Person-to-person matching with the Kuder Occupational Interest Survey

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Person-to-person matching with the Kuder Occupational Interest Survey

by

Joan Laing

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INTRODUCTION

The Role of Interest Inventories in Career Counseling

In order to do effective career counseling, the counselor must explore a number of personal variables with the client. These might include such considerations as abilities, aptitudes, motivation, geographical requirements or preferences, income expectations, values, and interests. In fact, anything which is important to the client may enter into his/her vocational choice or pattern of successive vocational choices. Although assessment of interests is the focus of this research, it should be remembered that it is a part of career counseling; jobs are rarely, if ever, chosen solely on the basis of interests, without regard to other factors.

Intuitively, it might seem superfluous even to consider interests as a factor in occupational choice. It seems reasonable to assume that people will generally enjoy doing whatever they do best, so that the assessment of abilities should provide an index of interests as well. However, research has failed to confirm such a correspondence between these two variables (Goldman, 1971).

Zytowski (1973) points out that interests are more crucial to job selection for some persons than for others. He suggests that interests are most likely to play a role in decision-making for persons who have access to a variety of vocational choices and who tend to be planful about selecting from these choices. Presumably someone entering vocational counseling tends to be this type of individual: that is, planful and faced with some choice of career. Thus, it seems reasonable that the
client's interests usually ought to be incorporated into the vocational planning process.

Assuming that interests are to be considered in vocational planning with an individual, they must somehow be assessed. One might simply ask the client: "What do you like to do?" Some clients respond, "I don't know." Others may say "Everything," without being able to distinguished relative preferences. The client's response to such a question gives the counselor no basis for comparing the client's interests with those of others. In addition, the question "What do you like to do?" limits responses to those activities with which the client has had direct experience. A middle-aged woman might find automobile repair extremely interesting, but if she has always lived in a traditional setting in which getting one's hands greasy was a privilege reserved for fathers, brothers, and husbands, she may not even be aware of this. Similarly, a young person may not know that he/she would be interested in live theatre, if the opportunity to attend plays has never existed.

For these and other reasons, interests are typically assessed by means of a published inventory of some type. The counselor has a wide range of instruments from which to choose: interest in occupations or activities may be assessed; type-of-interest or occupational scales, or both, may be provided; raw scores, lambda coefficients, rank-order, or some standardized-score approach may be used in assessing the client's comparative levels of interest; items may be free- or forced-choice; supplemental validation and personality-type scales may be provided. Thus, the possibility exists of selecting the particular inventory which
will provide the most valuable information to a specific client. All vocational clients need not, and should not, be treated alike at the point of interest testing.

However, the effectiveness of using any tests in counseling has itself been the focus of controversy. It is instructive to note the titles of three publications, all by Goldman: Tests Should Make a Difference (1969); Using Tests in Counseling (1971); and Tests and Counseling: The Marriage that Failed (1972b).

Writers addressing the subject of tests-in-counseling typically stress the importance of using tests knowledgeably and appropriately. A sampling of relevant publications would include Sharf (1971); Clark (1972); Hanson and Cole (1972); Goldman (1972a); Layton (1972); Prediger (1972); Wesman (1972); and Dolliver and Nelson (1975). These authors suggest that:

(1) tests, including interest inventories, can be a useful element in the counseling process;

(2) counselors ought to be better trained in the use (selection, administration, and interpretation) of tests;

(3) test publishers and persons with special skills in testing ought to be more conscientious in disseminating information about how tests can appropriately be used.

Goldman (1971) suggests that it is easier to find information relating to the psychometric qualities of tests than it is to locate guidelines on how to use them effectively. Materials on how to incorporate interest inventories into the career-counseling process are sometimes available
from the publishers of the various measures. Other sources include Goldman's own book (1971) and Zytowski (Notes 1, 2, and 3).

A complicating factor in the use of interest inventories is their diversity. Although this makes it possible for the counselor to select an inventory appropriate for his/her client, it also requires a fair degree of sophistication about choosing and using such inventories. Approximately three and a half million interest inventories are scored annually by the major testing services (Tittle & Zytowski, 1978). Presumably, then, some three and a half million times per year some counselor has decided "The results of this inventory will be helpful to this client." In order to make such a decision wisely, the counselor should have some knowledge of the construction of interest inventories and the implications of the scores derived from them, in addition to knowing the needs of his/her particular client.

Interest Inventories

Development

In 1919, work was begun on the first interest inventory incorporating a statistically-evaluated standardization technique and an objectively-verifiable scoring method. This prototype measure was developed at the Carnegie Institute of Technology. Even prior to that time, according to Fryer (1931), less-sophisticated instruments were being used to assess interests.

Since these initial attempts to systematically measure interests, many different inventories have been devised. Some have been more durable
than others. The Strong-Campbell Interest Inventory (SCII) was published in its first version in 1927. According to Campbell (1971), the Strong Interest Blanks have a longer history than any other current commonly-used psychological inventory. The Kuder Occupational Interest Survey (KOIS) is slightly less venerable; its initial publication was in 1939.

It is illuminating to examine the goals of some of these early researchers. What did they hope to accomplish? Quoting from Fryer (1931, p. 41): "In the use of the interest inventory later investigators aim to go farther than orientation. They aim not only to secure an estimate of like, dislike, or indifference to the items of the investory, but to generalize these estimates into a score . . . . When the problem is faced of summarizing the results of an inventory into a score, the question is immediately raised: 'A score of what?'"

