are shown in Figures 3 and 4; for ethnicity in Figures 1 and 2.

### Results

This study used multivariate discriminant function analyses to evaluate the predictive validity of 36 of the content scales on the newly revised Strong assessment. Using samples of college students and working adults, validity was evaluated against criterion measures of college major and occupational group.

Table 1 shows discriminant function results for 2004 Strong GOTs and BISs when predicting several concurrent validity criteria. Thirty-one college majors are predicted for the college students. Nineteen broad occupational groups, aligned with the Department of Labor's O\*NET structure, are predicted for a sample of working adults. Briefly, the results show that the BISs, as more specific scales, substantially improve the prediction of these criteria over the broad GOTs. The best predictions are obtained for the 31 college majors. For college major, the GOTs correctly predicted group membership 21.7% of the time, and BISs about 29.1%. In predicting occupational group, the GOTs correctly predicted 20.0% of the time, and BISs 21.0%.

Mean scores for the 36 content scales of interest were also calculated, allowing an examination of consistencies and differences of the scales across gender and ethnicity, and permitting evaluation of validity generalization. Following the guidelines established in the 1994 Strong Interest Inventory Applications and Technical Guide (Harmon, et al., 1994), any group differences greater than one-half standard deviation were noted. None of the GOTs differ by more than one-half standard deviation (five points) between the four ethnic groups (see Figure 1). Samples of mean BIS scores are shown in Figure 2 for the four ethnic groups. Consistent with findings by Harmon, et al. (1994), only two of the BISs differed by more than five points between the ethnic groups. African Americans demonstrated lower means on the Nature and Agriculture BIS, and higher means on the Religion and Spirituality BIS. The other BIS means in this figure are similar to the remaining 28 BISs in that they differ by less than five points between ethnicities.

Previous studies have noted interest differences between men and women (Hansen, 1978). For example, men report significantly more interests in Realistic areas than women. Also, women tend to discriminate less between the Realistic and Investigative Themes than men (Hansen & Collins, 1993). This explains the current

findings that show women score, on average, more than five points lower than men on the Realistic GOT, as well as on many R- and I-Themed BISs, such as Mechanics and Construction, Computer Hardware and Electronics, Research, and Mathematics (see Figures 3 and 4).

### Discussion

The present study sought to begin validation of the revised and new content scales of the newly revised Strong assessment. Results are similar to previous studies that indicated the BISs add explanatory power to the GOTs (Ralston, Borgen, Rottinghaus, & Donnay, 2003), as they explained additional variance in both college major and occupational group membership.

As Savickas and Spokane (1999) have argued, the purpose of validating an interest inventory is to give its scales meaning. Direct meaning is the hallmark of content

scales. "Content scales take the mystery out of interpretation, and seamlessly link the quantitative to the linguistic" (Ralston, et al., in press). This study highlighted predictive validity of the newly revised Strong assessment scales, as well as differences between men and women, and four ethnic groups. Similar results were found in previous studies that showed ethnic differences on the Nature and Agriculture BIS, Religion and Spirituality BIS; and gender differences on the Realistic GOT, and R and I-themed BISs. This information enhances the interpretative value of the Strong for career planning and exploration. Further validity evidence will be presented in the forthcoming Strong manual. Future studies should continue examining the validity of the content scales of the newly revised Strong assessment, as well as differences between gender and ethnic groups.

