Appropriateness of the Use of the SCII-TPPSC for Anglophone and Francophone Canadian Populations

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Abstract

Holland's hexagonal model has been used to interpret scores of the Strong-Campbell Interest Inventory (SCII) and the Test de préférences professionnelles Strong Campbell (TPPSC) with Anglophone and Francophone Canadian college populations ever since the introduction of the General Occupational Theme scales in 1974 and 1977 respectively. An examination of the appropriateness of the use of the theoretical model in organizing the General Occupational Theme scores of the SCII and the TPPSC with Canadian populations is therefore highly relevant and overdue. The fit of Holland's RIASEC model to the internal relationships among the General Occupational Theme scales was investigated for a combined sex, a male and a female U.S. General Reference sample (as reported in the SCII manual), and for Anglophone and Francophone subjects in a combined sex, a male and a female sample by means of the KYST nonmetric multidimensional scaling analysis. For the combined sex samples and for all males, the SCII-TPPSC GOT scale fit to the hexagonal model was very appropriate. For Canadian Anglophone and Francophone females, the fit between the GOT scales with the hexagonal model was considerably better than for the U.S. female norming sample. Developmental issues such as the effect of age on the clustering of certain scales and the interpretation of their scores are discussed.

Résumé

Le modèle hexagonal des intérêts de John Holland sert de fondement théorique aux échelles thématiques du Strong Campbell Interest Inventory (SCII) et du Test de Préférences Professionnelles Strong Campbell (TPPSC) depuis 1974 et 1977 respectivement. Il est donc pertinent et urgent d'étudier l'applicabilité de ce modèle dans l'interprétation des interrelations entre les échelles thématiques du SCII et du TPPSC chez la population canadienne. Cette recherche a examiné cette question chez la population normative américaine (hommes et femmes en général) et chez une population d'étudiants universitaires canadiens anglophones et francophones de sexe masculin et féminin. L'analyse multidimensionnelle (KYST) des intercorrélations entre les échelles thématiques du TPPSC indiqua que le modèle hexagonal représente adéquatement l'organisation des intérêts des sujets de sexe masculin. Toutefois le modèle théorique de Holland représente mieux les intérêts des étudiantes universitaires canadiennes anglophones et francophones que ceux de l'échantillon normatif américain de sexe féminin. La discussion traite de l'influence de facteurs développementaux tel que l'âge dans le groupement de certaines échelles dans la représentation spatiale.

The Strong-Campbell Interest Inventory (SCII, Campbell, 1974; Campbell & Hansen, 1981; Hansen & Campbell, 1985), is perhaps the best known and most widely used instrument in vocational testing and assessment of career interests. It provides a measure of six personality types based on Holland's (1966, 1973, 1985) theory of vocational choice, which posits the following six personality types — Realistic (R), Investigative (I), Artistic (A), Social (S), Enterprising (E), and Conventional (C). These types are ordered *RIASEC* in a clockwise

direction around a hexagon. The internal relationships among the personality types are defined by the hexagon, so that the distances between the types are "inversely proportional to the theoretical relationship between them" (Holland, 1973, p. 5). Opposite types on the hexagon are least related, and adjacent types most related. Alternating types are indicative of an intermediate relationship. These personality types form the framework for interpreting and organizing vocational choices. It becomes important therefore to examine the fit of Holland's hexagonal model of six personality types to the six SCII Occupational Theme scales for specific populations.

A number of studies examining the construct validity of the SCII General Occupational Theme (GOT) scales have indicated that the internal structural relationships differ somewhat from Holland's hexagonal model (Utz & Korben, 1976; Slaney, 1978; Campbell, 1974; Horton & Walsh, 1976; Gaffey & Walsh, 1974). Rounds, Davison, and Dawis (1979) found that whereas the SCII hexagon fit was good for males, for females it was not as good, with a near reversal of the Social Enterprising scales. They recommended caution in the interpretation of scores for females on the SCII GOT scales in terms of the set of contrasts and descriptors typically used to describe the personality types.

Tuck and Keeling (1980) found a noticeable inconsistency in their data for females. The distance between the postulated adjacent types of Conventional and Realistic was greater than the distance between five of the six alternating types, and two of the three opposite types. In fact, the fit of the data was better for the order IRASEC for females in 40 out of 54 comparisons. Feldman and Meir (1976), as well as Edwards and Whitney (1972), also found in their data, that the order of types is IRASEC for females. In light of the discrepancies in the research findings, there is an indication that further study with other samples is needed to support an equivalent interpretation of the SCII GOT's with all populations.

