

# Individual Differences in RIASEC Profile Similarity Across Five Interest Inventories

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*The present research indicated substantial variation within the 5 RIASEC (Realistic, Investigative, Artistic, Social, Enterprising, Conventional) profiles obtained by each of 99 individuals who responded to the same 5 interest inventories. The authors concluded that the RIASEC indicators on each inventory probably reflect different portions of the trait complexes denoted by the RIASEC types. Furthermore, some amount of the intraindividual differences in RIASEC profiles may be attributable to each participant's degree of "traitedness."*

Counselors often use vocational interest inventories to identify the dominant occupational interests of their clients. In interpreting the scores from these inventory results, the client and counselor attempt to determine a group of educational and vocational alternatives that merit further exploration and information gathering before settling on a few alternatives from which to choose. The most common means of assessing and interpreting vocational interests organizes scale scores into Holland's framework of vocational personality types and work environments for matching people and occupations (Holland, 1997). Several prominent interest inventories have incorporated Holland's RIASEC (Realistic, Investigative, Artistic, Social, Enterprising, Conventional) typology into their interpretive reports (e.g., the Self-Directed Search [SDS; Holland, Fritzsche, & Powell, 1994]; the Strong Interest Inventory [SII; Harmon, Hansen, Borgen, & Hammer, 1994]; the Revised Unisex Edition of the ACT Interest Inventory [UNIACT-R; ACT, 1995]). A few other inventories provide methods to convert broad interest patterns into the RIASEC typology (e.g., the Campbell Interest and Skills Survey [CISS; Campbell, Hyne, & Nilsen, 1992] and the Kuder Occupational Interest Survey [KOIS; Kuder & Zytowski, 1991]).

Because vocational interest inventories have largely conformed to the RIASEC typology as a means of conceptualizing broad interest patterns, it seems that each of them should produce similar RIASEC profiles for the same individual. In fact, scores from the above-mentioned vocational interest inventories do show at least a modest degree of convergent validity. Savickas, Taber, and Spokane (2002) reported that the median correlation of RIASEC scores from different inventories correlated about .50 and that the RIASEC scales from the particular set of five inventories used in the present study correlate about .60.

Although relations between these sets of RIASEC scales for groups of individuals are largely sound, questions still remain. For instance, although it is known that operational definitions of the same RIASEC constructs on different interest inventories show convergence at the level of groups, it is not known whether individuals receive similar RIASEC profiles from different inventories. Given a median correlation of .60, counselors can expect some variation in RIASEC profiles for the same client when using different interest inventories. Most counselors would assume that this variation would be minor, yet to our knowledge, the question has not been examined empirically. Thus, the present research investigated the amount of variation in RIASEC profiles that can occur within individuals

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by examining the agreement of RIASEC profiles for the same individuals across five different interest inventories. In short, we sought to determine how accurately different inventories produce the same results for individuals.

## METHOD

### Participants

Participants were conference attendees at a biennial conference of the Society for Vocational Psychology, which focused on vocational interests. As a part of the registration process, participants completed five interest inventories: the CISS (Campbell et al., 1992), the KOIS (Kuder & Zytowski, 1991), the SDS (Holland et al., 1994), the SII (Harmon et al., 1994), and the UNIACT-R (ACT, 1995). The data participants submitted were anonymous but did indicate their sex and occupation. Of the 150 conference participants, 118 (80 women, 38 men) agreed to submit their interest inventory results for use in subsequent studies. Of those who submitted their interest inventory results, 19 did not complete all five inventories and were dropped from the analysis. The sample thus consisted of 99 participants (66 women, 33 men). Some 44.4% ( $n = 44$ ) of the participants in the study identified themselves as career counselors, 41.4% ( $n = 41$ ) identified themselves as career counseling researchers and teachers, 9.1% ( $n = 9$ ) listed their primary occupation as "other," and 5.1% ( $n = 5$ ) did not specify their occupation.