**Scoring**

Strong (1943) originally suggested that an interest inventory might be appropriately scored by first determining the "differential interests" of men (and later, women) in a variety of occupations. Differential interests were operationally defined as those which distinguished men in a particular occupation from a men-in-general group. Therefore, to score an inventory, the task was to determine whether the inventory-taker's results differed from those of men-in-general in the same way that some criterion group's results did. An individual would, of course, receive as many scores as there were occupational groups to compare him with, so that patterns of similarity and dissimilarity could be observed and interpreted.
All interest inventories were not, and are not, scored using Strong's approach, and Fryer's question "A score of what?" is still a valid one for a counselor to consider when choosing and using interest inventories. Although the use of such inventories implies that interests are of real concern when doing vocational counseling, the actual meaning of a score varies from inventory to inventory.

On the KOIS, for instance, an individual's reported score on a scale is simply the ratio of his/her score to the highest possible score on that scale; a "general" factor is not considered. The ratios (lambda) obtained are used to rank-order the scales for the testee, and the counselor uses the rank order of occupations and/or college majors, rather than the scores themselves, in interpreting the inventory results. This leads to a curious paradox: although KOIS-takers are all compared to the same norm groups, the lambda scores which different persons obtain cannot be compared to each other. That is, if one client receives a lambda score of .60 on the Automobile Mechanic scale, and another lambda score of .50 on the same scale, this does not necessarily imply that the former student is more like automobile mechanics than is the latter. If the Automobile Mechanic scale occupies the same rank-order position for both clients, the interpretation of these scores will be identical for both (Kuder, 1974).

The divergent developmental paths of interest inventories are of more than historical significance. For instance, since the theoretical rationales behind the construction of the KOIS and the SCII differ, and the criterion (norm) groups were differently selected, it follows that corre-
lations between similarly-named scales on the two inventories tend to be low (Layton & Borgen, 1972).

Other inventories use still other scoring systems. Rankings, T-scores, lambdas, raw scores, stanines, percentiles—all are used with one or another measure (Zytowski, Note 1). For the counselor to use the available information accurately and productively, he/she still needs to understand the significance of a score on the particular inventory being used.

Beyond the particular mathematics used to arrive at a score, questions of reliability and validity must be considered. Generally, reliability of the more commonly-used inventories seems to be adequate for noncognitive measures; that is, an individual's score on these tests is likely to be relatively stable. However, issues of validity lead to the question: "What is validity for an interest inventory?"

Validity

The typical approach to validation of interest inventories has been to show that the tests can in fact differentiate among occupational groups: for instance, that physicians' results will differ from those of, say, engineers. Since such differentiation of groups cannot occur unless the scales are relatively independent, the independence of scales has been used as one index of the instruments' validity. An example of this type of validation may be seen in Holland (1965).

The KOIS and SCII are the only inventories which have been used long enough to demonstrate long-term predictive validity. It does appear that people tend to enter and remain in occupations which these instruments
would suggest for their consideration (Dolliver & Will, 1977; Zytowski, 1976). Confusingly, though, for any single individual the occupations suggested by the two inventories may differ to a substantial degree, due probably to differences in norm groups and scoring procedures.

It is rather difficult to compare predictive validity of the SCII and KOIS because of the different methodologies used by investigators. Zytowski (1976) found that slightly more than half of his sample of 882 persons were employed in occupations that would have been suggested to them from the results of a KOIS which they had taken from 12 to 19 years previously. He did find, however, that the KOIS predicted better for some groups than for others. Campbell (1971), after reviewing several studies, suggests that about 50% of subjects eventually enter an occupation on which they scored high on the Strong Interest Blanks, precursors of the SCII.

However, presently-available interest inventories are surpassed in predictive validity by another approach, which is less expensive in terms of both time and money when it can be used. According to John Holland: "Despite several decades of research, the most efficient way to predict vocational choice is simply to ask the person what he wants to be; our best devices do not exceed the predictive value of that method" (Holland, 1966). A recent study by Borgen and Seling (1978) confirms this, while pointing out that: "Clients without expressed choices frequently appear for counseling. They do not have expressed choices. Thus, the studies reviewed here showing the superiority of expressed choices do not have much relevance for clients without developed choices."
Current Research Issues

Interest inventories were originally constructed to discriminate among the interest patterns of vocational groups; later research dealt with these instruments' ability to predict individuals' eventual entry into occupational categories. Osipow (1973, p. 308) points out that "Interests have been used to make . . . predictions, and . . . become involved in an unfruitful static attempt to predict a one-shot event, when in fact interests and jobs are really constantly changing." In career counseling with an individual, the counselor's task is not to predict what occupation that person will eventually enter; rather, it is to facilitate a decision-making process leading to an eventual vocational choice (Harmon, Note 4).

This has led to questioning whether the traditional approach to demonstrating validity of interest inventories is in fact capable of providing all the information needed in order to select an inventory appropriately. Concurrent and predictive validity, it has been suggested, may be necessary but not sufficient if the goals of the career counselor and the client are to be met.

Evidence of concurrent and predictive validity is important, since in order for the measures to demonstrate construct validity, these discriminations must be made with some degree of accuracy. But it is also important to remember that the function of an interest inventory is primarily to facilitate vocational exploration and choice, and that this may not necessarily be accomplished more effectively merely by making the instrument more "valid" in the traditional sense of the word. Research on
whether interest inventories are, or can be, useful in career counseling may provide results more directly meaningful to the counselor than have the predictive-validity studies.