In the area of vocational psychology and vocational testing, cultural sensitivity is important. Fouad, Cudeck & Hansen (1984) examined the correspondence of interests of Hispanics to Holland's theory, and results supported Holland's (1966, 1973, 1985) structure of interests. The relatively small sample used in the study (55 females and 39 males), did not permit an examination of possible sex differences. Haverkamp (1987) found the hexagonal model appropriate for her Chicano-Latino and American-Indian samples, but not for Black and Asian-Pacific islander students using combined sex samples. However, in another study (Wakefield, Yom, Doughtie, Chang & Alston, 1975), the validity of the Holland scales for blacks was found to

correspond generally to those for whites, with some discrepancies in the closeness of association between certain scales.

Studies on work values, a variable closely related to career interests, (McCarrey, Edwards & Jones, 1977) have identified differences between Canadian Anglophones and Francophones. As a consequence, the assumption is that there could be differeces in career patterns between these two groups, as well as the male-females differences cited in the literature.

To date no research findings are available on the applicability of the Holland hexagonal model to the patterns of interests of a Canadian population. Specifically, there is no information as to possible differences or similarities between Anglophone and Francophone Canadians.

The present study examines the appropriateness of the use of the Holland hexagonal model in assessing vocational and career interests for Canadian Anglophones and Francophones separately, and for females and males separately.

Instruments

The French Test de Préférences Professionnelles Strong-Campbell (TPPSC) (Strong, Campbell & Chevrier, 1977) like the English SCII (Campbell, 1974; Campbell & Hansen, 1981; Hensen & Campbell, 1985) has six GOT scales which consist of 120 items, 20 items per scale, most of the items being occupational titles. Each item is scored plus 1, 0, or minus 1 for, respectively, a "like," "indifferent," or "dislike" response. Scale scores, the sum of item scores, are converted to standard scores based on combined-sex General Reference Sample norms. Verbal statements provide same sex comparisons. These six SCII-TPPSC scales correspond to Holland's six personality types.

Data and Subjects

Client data consisted of the General Occupational Theme (GOT) scores of the Strong Campbell Interest Inventory (SCII), (Campbell, 1974; Campbell & Hansen, 1981; Hansen & Campbell, 1985), and the GOT scores of the Test de Préférences Professionnelles Strong-Campbell (TPPSC) (Strong, Campbell & Chevrier, 1977).

This information was obtained from 640 Anglophone Canadian female clients (SCII), 624 Francophone Canadian female clients (TPPSC), 366 Anglophone Canadian male (SCII), and 371 Francophone Canadian male clients (TPPSC), who had sought vocational counselling in order to clarify their interests at a University Counselling Centre offering services in both French and English, during the academic years from 1977 through 1986. The SCII and the TPPSC are

routinely administered to vocational counselling clients seeking help in defining their educational and/or occupational interests.

Mean age of the total sample was 22 years. The sample's age distribution was constituted as follows: 16-18 years old: 12.7%; 19-21: 51%; 22-24: 18.8% and 25 and above: 17.5%. Mean age of both the male and female samples was 22 years while for the anglophone and francophone samples it was 22.3 and 21.7 years respectively. The three most highly represented faculties in which students were registered were, Arts: 28.8%, Science & Engineering: 25.1%, and Social Science: 18.3%. The remaining 27.8% were from Administration, Health Sciences, Education, etc. 38.1% of the client sample were in their first year of a programme, 26.8% in their second year, and 15.6% in third year. The remaining 19.5% were either in the fourth year or in graduate studies.