### Measures

The present study compared scales on five interest inventories: CISS (Campbell et al., 1992); KOIS Form DD (Kuder & Zytowski, 1991); SDS Form R (Holland et al., 1994); SII, Skills Confidence Edition (Harmon et al., 1994); and the UNIACT-R (ACT, 1995). Complete technical data appear in the manuals just cited and are briefly summarized therein.

*CISS* (Campbell et al., 1992). The CISS consists of 320 items that measure vocational interests in seven orientation scales (Influencing, Organizing, Helping, Creating, Analyzing, Producing, and Adventuring). Scores are reported as *T*-scores. The seven orientation scales resemble the RIASEC typology (Holland, 1997) with the addition of a seventh scale, Adventuring. The Adventuring orientation resembles one aspect of the Realistic type, one that involves activities that require physical endurance, risk taking, and competition with others. The Producing orientation resembles a second aspect of the Realistic type, one that involves practical activities that produce useful products. To obtain a composite Realistic score on the CISS, we averaged the scores of the Producing and Adventuring interest scales. The Analyzing orientation resembles the Investigative type and involves activities in which people work with data and numbers. The Creating orientation resembles the Artistic type and involves activities such as acting, writing, musical performance, and other artistic endeavors. The Helping orientation resembles the Social type and involves personal service in which an individual expresses genuine concern for the well-being of other people. The Influencing orientation resembles the Enterprising type and encompasses occupations in which people lead and persuade others. The Organizing orientation resembles the Conventional type and involves activities that require orderliness and planning. Campbell et al. provided reliability information and validity data for these scales in the CISS manual.

*KOIS Form DD* (Kuder & Zytowski, 1991). The KOIS Form DD contains 100 forced-choice triads of activities. The respondent compares and ranks each set of these activities from *most preferred* to *least preferred*. The score report form includes 10 vocational interest estimate scales (VIEs): Scientific, Artistic, Literary, Social Service, Musical, Outdoor, Computational, Clerical, Persuasive, and Mechanical. The back of the KOIS report form describes how VIEs can be converted into the RIASEC typology. Those with preferences for outdoor and mechanical activities fit the Realistic type. Scientific preferences fit the Investigative type. Literary, artistic, and musical preferences fall within the Artistic type. Social service preferences fit



the Social type. Persuasive preferences fit the Enterprising type. Clerical and computational preferences fit the Conventional type. The Kuder general manual (Kuder & Zytowski, 1991) reports reliability and validity evidence for scores from the inventory.

*SDS Form R (Holland et al., 1994).* The SDS Form R is a self-scored inventory that measures resemblance to Holland's RIASEC types. The assessment booklet contains four sections: activities (six scales with 11 items each), competencies (six scales with 11 items each), occupations (six scales with 14 items each), and self-estimates (two sets of six ratings). Raw scores in the four sections are summed to indicate a person's similarity to the RIASEC personality types. The response format for the items are "like" or "dislike" for the activities section and "yes" or "no" for the competencies and occupations sections. For self-estimates, respondents provide two ratings for each type of ability and skill. The SDS technical manual (Holland et al., 1994) provides extensive information concerning validity of the scale scores on previous versions of the SDS.

*SII, Skills Confidence Edition (Harmon et al., 1994).* The SII contains 317 items scored on four sets of scales. Only the General Occupational Themes (GOTs) are described herein. The six GOTs are based on the RIASEC typology (Holland, 1997). The response format for the SII uses a three-option Likert-type scale in which respondents indicate *like*, *indifferent*, or *dislike*. The technical and applications guide to the SII (Harmon et al., 1994) provides detailed information regarding the validity of scores from the revised version of the SII.

*UNIACT-R (ACT, 1995).* The UNIACT-R is a 90-item interest inventory scored on six scales that correspond to the RIASEC typology: Technical (Realistic), Science (Investigative), Arts (Artistic), Social Service (Social), Business Contact (Enterprising), and Business Operations (Conventional). Scale scores are reported in stanines. Numerous studies have supported the construct, convergent, discriminant, and criterion validity of the UNIACT-R scores (ACT, 1995).