**Effects of interest inventories**

The function, in addition to the validity, of an interest inventory should be considered in determining its appropriateness for use with a particular client. If validity is necessary, but not sufficient, then meaningful research must also be directed toward exploring what the effects of an interest inventory are, and what they should be. Sharf (1974) suggests asking the question: What should the client have gained and/or learned from the interest-inventory experience?

There are several recent publications which address the question of what effects the inventory experience should, and does, have. The criterion measures chosen for evaluation provide indices of the effects the researchers consider important. Sharf (1978) chose the following: degree of similarity between occupational choice and interest measures; attitudes toward career choice; and occupational information-seeking behavior. Rubenstein's (1978) dependent measures assessed clients' self-knowledge of vocational interest patterns, degree of vocational choice certainty, and ratings of counselor performance and of the counseling experience. Zytowski (1977) investigated self-knowledge, information seeking, and confidence in or satisfaction with vocational plans. Krivatsky and Magoon (1976) chose to examine frequency and variety of vocational information seeking and satisfaction with treatment. Similar criterion measures were
selected by Cooper (1976), Zener and Schnuelle (1976), Schaefer (1976), and Holland, Takai, Gottfredson, and Hanau (1978).

These effects-studies criteria emphasize what Tittle (Note 5) has referred to as the exploration validity of interest inventories, rather than their predictive validity. The most-popular criteria of this type would include:

1. number and nature of vocational options being considered;
2. extent of vocational information-seeking;
3. degree of vocational decisiveness;
4. satisfaction with the inventory experience.

Thus far, most studies designed to assess the exploration validity and/or effects of interest inventories have yielded few or no significant treatment effects (Tittle, 1978). Holland, Takai, Gottfredson, and Hanau (1978) note that inventories appear to have relatively small impact when mean differences on various measures of effectiveness are used as the criterion. They suggest that different subgroups of persons may be affected in different ways by the interest-inventory procedure, so that effects are cancelled out by an overall analysis.

Cooper (1976) found that the use of auxiliary materials enhanced interest-inventory effectiveness. This may indicate that the effects of an interest inventory are dependent on how the counselor uses it. Presumably, integration of interest inventories with other career-exploration procedures would be more effective than presentation of interest-inventory results alone. No studies were located which investigated whether the use
of career-exploration procedures is more effective when interest inventories are included than when they are not.

In the world of the researcher, predictive/concurrent and exploration validity can be investigated separately. However, the practicing career counselor needs to combine the two: he/she would prefer to use an inventory which has high concurrent and predictive validity, but he/she would also like to maximize the effects of test feedback.

**Effects of test feedback in general**

Shrauger (1975) has summarized research into the effects of evaluative feedback in general. He delineates six phases of the process of responding to such feedback, which appear to be applicable to interest inventories as well:

1. reception and retention of evaluative information;
2. assessment of the information source;
3. attribution of responsibility for the outcome obtained;
4. changes in self-evaluation;
5. satisfaction with feedback;
6. changes in task performance.

It appears that subject response to evaluative feedback is generally a function of his/her initial expectancy. That is, feedback congruent with expectations is more likely to be remembered, believed, and assumed to result from one's own abilities than is feedback which is incongruent with expectations. However, affective reaction to feedback is more positive (regardless of expectations) when the evaluation itself is perceived as positive, rather than negative.
Most of the studies cited by Shrauger involve evaluative feedback about subjects' abilities or skills. It is possible that feedback about interests may have similar effects: that is, feedback which is congruent with expectations and/or perceived as positive may be more effective. However, none of the research to date on interest inventories has explored the impact of subject expectations on subject response to the results of testing.

Use of interest inventories with special subgroups

In recent years, as social pressure and legislative decree have demanded equal opportunity for both sexes in a variety of settings, concern has arisen that traditional interest inventories are sex-biased. Owing to the fact that scales are normed separately by sex, some occupations are suggested to persons of one gender and not the other and/or there are more occupational scales provided for males than for females. The issues of whether interest inventories have equivalent validity for both genders, and also whether the inventories facilitate vocational exploration and choice to an equal degree for both genders, have been the impetus for some recent publications.

It has been suggested by some that these concerns may be resolved by the construction of essentially new instruments. Birk (1974) states that interest inventories ought to go beyond simply eliminating stereotypic content, and should encourage persons of both genders to choose from the full range of vocational options. Osipow (1976), after reviewing current trends in interest inventories, concludes that there appears to be a move
toward the use of single-sex instruments whose items minimize sex-role stereotyping.

Other research has focused on the use of traditional inventories in nontraditional ways. Both the SCII and the KOIS now supply inventory-takers with their scores on both the male- and female-normed scales. A study by Zytowski and Laing (1978) indicates that KOIS rank-order on opposite-gender scales has equivalent predictive validity with rank-order on own-gender scales, thus permitting the counselor to consider high rankings on both men's and women's scales as indicative of occupations/majors worthy of consideration, regardless of the client's gender. They suggest, nevertheless, that it would be preferable to have all scales normed on both genders, while admitting that there may be so few persons of one gender in certain occupations that the creation of such new scales will not be possible in the foreseeable future.

Borgen and Helms (1975) studied the predictive validity of the men's form of the Strong Vocational Interest Blank for academically able women. They reported that, for their sample, male-female differences were more marked for some occupations than for others. Johnson (1977; Note 6) found that use of the other-gender scales on the SCII tends to reinforce, rather than diminish, sexual stereotypes.