TABLE 1

Intercorrelations between the SCII-TPPSC General Occupational Themes - Scales for 1008 Canadian Anglophone males and females (below the diagonal) and 1010 Canadian Francophone males and females (above the diagonal)

Holland Scale	R	I	A	S	E	C
Realistic		.54	.20	.22	.30	.31
Investigative	.48		.35	.28	.13	.26
Artistic	.22	.33		.38	.13	-.01
Social	.19	.23	.39		.33	.26
Enterprising	.25	.10	.09	.26		.58
Conventional	.25	.25	-.04	.23	.58	

Procedure

For the Canadian samples, it was decided to pool data across three different editions of the SCII-TPPSC (Campbell, 1974; Campbell & Hansen, 1981; Hansen & Campbell, 1985). In order to justify the use of pooled data, equivalence of revisions had to be established. The 1974, 1981 and 1985 manuals of the Strong-Campbell Interest Inventory report that the test items used to obtain the General Occupa-

tional Theme scores remained the same over the three different editions. In spite of somewhat different actual GOT correlations among the three forms of the test, the patterns of inter-correlations for each general reference sample support the overall structure of the hexagon, with the strongest correlations occurring between adjacent scales and the weakest between scales directly opposite each other. In all versions the hexagonal arrangement for the norming samples of women is not as obvious as it is for men.

TABLE 2

Intercorrelations between the SCII-TPPSC General Occupational Themes - Scales for 366 Canadian Anglophone males (below the diagonal) and 371 Canadian Francophone males (above the diagonal)

Holland Scale	R	I	A	S	E	C
Realistic		.50	.20	.24	.29	.31
Investigative	.49		.41	.31	.06	.27
Artistic	.18	.29		.41	.12	.09
Social	.22	.25	.45		.31	.32
Enterprising	.23	.07	.09	.27		.61
Conventional	.29	.28	.03	.23	.63	

Rather than relying only on the statements of equivalency of data given in the SVIB-SCII manuals for the three (Campbell, 1977: p. 34; Campbell & Hansen, 1981: p. 31; and Hansen & Campbell, 1985: p. 29) general reference samples, each set of correlations was submitted to the KYST[1] multidimensional scaling method in order to test the appropriateness of the two dimensional solution and of the hexagonal ordering of the occupational themes. Stress values for the two dimensional KYST solution obtained with the 1974 correlations were .03 for males and .01 for females. With the 1981 correlations, the stress values were .008 for males and .023 for females; with the 1985 correlations .007 for males and .027 for females. These stress values indicate good (when less than .05) and excellent fit (when less than

TABLE 3

Intercorrelations between the SCII-TPPSC General Occupational Themes - Scales for 640 Canadian Anglophone females (below the diagonal) and 624 Canadian Francophone females (above the diagonal)

Holland Scale	R	I	A	S	E	C
Realistic		.55	.34	.28	.28	.29
Investigative	.47		.38	.28	.16	.25
Artistic	.34	.38		.36	.19	-.04
Social	.24	.24	.33		.36	.24
Enterprising	.23	.11	.11	.27		.56
Conventional	.27	.25	-.08	.23	.56	

.025) of the two dimensional solutions. The one dimensional solutions were all above .10 (with the exception of the 1985 female general reference sample where it was .08) suggesting that the two dimensional solution provides the best fit.

In addition, the RIASEC ordering around the hexagon was maintained for all groups. Since equivalency was established empirically, in addition to the statements in the manual suggesting consistency with the hexagonal model, it seems logical to use the 1985 U.S. General Occupational Theme correlations to compare with the pooled Canadian sample. The 1985 SCII general reference sample represents the most up-to-date and recent available data on the general occupational theme scales for a U.S. population.

Correlation matrices for the SCII GOT scales for 300 United States males and 300 United States females were therefore obtained from the U.S. 1985 general reference samples (Hansen & Campbell, 1985b, p. 29), for the purpose of comparison with the Canadian samples.

Correlation coefficients were computed for the SCII-TPPSC GOT scales, to obtain separate matrices for women and men, and for Anglophone and Francophone Canadians.

Table 1 shows the intercorrelations of the six GOT scales for 1008 Canadian Anglophones, males and females combined, and for 1010

Canadian Francophone male and female subjects, also combined. Table 2 shows the intercorrelations of the six GOT scales for 366 Canadian Anglophone males and 371 Canadian Francophone males respectively. Table 3 shows the intercorrelations of the six GOT scales for 640 Canadian Anglophone females and 624 Canadian Francophone females respectively.

The correlations among the six GOT scale scores were converted to a two-dimensional representation by multidimensional scaling (Kruskal, Young, & Seery, 1973). The resultant two-dimensional display is such that the six dimensions are fitted into two dimensions in the best possible way. The fit measure indicates how well the stimulus coordinates account for the proximity data. Goodness of fit in reduced space is reflected in the stress values provided. A stress value of less than .05 is evidence of good fit, less than .025: excellent fit and of .000: perfect fit (Kruskal, 1964, p. 3).