## RESULTS

We first examined the profile validity checks on the CISS, KOIS, and SII to identify any invalid inventories. This was done to rule out the possibility that differences among RIASEC profiles were attributable to invalid protocols. It appeared that participants were conscientious in completing the inventories, and we concluded that any differences in interest profiles across inventories could be attributable to something other than careless responding. Therefore, we next turned to determining the top three RIASEC type codes for each participant.

Three-point codes were derived from the total scores on each of the inventories using their standard reporting format whether it was in raw scores as is the case with SDS; standard scores as in the case of the CISS, SII, and UNIACT-R; or percentile ranks as in the case of the KOIS. The three highest scores within the RIASEC typology were then converted to the 4-2-1 coding method developed by Prediger, Swaney, and Mau (1993). Ties were handled by assigning the same numerical values where the ties occurred. For example, a person with an SAE code (underlined letters signify tied scores) received a 3-3-1 numerical assignment. The UNIACT-R had several ties; therefore, ties were broken by counting the raw score item responses. This method was used in conjunction with the aforementioned method to make 3 points as clear as possible on the UNIACT-R. The treatment of tie scores in this study prompts us to note that Holland (Holland et al., 1994) suggested that a difference of less than 8 raw score points be considered no difference in determining RIASEC codes from scores on the SDS. His advice is a reminder that the standard error of measurement for the RIASEC scores in this study should be kept in mind when interpreting the results of the study.

Once the 3-point codes were derived, each individual's results were correlated (Miller, 1997). To accomplish this, a matrix was constructed for each participant. In this matrix, the RIASEC themes were arranged in rows. At the top of the matrix, each participant's 3-point code from each interest inventory was listed. In each cell of the matrix, numbers were entered based on the order in which each RIASEC theme appears in the 3-point code as described above, following Prediger et al.'s (1993) procedure. Themes that did not appear were assigned a value of zero. The



median correlation among the five interest inventories for each individual ranged from a high of  $r = .98$  to a low of  $r = -.30$ . These correlation coefficients show the general pattern of relations among the five interest inventories for each individual. For example, the participant with the highest median correlation ( $r = .98$ ) among his or her interest patterns had RIASEC codes of ASI, AER, ASI, ASI, and ASE on the CISS, the KOIS, the SDS, the SII, and the UNIACT-R, respectively. For this individual, the five different inventories produced generally similar profiles. The only inventory that departed from this to a degree was the KOIS, which generally correlated between  $r = .61$  and  $r = .62$  with the other inventories. In contrast, the participant with the lowest median correlation ( $r = -.30$ ) among his or her interest patterns had RIASEC codes of SIE, ICE, SIA, ACE, and IEA on the CISS, the KOIS, the SDS, the SII, and the UNIACT-R, respectively. For this individual, the different inventories produced remarkably different interest profiles.

Having no norms or convention with which to interpret the meaning of the median correlations for the participants, we reviewed the patterns that each level of median correlation seemed to reflect. Our conclusions appear in Table 1, which provides a general description of and interpretive guidelines for the patterns of relations. As can be seen in the above examples, higher median correlations reflected greater similarity among profiles, whereas lower correlations reflected less similarity among profiles. In this sample, only 19 of the 99 participants showed a set of five interest profiles that could be rated as being *quite similar* to *very similar*, indicating that, for the most part, all five inventories agreed on at least the primary RIASEC type and that two or more inventories produced the same three-letter profile. About half of the participants in the sample ( $n = 50$ ) showed a set of RIASEC profiles that we rated as *less similar* to *most dissimilar*. This indicated that for most of the participants, there was little agreement among their sets of five RIASEC profiles.

It appears that getting exact three-letter RIASEC profile matches on even two inventories may be an infrequent occurrence. Examination of the number of exact profile matches between inventories showed that the CISS and the SII had more agreements (15%) between them than any of the other inventories. The KOIS and SDS had the fewest profile matches (3%).

To quantify the degree to which each inventory encompassed the RIASEC typology, we followed Hutchinson's (2000) suggestion of determining the level of agreement among the five methods. Essentially, this consisted of summing the rows of the correlation matrix to produce a total that indicates which method agreed the most with the other methods. Higher totals indicate greater agreement, whereas lower totals indicate less agreement among the five methods.