It appears, then, that several researchers are interested in investigating the validity of currently-used interest inventories for both women and men when scales exist for only one gender. Less research has been done on the use of interest inventories with minority groups, though Tittle (1978) emphatically states that there is a need for such research.
The scales typically have been normed on groups without selection by race, so that the norm groups are predominantly, or even exclusively, Caucasian. The issue can be raised, then, of whether a Black male who scores low on the male "physician" scale does so because his interests are unlike those of physicians—or because his interests are unlike those of white upper-middle-class males who are employed as physicians. An unpublished study by Robinson (1978) discusses his findings that there are, in fact, differences in response patterns on the KOIS attributable to race. These differences were found for Black and white female elementary school teachers at the item level, although the validity of the instrument as a whole appeared to be equivalent for the two groups. Borgen and Harper (1973) found equivalent predictive validity for a group of Black and white males on the Strong Vocational Interest Blank; however, all subjects were National Merit Scholars, so there may have been more similarity between the interests of Blacks and whites in this particular sample than there would have been in a less elite group.

Limitations of Present KOIS Scoring System

It seems appropriate that publishers of widely-used interest inventories which have demonstrated construct validity should provide vocational counselors and their clients with materials designed to increase effectiveness, or "exploration validity." Kuder (1977) suggests that the traditional report form used in the KOIS (a sample is provided as Appendix A), while it assesses similarity between a person and groups of people, may not give sufficient weight to the uniqueness of the individual. He
notes (p. 1) that "even the members of an occupational group do not match their group perfectly. Actually, considerable variation exists among them, and there is ordinarily a corresponding variation in the extent to which the different members resemble the composite of their group." He also points out that occupational groups differ in homogeneity, so that a person's similarity to a more-homogeneous group may be assessed more accurately than his/her similarity to a less-homogeneous group.

Although Kuder's present method of scoring has demonstrated satisfactory predictive validity, there are certain disadvantages associated with this approach. These include:

(1) variable homogeneity within occupational groups;
(2) the matching of the testee to a "group composite" rather than to any existing individual;
(3) the difficulty of finding sufficient workers to create a scale for relatively uncommon occupations;
(4) the necessity for separate male and female norm groups;
(5) the possible need for separate norm tables for other special subgroups.

Kuder does not advocate abandoning the presently-used scoring system in favor of a totally new approach. The significance of a score on a traditionally-scored inventory is well-documented in terms of both its validity and its interpretability. He does, however, suggest the possibility of supplementing the traditional KOIS results by using a person-to-person matching procedure.
A New Scoring Approach to the KOIS

The typical interest-inventory score is derived either by matching the interest pattern of the client with the "typical" pattern of a group of people in a given occupation (the normative approach), or by counting the number of times the client endorses similar interests (the homogeneous approach). KOIS scores are presently derived normatively; its predecessor, the Kuder Preference Record, used the homogeneous approach.

Kuder now proposes a third method of scoring the interest inventory. Acting on the premise that "there are as many jobs as there are people" (Ghiselli, 1966), he suggests that it would be possible to match the interests of a person taking an interest inventory with those of each of a large number of persons who are engaged in a variety of college majors or occupations—"person-to-person matching." The outcome would differ from the present system in that the testee would not be provided with information about which occupational groups he/she most resembles. Rather, the testee would receive information about those individuals (criterion persons) whose interests most resemble his/her own. These criterion persons could all be in similar occupations, but would not necessarily be; the sole basis for matching would be similarity of interests.

This approach is facilitated by Kuder's approach to interest-inventory item construction, in which each item includes a triad of phrases. The inventory-taker's task is to mark the items in each triad which he/she considers most and least attractive. Consider the following item (#95 from the KOIS):
a. make some candy M L
b. tell stories to children M L
c. paint with water colors M L

The respondent is instructed to mark one item as most liked or attractive, one least, and to leave one blank. In effect, the person arranges the alternatives in one of six most-to-least rank orders: a, b, c; a, c, b; b, a, c; b, c, a; c, a, b; or c, b, a.

These rankings can be used to derive an index of similarity between the inventory-taker's and the criterion person's pattern of responses. Hornaday, in some unpublished research (Note 7), has found that weightings proportional to the degree of agreement in the two persons' answer patterns, summed for the 100 items, give reliable results. The Hornaday index, ranging from zero (no similarity) to 900 (perfect agreement), with 333 representing the expected score obtained by chance, can be used to "score" the similarity between the testee and any other individual who has taken the KOIS.

This returns us to Fryer's question: "A score of what?" The traditional inventory approach yields a number of scores indicating the testee's interest similarities with each of a number of occupational groups. Scores derived via the proposed person-to-person matching procedure clearly cannot be interpreted as analogous to these traditional scores.

Kuder suggests obtaining a large (several thousand persons) criterion group of individuals who have been in a variety of occupations for some time, as well as individuals who have chosen a variety of college majors.
The inventory-taker's score would be used to identify those persons in the matching pool whose interest patterns most closely resemble his/hers.

The information returned to the client would be in the form of brief biographical sketches of these most-similar individuals. Such a sketch might include the following data:

(1) present occupation with a description of characteristics of the work;

(2) educational and work history:

(3) entry into current occupation;

(4) the individual's perception of the advantages and disadvantages of the occupation;

(5) what advice the worker would offer to someone considering entering the same occupation.

Thus, the inventory-taker would receive feedback not only about the names of occupations, but also information about how the components of these occupations affect persons whose interests are similar to his/her own. Moreover, it is possible to seek communalities and differences. One inventory-taker, for instance, might notice that all the persons with whom he/she is matched list "opportunity to work with people" as a satisfaction in their occupation or major, even though the occupations and majors in which they are engaged may differ in many other ways.