TABLE 4

Two Dimensional Kyst Solutions for the SCII-TPPSC GOT scale scores for U.S. Anglophone and Francophone Canadian samples

SCII-TPPSC GOT Scales	U.S.		CANADIAN			
			Anglophone		Francophone	
	1	2	1	2	1	2
Realistic	-0.039	-0.863	-0.077	0.758	0.149	0.871
Investigative	0.491	-0.717	-0.450	0.734	-0.544	0.697
Artistic	1.414	0.515	-1.248	-0.353	-1.184	-0.272
Social	-0.172	0.702	-0.262	-0.855	-0.323	-0.851
Enterprising	-0.819	0.504	0.983	-0.344	0.831	-0.536
Conventional	-0.875	-0.142	1.053	0.059	1.071	0.091
Stress Value	.007		.008		.004	

In order to insure that the two dimensional solution provided the best and most parsimonious fit, the correlations among the six GOT scales were also submitted to a one dimensional multidimensional analysis. Stress values for this solution are as follows: all subjects, .245;

all Anglophones, .245; Anglophone males, .255; Anglophone females, .178; all Francophones, .224; Francophone males, .227; and Francophone females, .213. For the U.S. general reference sample, the one dimensional value was .189 for males and .080 for females. These stress values suggest that the one dimensional solution does not provide a good fit for the data.

TABLE 5

Two Dimensional Kyst Solutions for the SCII-TPPSC GOT scale scores for male samples

SCII-TPPSC GOT Scales	U.S.		CANADIAN			
			Anglophone		Francophone	
	1	2	1	2	1	2
Realistic	0.268	0.694	0.236	0.782	0.149	-1.043
Investigative	-0.347	0.708	-0.404	0.915	0.870	-0.441
Artistic	-1.498	-0.177	-1.112	-0.372	0.948	0.670
Social	-0.121	-0.775	-0.585	-0.674	0.013	0.740
Enterprising	0.751	-0.655	0.958	-0.646	-1.083	0.218
Conventional	0.948	0.204	0.908	-0.005	-0.896	-0.145
Stress Value	.007		.010		.010	

Results

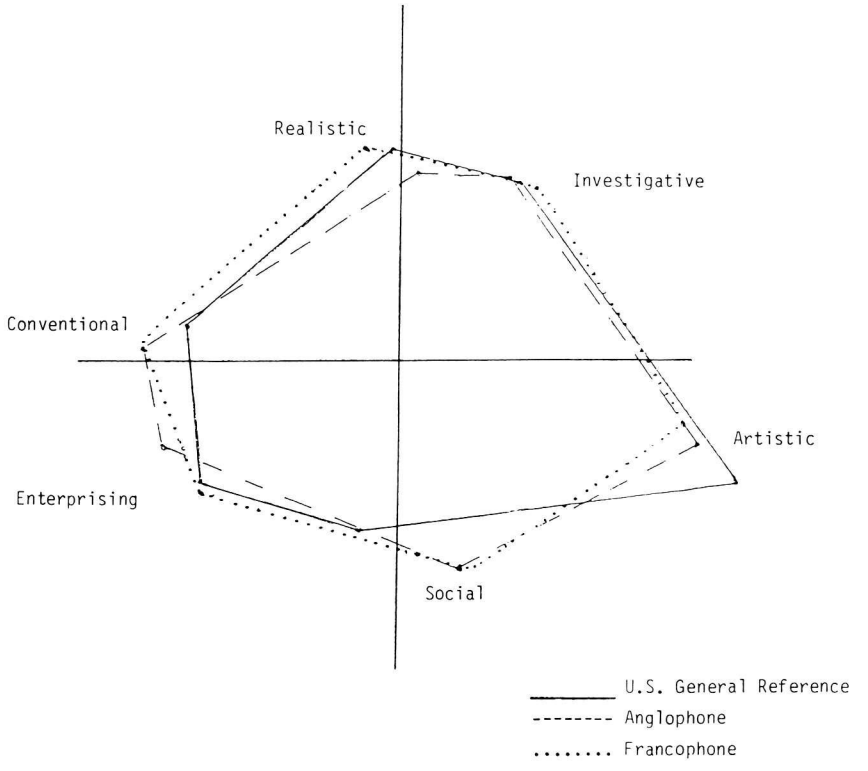
Tables 4, 5 and 6 give the two dimensional KYST solutions for the GOT scale scores, first for the combined sex, second for the male, and third for the female sample. Each table, respectively, gives the two-dimensional solutions for the U.S. General Reference sample, the Anglophone Canadian and the Francophone Canadian samples. Stress values for the combined sex sample of the U.S. General Reference sample was .007, for the Anglophone Canadians .008, and for the Francophone Canadian sample .004. For the male samples, the corresponding stress values were: .007, .010 and .010 and for the