After identifying which method had the most agreement, we then conducted paired-samples  $t$  tests. To guard against experiment-wise error, Bonferroni corrections were applied to a set alpha of .05. As can be seen in Table 2, the KOIS departed the most in terms of the comprehensiveness with which it indicated RIASEC types when compared with the CISS:  $t(98) = 5.86, p < .001$ , effect size (ES) = .55; the SDS:  $t(98) = -4.72, p < .001$ , ES = -.46; the SII:  $t(98) = -7.31, p < .001$ , ES = -.63; and the UNIACT-R:  $t(98) = -3.49, p < .001$ , ES = -.33. The UNIACT-R also seemed to be less comprehensive in measuring RIASEC types when compared with the SII,  $t(98) = 4.21, p < .001$ , ES = .31, but no differences were found when compared with the CISS and the SDS. Also as shown in Table 2, it should be noted that the ESs for significant results ranged from .31 to -.63. According to Cohen (1988), these medium ESs roughly translate into a moderate degree of departure from comprehensiveness in measuring RIASEC types. Inspection of the means showed that for this sample the SII ( $M = 2.20$ ) was the most comprehensive, followed closely by the CISS ( $M = 2.12$ ), then the SDS ( $M = 1.99$ ), the UNIACT-R ( $M = 1.84$ ), and the KOIS ( $M = 1.39$ ). However, no significant differences were observed between the CISS, the SDS, or the SII, indicating that they are generally similar in the comprehensiveness with which they measure the RIASEC typology.

## DISCUSSION

The present research examined the agreement of the same individuals' RIASEC profiles across five different interest inventories. The results of this investigation forced us to conclude



TABLE 1

Patterns of Relations ( $N = 99$ )

Degree of Similarity	Correlation Ranges	$n$	Description of Patterns
Very similar	.90s	14	93% ( $n = 13$ ) had 100% agreement on the first letter code. There was 60–100% agreement on the second letter code; for each person in this group there were two or more inventories that had 100% agreement across all three codes. For example: ASI, AER, ASI, <u>ASI</u> <sup>a</sup> , ASE = .98 <sup>b</sup> .
Quite similar	.80s	5	60% ( $n = 3$ ) had 100% agreement on the first letter code. There was 40–60% agreement on the second letter code; all 5 had at least two inventories in 100% agreement. For example: SRA, SIA, SIA, SAI, SAR = .85.
Similar	.70s	14	36% ( $n = 5$ ) had 100% agreement on the first letter code. Half of the participants had an agreement of 40%; the other half agreed 60% on the second letter codes; 12 of the 14 had at least two inventories in 100% agreement. For example: SRI, SAR, SRC, <u>SEC</u> <sup>a</sup> , SRI = .74.
	.60s	16	19% ( $n = 3$ ) had 100% agreement on the first letter code. Generally, there was 40% agreement on the second letter code with some having 60% agreement; only 1 participant had 80% agreement. Nine of the 16 had at least two or more inventories in 100% agreement. For example: ESR, <u>ERC</u> <sup>a</sup> , ESA, SEA, SEA = .66.
Less similar	.40s–.50s	7	0% had 100% agreement on the first letter code. Generally, permutations of the same three-letter code appear across inventories. For the most part, inventories contain at least two of the same codes, though not necessarily in the same order. Four of the 7 had at least two inventories that were in 100% agreement. For example: ISA, EIA, AIS, IAS, AIS = .46.
Dissimilar	.27–.30s	18	0% had 100% agreement on the first letter code. Three of the 18 had at least two inventories that were in 100% agreement. Typically, at least two inventories may have permutations of the same three letters. For example: <u>ASC</u> <sup>a</sup> , SCA, SER, EAS, SER = .33.
Very dissimilar	.07–.22	14	0% had 100% agreement on the first letter code. Typically, inventories would have opposite letter codes on the hexagon within the same inventory, or opposite primary codes between different inventories (e.g., R-S). Generally, interest patterns appear to be less consistent in relation to their hexagonal positioning. For example: SEA, CRA, CSE, CES, SER = .14.
Most dissimilar	Below .03	11	0% had 100% agreement on the first letter code. One of the 11 had at least two inventories that were in 100% agreement. Some show permutations of the same code, whereas other inventories display completely different codes. For example: IEC, IEA, EIA, ASE, ESR = -.01.