Such a procedure has several potential advantages. First, persons in nontraditional occupations for their gender or race can be represented, as there is no minimum number (beyond one) required in order to form a scale. By the same reasoning, persons engaged in uncommon occupations can
now be included in the criterion group, as can persons from other special subgroups (e.g., handicapped individuals).

It is also possible that the effectiveness, or "exploration validity" of the instrument could be improved by providing the additional information described above to the client. However, this latter point has not yet been subjected to experimental verification.

It should be noted that Kuder does not propose replacing the current person-to-group scoring approach with person-to-person matching. Person-to-person matching is expected to provide supplemental information. That is, not only would the inventory-takers receive listings of the occupational groups to which their interest patterns are most similar, but they would also receive information about what persons most like them are actually finding to be satisfying about their jobs.

Present Study

The present study was planned to investigate the practicality and utility of the suggested person-to-person matching procedure for the KOIS. For the purposes of the study, there were three groups of subjects: one received traditional KOIS feedback, one the person-to-person matching results, and one received both. The study was intended to:

1. implement and evaluate the technical procedures required to perform the person-to-person matching;
2. obtain feedback from subjects regarding their reactions to the new procedure.

In addition, it was hypothesized that, following the experimental treat-
ments, the groups might have differed on any of these dimensions:

(1) the number and nature of college majors being considered;
(2) career-exploration behaviors;
(3) vocational decisiveness;
(4) satisfaction with the procedure.
METHODS

Criterion Persons

It was decided to restrict membership in the criterion group to persons who were upperclassmen or women at Iowa State University. All were selected by faculty in their departments as being representative of students in their major fields. Most were seniors, though there were a few juniors and new graduates. There were 42 criterion persons, 20 males and 22 females.

Each criterion person took the Kuder Occupational Interest Survey and also completed a questionnaire which requested information about his/her major, his/her personal satisfaction and dissatisfaction with the major, why he/she chose the major, what advice he/she would give to others considering this major, and some information about his/her other activities. This material was then edited into a one-page "biosketch" of the criterion person (samples are shown in Appendix B). References to gender were deleted when possible, obvious spelling and grammatical errors were corrected, and redundancies omitted; however, the final biosketch used the criterion person's own words and style insofar as feasible.

Altogether, 26 separate majors or combinations of majors were represented. All majors were those which, at Iowa State University, are part of the College of Sciences and Humanities. An effort was made to have at least one person from each possible major in the college, and preferably two (a male and a female). The twenty-six majors are listed in Table 1; Table 2 presents, for comparison, the college major scales available on the
Table 1. College majors represented (by gender) in the person-to-person matching procedure

<table>
<thead>
<tr>
<th>College major</th>
<th>Male criterion person</th>
<th>Female criterion person</th>
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<tbody>
<tr>
<td>Anthropology</td>
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<td>1</td>
<td>1</td>
</tr>
<tr>
<td>History</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Industrial Administration</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Industrial Administration/Spanish</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>International Studies/Sociology</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Journalism/Mass Communication</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Mathematics/Physics</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Music</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Philosophy</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Physics</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Political Science</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Psychology</td>
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<td>1</td>
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<tr>
<td>Sociology</td>
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<td></td>
</tr>
<tr>
<td>Speech</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Speech/Political Science</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Statistics</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Zoology</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
Table 2. College major scales on the present KOIS-DD report form

<table>
<thead>
<tr>
<th>Male Norms</th>
<th>Female Norms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>Art &amp; Art Education</td>
</tr>
<tr>
<td>Animal Husbandry</td>
<td>Biological Sciences</td>
</tr>
<tr>
<td>Architecture</td>
<td>Business Ed &amp; Commerce</td>
</tr>
<tr>
<td>Art &amp; Art Education</td>
<td>Drama</td>
</tr>
<tr>
<td>Biological Sciences</td>
<td>Elementary Education</td>
</tr>
<tr>
<td>Business Acc't &amp; Finance</td>
<td>English</td>
</tr>
<tr>
<td>Business &amp; Marketing</td>
<td>Foreign Languages</td>
</tr>
<tr>
<td>Business Management</td>
<td>General Social Sciences</td>
</tr>
<tr>
<td>Economics</td>
<td>Health Professions</td>
</tr>
<tr>
<td>Elementary Education</td>
<td>History</td>
</tr>
<tr>
<td>Engineering, Chemical</td>
<td>Home Economics Education</td>
</tr>
<tr>
<td>Engineering, Civil</td>
<td>Mathematics</td>
</tr>
<tr>
<td>Engineering, Electrical</td>
<td>Music &amp; Music Education</td>
</tr>
<tr>
<td>Engineering, Mechanical</td>
<td>Nursing</td>
</tr>
<tr>
<td>English</td>
<td>Physical Education</td>
</tr>
<tr>
<td>Foreign Languages</td>
<td>Political Science</td>
</tr>
<tr>
<td>Forestry</td>
<td>Psychology</td>
</tr>
<tr>
<td>History</td>
<td>Sociology</td>
</tr>
<tr>
<td>Law (Grad School)</td>
<td>Teaching Sister, Catholic</td>
</tr>
<tr>
<td>Mathematics</td>
<td></td>
</tr>
<tr>
<td>Music &amp; Music Ed</td>
<td></td>
</tr>
<tr>
<td>Physical Education</td>
<td></td>
</tr>
<tr>
<td>Physical Sciences</td>
<td></td>
</tr>
<tr>
<td>Political Science &amp; Gov't</td>
<td></td>
</tr>
<tr>
<td>Premed, Pharm &amp; Dentistry</td>
<td></td>
</tr>
<tr>
<td>Psychology</td>
<td></td>
</tr>
<tr>
<td>Sociology</td>
<td></td>
</tr>
<tr>
<td>U.S. Air Force Cadet</td>
<td></td>
</tr>
<tr>
<td>U.S. Military Cadet</td>
<td></td>
</tr>
</tbody>
</table>

present KOIS-DD report form. The latter scales have been normed on large
groups of individuals in each of those particular majors.