female samples, the values were: .027, .009 and .010 again for the U.S. general reference, the Anglophone Canadian and the Francophone Canadian samples respectively. The stress values suggest that a two-dimensional representation of the data is excellent (<.025) for all samples with the exception of the U.S. females where it is good (<.05) (Kruskal, 1964, p. 3).

TABLE 6

Two Dimensional Kyst Solutions for the SCII-TPPSC GOT scale scores for female samples

SCII-TPPSC GOT Scales	U.S.		CANADIAN			
			Anglophone		Francophone	
	1	2	1	2	1	2
Realistic	0.596	-0.740	0.318	-0.645	-0.034	-0.555
Investigative	0.910	-0.084	0.602	-0.568	-0.752	-0.678
Artistic	1.065	0.647	1.122	0.293	-1.053	0.231
Social	-0.537	0.266	0.133	1.009	-0.304	0.912
Enterprising	-1.201	0.282	-1.131	0.104	0.918	0.387
Conventional	-0.832	-0.372	-1.044	-0.193	1.225	-0.297
Stress Value	.027		.009		.010	

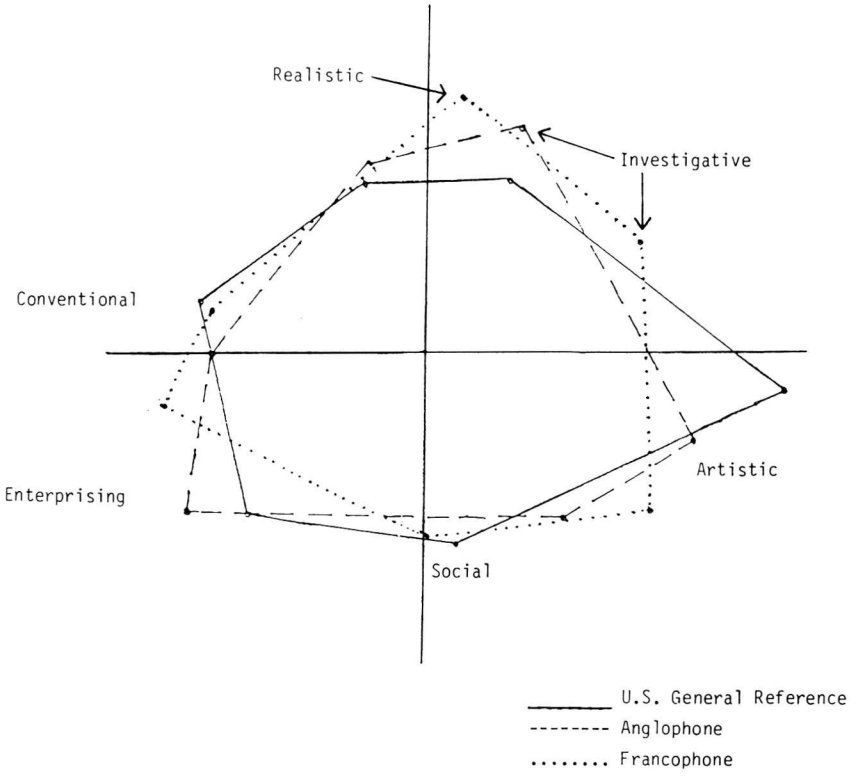


Two Dimensional Configurations for U.S. General Reference, Anglophone and Francophone Canadian Combined Sex Samples Obtained from SCII-TPPSC GOT Scale Correlations

Figure 1

Figures 1, 2 and 3 show, in a clockwise ordering, the superimposed two dimensional spatial representations of the KYST solutions for the combined sex, male and female samples respectively. Each figure provides the superimposed spatial representations for the U.S. General Reference, Anglophone Canadian and Francophone Canadian samples indicated.