Note. R = Realistic; I = Investigative; A = Artistic; S = Social; E = Enterprising; C = Conventional.

<sup>a</sup>Underlined letters signify tied scores. <sup>b</sup>The order of inventories for the examples is the Campbell Interest and Skills Survey; Kuder Occupational Interest Survey Form DD; Self-Directed Search Form R; Strong Interest Inventory, Skills Confidence Edition; and Revised Unisex Edition of the ACT Interest Inventory.

that for many clients it matters which interest inventory their counselor chooses to administer. In responding to different inventories, the same individual may receive different results, at least in terms of RIASEC profiles. We were surprised by the extent of how different these profiles for the same individual may be. Of course, we expected some variation, but

TABLE 2

## Paired Comparisons of Mean Summated Correlations and Their Effect Sizes

Inventory 1	Inventory 2	t(98)	ES
CISS	KOIS	5.86***	.55
	SDS	1.44	-.11
	SII	-1.17	-.07
	UNIACT-R	2.97	.23
KOIS	SDS	-4.72***	-.46
	SII	-7.31***	-.63
	UNIACT-R	-3.49***	-.33
SDS	SII	-2.66	-.19
	UNIACT-R	1.39	.13
SII	UNIACT-R	4.21***	.31

Note. ES = effect size; CISS = Campbell Interest and Skills Survey; KOIS = Kuder Occupational Interest Survey Form DD; SDS = Self-Directed Search Form R; SII = Strong Interest Inventory, Skills Confidence Edition; UNIACT-R = Revised Unisex Edition of the ACT Interest Inventory. \*\*\* $p < .001$ .

the results of this study revealed the possibility of great variation when the same individual responds to different interest inventories.

We believe that some of the variation is due to the differences in the test construction procedures used to design and develop the different inventories. Recall that for groups of individuals, the median correlation of RIASEC scores across the five inventories was  $r = .60$ . So we know that two different inventories taken by the same client may produce two sets of RIASEC scores that vary to some degree. The degree of that variation within different individuals was the concern of this study. Despite differences in test construction and the correlation of the scales, we thought that the inventories would produce fairly uniform RIASEC profiles for each individual. After all, that is why the scales are assigned RIASEC labels. A Realistic indicator or score on each of the five inventories should serve as a sign of the Realistic vocational personality type and its complex of traits.

The results of this study suggest that the RIASEC scores on these five interest inventories probably indicate different portions of the traits in the complex denoted by each of the six RIASEC types. Although the inventories directly measure *quantitative traits*, the RIASEC scores indicate resemblance to *qualitative types*. Simply stated, types designate a complex of traits. According to Holland (1997), "each personality type has a characteristic repertoire of attitudes and skills for coping with environmental problems and tasks" (p. 2). The inventories in this study use a combination of trait scores to indicate degree of resemblance to RIASEC types. For example, the Realistic type on the KOIS is indicated by mechanical and outdoor interests, whereas on the CISS it is indicated by interests in adventure and producing things. The SDS, which is really an intervention rather than an inventory, indicates type resemblance using scores on interests, competencies, and activity preferences. So the different RIASEC profiles produced by a single individual do not mean that one interest inventory or another is wrong; rather, different inventories measure different traits or aspects of RIASEC types. To the degree that the inventories differ, it is the responsibility of counselors who use the inventories to know about these differences and to competently select the appropriate inventory or inventories to use with a particular client or group.

To this point, we have concentrated on variation in individuals' RIASEC profiles attributable to differences in the operational definitions used by the interest inventories to indicate type resemblance. From another perspective, these intraindividual differences may be attributable, to some degree, to differences among individuals. If the intraindividual variation was solely attributable to the inventories, then these differences should form a fairly consistent pattern



across individuals because the differences in the inventories themselves are consistent and stable. The results of this study did not indicate that this was the case. Instead, we found that there was great variation among the five RIASEC profiles produced by some individuals, yet not by other individuals. This finding suggests that individual differences in personality may account for some portion of the differences in intraindividual variation.