It should be emphasized that the person-to-person matching procedure
is not designed to match inventory-takers to a specific major, but rather
to the person or persons whose interests are most like his/her own. The
criterion group was chosen from among different majors in an attempt to
provide maximum heterogeneity within the group; the information provided
in the biosketches is intended to give the subject (or client) information about individuals in the criterion group whose interests are similar to his/her own.

Experimental Subjects

It was attempted to recruit subjects in their first or, at most, second year of university studies who would be potential candidates for career counseling. Though these persons were all students in introductory-level psychology courses and received experimental credit, instructions for signing up for the experiment included a request for students who had not yet selected a major field of study. In fact, the group comprised persons at all stages of college-major choice, and some subjects were later dropped from certain analyses made in the study. One hundred forty-nine undergraduate students at Iowa State University (106 females, 43 males) composed the original experimental group.

Matching Procedure

All experimental subjects took the KOIS; their results were then used to match them with individuals in the criterion group, so that a set of 42 criterion-person matches was made for each of the 149 subjects. The matching procedure involved the use of weightings proportional to the degree of agreement in the subject's and criterion person's answer patterns for each item, then summing over the 100 items. As previously stated, this index of similarity, the iota score, ranges from zero (absolute dissimilarity) to 900 (perfect agreement), with 333 representing
the expected score obtained by chance. Matching scores can be computed for any two persons who have taken the KOIS.

Each subject, at some point during the experiment, received a copy of all his/her iota scores; some explanatory material; and not more than seven biosketches from the criterion group of forty-two (see Appendix B for samples). Seven biosketches were chosen as a maximum because it was felt that receiving a larger number would be confusing to the subjects. However, a subject might receive fewer than seven biosketches; it was decided to use iota score level of 500 as a cut-off point, and not to distribute biosketches of persons whose interest-pattern matches fell below this level to the subjects. This decision was made as it was felt that the interest patterns of the persons being matched should be somewhat more similar than would be indicated by simply exceeding the "random" matching level of iota score 333.

Experimental Procedures

There were three treatment groups, with treatments assigned randomly to groups. The procedure required three experimental sessions per group, spaced at two-week intervals. The sessions ranged in length from approximately 30 to 60 minutes, with the maximum total time for the experiment 2 1/2 hours per subject.

During the first session, all subjects completed the pretest materials and the KOIS. There were no differences among the treatments at this point.
The second session was used to provide feedback on inventory results to subjects. One group received the standard KOIS report form produced by Science Research Associates (a sample form is provided as Appendix A), with a group interpretation of results. Group interpretation of test results has been found to be equivalent to traditional individual interpretation (Lallas, 1956; Wright, 1963; Rubinstein, 1978). In this study, the interpretation used was based on an audiotaped KOIS interpretation recorded by D. G. Zytowski which has been available to clients of the Iowa State University Student Counseling Service. Warman (Note 8) found that 70% of users of this audiotape reacted favorably to this approach and 7% unfavorably, with the remainder neutral.

A second group received a list of all their similarity (iota) scores and the college-major biosketches of those persons in the matching pool whose profiles were most like their own. Iota scores had to exceed 500 for a match to be made, and no more than seven biosketches were given to any subject. An explanation of the procedure was provided which was analogous to the group interpretation given the first treatment group. Appendix B includes the explanatory material that was given to each subject, a sample iota-score report, and several college-major histories.

The third group received both the traditional inventory report form and the person-to-person matching materials, with the same interpretations which were provided to members of the other two treatment groups. Half of this group received the traditional materials first; the other half received the experimental materials first.
At the third meeting, all groups began by taking the posttest. Members of the first group then received their person-to-person matching materials, with an explanation of the procedure; members of the second received their traditional KOIS report forms, with a group interpretation; members of the third, who had received both forms of feedback at the second session, were given a questionnaire asking subjects to compare the two procedures.

Finally, all subjects were informed of the purposes of the study and of the experimental nature of the person-to-person matching materials.

Dependent Measures

The Pretest Survey (Zytowski, 1977) was given only at pretest. Since subjects were volunteers, it was felt that this instrument would provide an index of their motivation to engage in college-major planning and/or choice associated with taking the interest inventory. A copy of this instrument is provided as Appendix C.

The Alternatives Questionnaire (Cooper, 1976) was administered both at pretest and posttest. This instrument provided information about both the total number of college majors being considered and the nature of these majors (Appendix D).

Also given at both pre- and posttest was the Vocational Exploration Behavior Checklist (Cooper, 1976). This checklist includes a variety of career-exploration behaviors; subjects noted how many times they had performed each activity during the preceding two weeks (Appendix E).
The last dependent measure which was included in both the pretest and posttest materials was the Vocational Decision Scale (Osipow, Carney, & Barak, 1976). This scale was revised somewhat, with the permission of the authors, to make it more applicable to college-major decisiveness (Appendix F).

Cooper's (1976) Satisfaction Opinionnaire was administered only at posttest, to assess the subjects' perceived satisfaction with the inventory feedback received (Appendix G).