In figure 1, the arrangement of the GOT scales conforms to Holland's RIASEC ordering for all three combined sex samples. The shape of the configurations approximates a hexagon. Also the coordinates (scale values) for the same name GOT scales are very similar for the three samples.

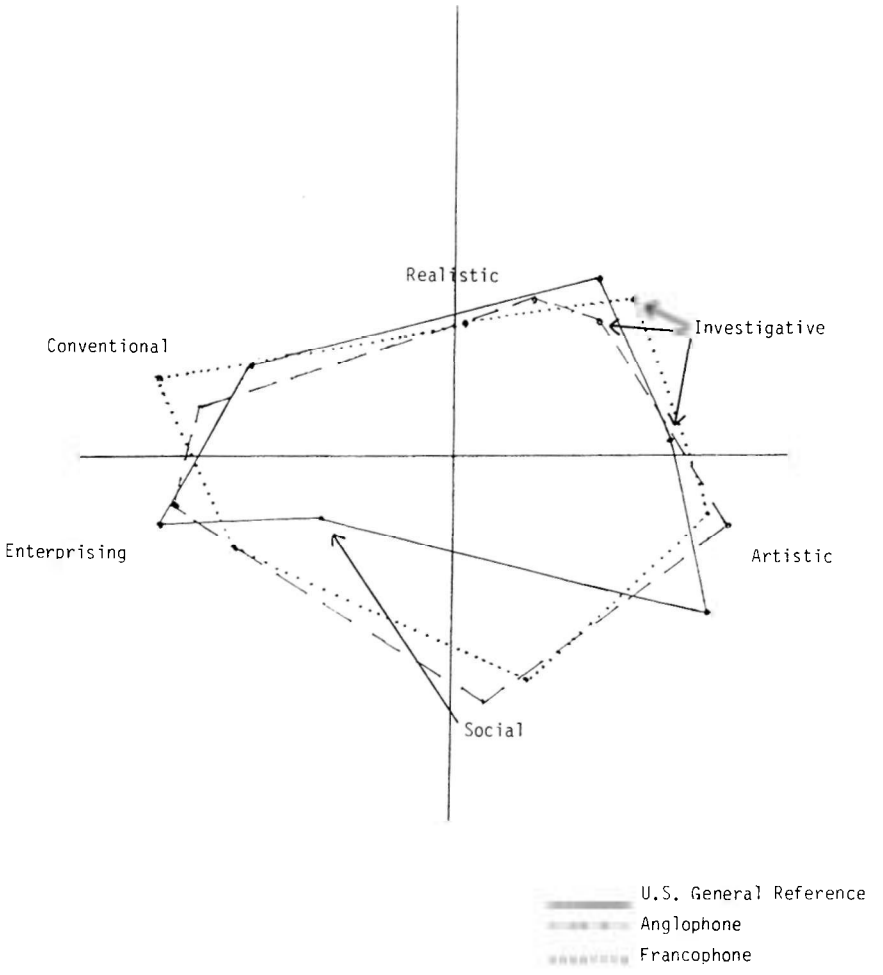


Two Dimensional Configurations for U.S. General Reference, Anglophone and Francophone Male Canadian Samples Obtained from SCII-TPPSC GOT Scale Correlations

Figure 2

In figure 2, the spatial representations for the male samples follow the RIASEC ordering and approximate an equilateral hexagon as suggested by Holland (1966, 1973, 1985). In addition, the same name GOT scales cluster together. Further examination of the superimposed hexagons indicates patterns of cloosest relationships among the following pairs of scales: Realistic-Investigative, Artistic-Social and Enterprising-Conventional.

In figure 3, the RIASEC ordering is appropriate for all three female samples. However, the two dimensional representation of the GOT proximity data for the U.S. female General Reference sample does not approximate the shape of a hexagon. The Social score clusters



Two Dimensional Configurations for U.S. General Reference, Anglophone and Francophone Female Canadian Samples Obtained from SCII-TPPSC GOT Scale Correlations

Figure 3

with the Enterprising one, and is closer to the Conventional and Realistic scales and more distant from the Artistic scale than that suggested by the hexagonal model. For the Anglophone Canadian females, the configuration suggests a somewhat square representation in that some scales (Enterprising-Conventional and Realistic-Artistic) cluster together in a pair pattern.