Figure 1. Mean GOT scores of men and women

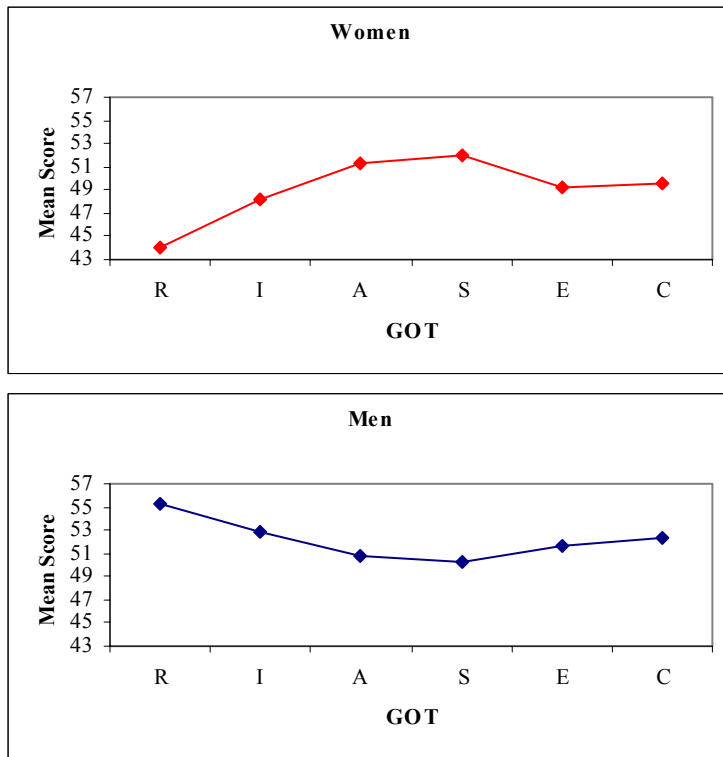


Figure 2. Selected BIS means by gender

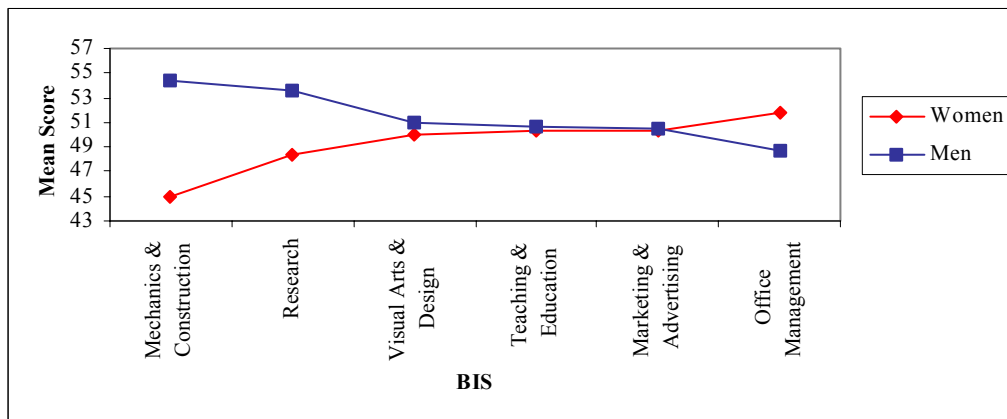


Figure 3. Mean GOT scores of four ethnic groups