At the end of the experiment the subjects in Group C, who received both the standard KOIS report form and the person-to-person matching results during the second experimental session, were asked to rank the traditional feedback, the experimental feedback, and the combination of the two. They were also asked to explain why they ranked the procedures as they did (Appendix H).

Data Analysis

A least-squares multiple regression procedure was used to analyze the data obtained from the questionnaires. The ranking of the three types of feedback was analyzed by a Friedman two-way analysis of variance by ranks.
RESULTS

A total of 149 persons (106 females and 43 males) completed the initial testing. Of these, all but one obtained at least seven iots matches above score level 500. (The mean lowest iota match was 556.2.) Both males and females tended to match with criterion persons of their own gender more frequently than with those of the other gender. This tendency was more pronounced for females. Summary statistics for this group are presented in Table 3.

The results of the Pretest Survey indicated that the average subject was relatively interested in the results of an interest inventory (3.9 on a 5-point scale, with 5 indicating greatest interest); had tentatively decided on a college major (1.9 on a 5-point scale, with 1 indicating a definite decision); and fairly satisfied with that choice (2.6 on a 5-point scale, with 1 indicating complete satisfaction). Mean score for males and females were similar; they are presented in Table 4.

Subjects were excluded from the rest of the analyses if they did not attend all three sessions; did not complete all the questionnaires; or if they both stated in the Pretest Survey that they had definitely decided on a college major and had a score of less than 05 (indicating high decision) on the Career Decision Scale. There were 124 subjects (88 females, 36 males) remaining who provided usable questionnaire data. The subject composition of each group is shown in Table 5.

Tests were made to ascertain whether there were mean differences attributable to group, sex, and/or group X sex interaction on the following dependent measures: Satisfaction Opinionnaire; College Major Alterna-
Table 3. Summary statistics for iota matches of initial experimental group

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number in sample</td>
<td>43</td>
<td>106</td>
</tr>
<tr>
<td>Number receiving less than seven iota scores over 500</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Mean number of own-gender matches</td>
<td>4.09</td>
<td>4.81</td>
</tr>
<tr>
<td>Mean number of other-gender matches</td>
<td>2.88</td>
<td>2.19</td>
</tr>
<tr>
<td>Number of persons receiving more other- than own-gender matches</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>Percent of persons receiving more other- than own-gender matches</td>
<td>23%</td>
<td>8%</td>
</tr>
</tbody>
</table>

Table 4. Subjects' mean scores on Pretest Survey

<table>
<thead>
<tr>
<th>Item</th>
<th>Males</th>
<th>Females</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motivation</td>
<td>3.92</td>
<td>3.83</td>
<td>3.90</td>
</tr>
<tr>
<td>Decision</td>
<td>1.89</td>
<td>2.06</td>
<td>1.94</td>
</tr>
<tr>
<td>Choice Satisfaction</td>
<td>2.60</td>
<td>2.72</td>
<td>2.64</td>
</tr>
</tbody>
</table>

tives; Vocational Exploration Behavior Checklist; and the Career Decision Scale. A multiple-regression procedure was used. In addition, group means pre- and posttest were compared for the latter three dependent measures.
Table 5. Composition of experimental groups

<table>
<thead>
<tr>
<th>Group</th>
<th>Males</th>
<th>Females</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>I (Standard KOIS results)</td>
<td>7</td>
<td>32</td>
<td>39</td>
</tr>
<tr>
<td>II (Iota matches)</td>
<td>15</td>
<td>26</td>
<td>41</td>
</tr>
<tr>
<td>III (Both standard KOIS results and iota matches)</td>
<td>14</td>
<td>30</td>
<td>44</td>
</tr>
<tr>
<td>Totals</td>
<td>36</td>
<td>88</td>
<td>124</td>
</tr>
</tbody>
</table>

Satisfaction

F-tests showed a mean difference among groups on the Satisfaction Opinionnaire which was statistically significant. The means were: Group I, 38.6; Group 2, 31.8; and Group 3, 28.3. (Higher scores were associated with greater expressed satisfaction.) The overall mean was 36.2, with a standard deviation of 5.9. Results are presented in Table 6.

College Major Alternatives

There were no significant differences attributable to treatment, sex, or treatment by sex interaction on the number of college majors being considered at posttest (Table 7). The mean number of college majors being considered at that time was 2.96, as compared with 3.08 at pretest. Standard deviation at posttest was 1.45.

Data were also examined to determine whether the number of college majors increased, decreased, or remained the same at posttest, and whether such change was in accordance with the subjects' stated wishes. Data are
Table 6. Statistics of fit for Satisfaction Opinionnaire

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>F value</th>
<th>prob &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>1</td>
<td>91.28</td>
<td>2.65</td>
<td>0.1019</td>
</tr>
<tr>
<td>Treatment</td>
<td>2</td>
<td>1141.41</td>
<td>16.60</td>
<td>0.0001</td>
</tr>
<tr>
<td>Sex*Treatment</td>
<td>2</td>
<td>51.68</td>
<td>0.75</td>
<td>0.5218</td>
</tr>
<tr>
<td>Subjects</td>
<td>118</td>
<td>4057.38</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 7. Statistics of fit for College Major Alternatives (posttest)

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>F value</th>
<th>prob &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>1</td>
<td>3.29</td>
<td>1.56</td>
<td>0.2120</td>
</tr>
<tr>
<td>Treatment</td>
<td>2</td>
<td>0.73</td>
<td>0.17</td>
<td>0.8416</td>
</tr>
<tr>
<td>Sex*Treatment</td>
<td>2</td>
<td>4.93</td>
<td>1.16</td>
<td>0.3143</td>
</tr>
<tr>
<td>Subjects</td>
<td>118</td>
<td>248.92</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

presented in Table 8; it did not appear that changes were attributable to group membership.