Discussion

The results show that for Canadian populations, the SCII-TPPSC GOT scale interrelationships conform very closely with Holland's hexagonal model. It is, therefore, appropriate to use the pattern of these relationships suggested by the hexagonal model to interpret the results obtained from the SCII-TPPSC GOT scales with Canadian Anglophone and Francophone populations of males and females. These results agree with those obtained by Wigington (1983) with a similar population. Therefore the hexagonal model can be viewed as appropriate in interpreting SCII-TPPSC GOT scores for college students seeking vocational assistance.

In looking at the superimposed spatial representations for males and females combined, Canadian Anglophones and Francophones are more alike than their U.S. counterparts on all scales especially with regard to the distance between the Artistic scale and that between the Investigative and Social scales. Furthermore the distance between the Social and Enterprising scales is greater for both Canadian samples and therefore more consistent with the hexagonal model. It would therefore appear that the hexagonal model is more closely related to the spatial representation of the data for both Canadian samples than it is for the U.S. general reference sample. In considering results for males, there is general conformity to the posited hexagonal model. One difference is that for Francophone males, the Realistic theme is more closely related to the Investigative scale placement than it is for U.S. males and Canadian Anglophone males. This finding suggests that for Canadian Francophone males, the Realistic scale involves more of an Investigative component. For Canadian Anglophone males, the Social scale is more closely related to the Artistic scale than it is for the U.S. and Canadian Francophone samples.

Contrary to the findings of Rounds, Davison & Dawis (1979), and Tuck and Keeling (1980) that the data for females does not conform well to the hexagonal model, the Canadian Anglophone and Canadian Francophone female data fit the model generally well. However, as the above authors found, the same does not apply for the U.S. female General Reference data. For the U.S. General Reference sample females, the Social scale is very close to the Enterprising one and also clusters with Enterprising scale placement of the two Canadian female samples. However for Canadian females the relationship between the Social and Enterprising scales is closer to the relationship predicted by the hexagonal model.

While it is not possible to generalize from a college population to men and women in general, our findings suggest that the hexagonal

model of Holland and the use of the SCII-TPPSC as an adjunct to the process of vocational counselling, is even more appropriate for use with Canadian university students than has been found to be the case in several U.S. samples (Rounds et al., 1979; Tuck & Keeling, 1980). It is especially appropriate for use with clients in need of vocational assistance as suggested by these results and those of Wigington (1983).

An explanation of the different placement of the Social scale for the U.S. female sample may lie in developmental issues. The mean age of the U.S. and Canadian samples vary considerably with the U.S. sample being substantially older (38.2 years old versus 21.9). Havercamp's (1987) findings that the hexagonal model is more appropriate for the college age students in her sample but less so for pre-college age samples gives some credence to consideration of age factors. Further studies with subjects of various age groups may explain these discrepancies. Whereas the hexagonal model corresponds to interest patterns for males of all ages, for females, it appears that the model is most appropriate for a young adult population. Results of scores on the GOT scales are currently being used to identify careers which might suit the personality types of students seeking to make vocational choices.

Further speculations on the implications of age when counselling women making career and vocational choices should consider the interpretation of scores on the Social and Enterprising scales. In our sample of young women, differences between interests in the Social and Enterprising area are clearly evident while Social interests clearly predominate. The relationship is different for the older U.S. women where the Social and Enterprising interests cluster more closely together. It may be that with greater maturity women acquire a larger measure of self confidence and/or exposure to Enterprising careers. Possibly, the Social interest evolves with age and becomes an Enterprising interest. Careers which depend on influencing others and selling things or ideas may become more appealing to women as they become older and by implication, more confident about themselves as well as more aware of a greater variety of careers. Counsellors may be well advised to sensitize young women with high Social interest to explore and consider Enterprising occupations at an earlier age. Women would thus get an earlier start in these occupations and enjoy greater accomplishments.

Since the SCII-TPPSC was normed in the United States, this study undertook to examine the assumption that this instrument was valid for use in Canada for both Anglophone and Francophone males and females and found it to be so. Overall, a greater difference was

observed between men and women than between Canadian anglophones and francophones.

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