It seems that, in the case of the procedures used in the present study, individuals and not inventories were the greater source of variation in determining similarity of their five sets of RIASEC profiles. After reviewing the findings of this study, we considered the possibility that the individual differences variable that may be at work here is *traitedness*. Borrowing from personality psychology, Tracey (2003) proposed that the construct of *traitedness* might be a useful moderator in predicting an individual's occupational preferences. The construct of *traitedness* denotes the core idea that perhaps not all traits are equally relevant to all people (Allport, 1937). People who respond in a consistent manner with little variation on a trait measure are considered to be "traited" (Baumeister & Tice, 1988). Those individuals who are considered *traited* are more predictable because the trait is more relevant to their personality. "Untraited" individuals, in contrast, are more susceptible to situational demands and state manipulations. Thus, *traitedness* indicates the potential ability of a trait to accurately predict behavior.

*Traitedness* may be useful in explaining intraindividual variation in RIASEC profiles found in the present study. If an individual is more predictable across situations, then that trait is more relevant to that person and, thus, the expression of the trait is more behaviorally consistent across situations. Translated to interpreting the results of the present study, we postulate that individuals who were more consistent in RIASEC profile across the five inventories possess more RIASEC personality traits that are relevant to them and, therefore, they more consistently expressed their type in their responses to the five inventories, each of which measured somewhat different traits in assessing RIASEC types. By "relevant to them," we mean that the trait is integral to an individual's vocational identity and that she or he connects that trait to her or his self-concept through a wide range of vocational attitudes, activities, interests, competencies, and preferences. In addition to the pertinence of a RIASEC type's traits to a person's self-concept, there are two additional components of *traitedness* that we believe may have increased an individual's profile consistency on the five inventories. A type can be more accurately measured by interest inventories for individuals who (a) construct an internal representation of more traits that reflect RIASEC type complexes and (b) see themselves behaving in a consistent manner with respect to those traits (Baumeister & Tice, 1988; Kenrick & Stringfield, 1980). So intraindividual variability in *traitedness* may be a moderator that produced the results found in this study. In short, we recommend that future researchers investigate the hypothesis that *traitedness* on the traits included in the RIASEC type complexes may moderate the consistency with which individuals respond to different interest inventories.

We also recommend that future researchers examine the contextual conditions and personal characteristics that permit RIASEC type to be most accurately indexed. Currently, interest inventories type individuals based on total scores for scales. It may be useful to construct scoring systems that attend to consistency of item responses within scales as indices of *traitedness*. Such indices would indicate the degree to which someone possesses a type regardless of score elevation. These *traitedness* scores would be used to predict the consistency with which an individual could be expected to behaviorally express her or his RIASEC type. Because traits differ conceptually from types, a more appropriate term for variability in type resemblance may be *metatype*, which we define as the trait of having or not having a type (cf. "metatraits" in Baumeister & Tice, 1988). We suspect that the median correlation coefficients described in Table 1 probably serve as a *metatype* index for each participant in the present study.

Regarding counseling practice, it is important to remember that inventories provide only one indicator of interests. Used wisely, they suggest a road map for exploration, first in the



counseling interview and then in educational and work environments. We remain convinced that the RIASEC typology is a social construction that provides clients and counselors with a comprehensive vocabulary for discussing occupations and the self, a commonsense framework with which to comprehend the world of work, and an excellent heuristic scheme for guiding educational and vocational exploration. Problems in operational definition by different interest inventories are a fact of psychometric life that counselors must take into consideration as they evaluate the role that inventory results will play as they help individual clients consider their resemblance to the six RIASEC types. We believe that interest inventory results are but one piece of information in assessing type. Furthermore, we believe that the typology itself is a more important tool in career counseling than are the interest inventories that indicate a client's resemblance to the RIASEC types.

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