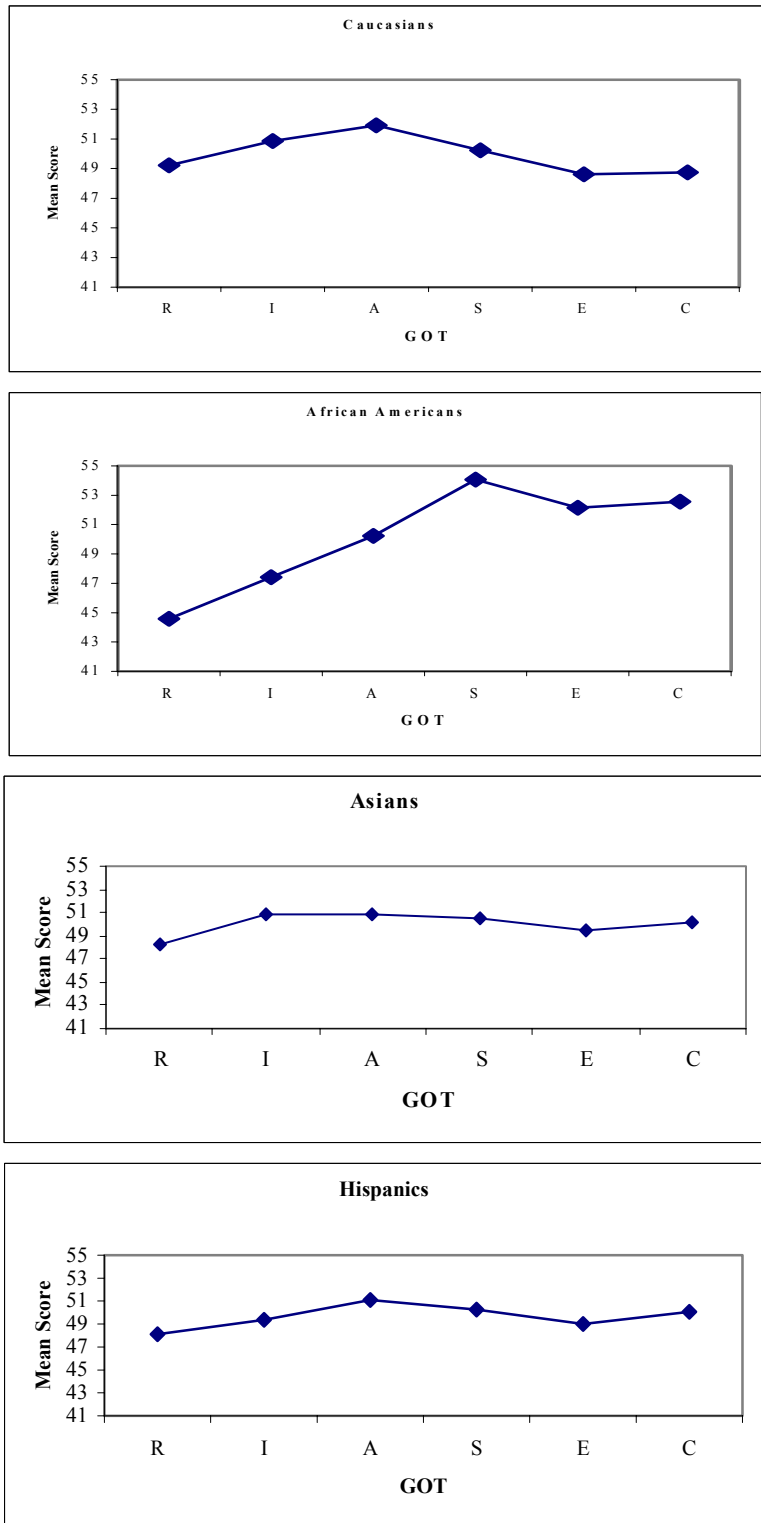
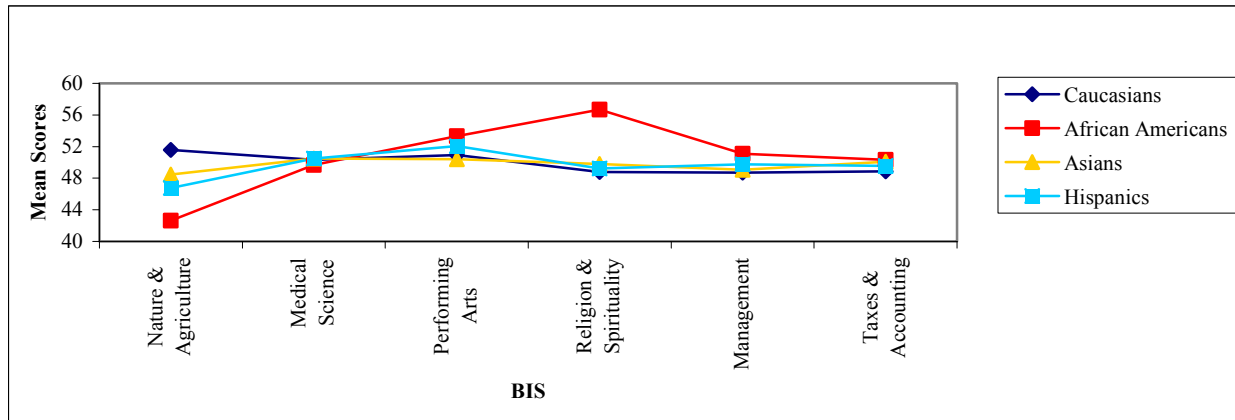


Figure 4. Selected BIS means by ethnicity





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