Vocational Exploration

Since subjects tended to respond to the Vocational Exploration Behavior Checklist by words such as "a few," "several," etc., it was not possible to calculate the number of times a specific behavior actually occurred, only whether it had or had not occurred. There was a significant difference attributable to gender on the posttest Vocational Explora-
Table 8. Actual and desired changes in number of college majors being considered, presented by group

<table>
<thead>
<tr>
<th>Desired result</th>
<th>Increase</th>
<th>Decrease</th>
<th>Same</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group 1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase</td>
<td>6</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Decrease</td>
<td>3</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Same</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td><strong>Group 2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase</td>
<td>4</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Decrease</td>
<td>2</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Same</td>
<td>7</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>Group 3</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase</td>
<td>4</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Decrease</td>
<td>4</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Same</td>
<td>6</td>
<td>4</td>
<td>9</td>
</tr>
</tbody>
</table>

The mean score on the Career Decision Scale at pretest was 22.46; at posttest, 20.70 (standard deviation at posttest, 10.89).
Table 9. Statistics of fit for Vocational Behavior Checklist (posttest)

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>F value</th>
<th>prob &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>1</td>
<td>20.01</td>
<td>5.08</td>
<td>0.0245</td>
</tr>
<tr>
<td>Treatment</td>
<td>2</td>
<td>8.76</td>
<td>1.11</td>
<td>0.3330</td>
</tr>
<tr>
<td>Sex*Treatment</td>
<td>2</td>
<td>4.14</td>
<td>0.53</td>
<td>0.5983</td>
</tr>
<tr>
<td>Subjects</td>
<td>118</td>
<td>465.18</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 10. Statistics of fit for Career Decision Scale (posttest)

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>F value</th>
<th>prob &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>1</td>
<td>222.83</td>
<td>1.88</td>
<td>0.1696</td>
</tr>
<tr>
<td>Treatment</td>
<td>2</td>
<td>3.92</td>
<td>0.02</td>
<td>0.9844</td>
</tr>
<tr>
<td>Sex*Treatment</td>
<td>3</td>
<td>416.14</td>
<td>1.75</td>
<td>0.1755</td>
</tr>
<tr>
<td>Subjects</td>
<td>118</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Preferences

A sample of 51 subjects was polled, two weeks after receiving both types of feedback, as to whether they would prefer receiving the standard results alone (Treatment 1), iota-score results alone (Treatment 2), or a combination of the two (Treatment 3). Results are presented in Table 11. It appears that Treatments 1 and 3 received more first choices than did Treatment 2, and that Treatment 3 received more first and second choices combined than did either Treatment 1 or 2. A Friedman two-way analysis of
Table 11. Preferences for different forms of KOIS feedback

<table>
<thead>
<tr>
<th>Preferences</th>
<th>Treatment 1 (standard)</th>
<th>Treatment 2 (experimental)</th>
<th>Treatment 3 (both)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First choice</td>
<td>21</td>
<td>8</td>
<td>22</td>
</tr>
<tr>
<td>Second choice</td>
<td>12</td>
<td>18</td>
<td>21</td>
</tr>
<tr>
<td>Third choice</td>
<td>18</td>
<td>25</td>
<td>8</td>
</tr>
</tbody>
</table>

Variance by ranks indicated that the differences observed are statistically significant (p < .05).

Since the iota-score matches are considered supplemental to the traditional feedback, the data were also examined to determine how many subjects preferred the standard feedback/experimental feedback combination to the standard feedback alone. Of this group, 22 preferred the standard materials alone and 29 preferred the combination of standard and experimental feedback.

Subjects were asked to explain their preferences for type of feedback. Of the 22 who preferred the standard feedback without the person-to-person matching results, 7 explained that they were only interested in occupational information, since they had already definitely chosen their majors and some were near graduation. (The person-to-person matches were available only for college majors.)

Of the remaining 15 in this group, 9 gave one or more of the following reasons for not feeling the person-to-person match technique helpful: there need to be more majors represented; the majors represented were ones
which the subject disliked; and the persons in the biosketches were "not like me."

The other six persons who preferred the standard results alone to the combination of standard and experimental results did so for a variety of reasons. Two said the results contradicted each other; one didn't like "being compared to just one person"; one suggested that the experimenters should have given him biosketches of persons with interests like his who were engaged in the majors he was actually considering; and one stated: "Maybe the people in the biosketches are all in the wrong major too."

On the other hand, 29 of the 51 persons preferred the combination of the biosketches and the traditional feedback to the traditional feedback alone. Their comments included:

I'm interested in choosing a major and the biosketches are like talking with someone in that major;

I liked comparing the two reports;

The computerized report listed areas and the personal histories told me something about them;

The histories (biosketches) give a good idea of what each major requires;

The personal histories showed me what other people, with interests similar to mine, were doing with them;

The histories were more personalized than the computerized report.
DISCUSSION

Person-to-Person Matching

The person-to-person matching technique appears to be feasible. Iota scores provide a means for assessing comparative similarity of individual interests as measured by the KOIS. However, before instituting the process on a larger scale, some mechanical difficulties need to be overcome. Particularly, compilation of feedback material is cumbersome and time-consuming when done by hand, as it was in this study. Use of a larger criterion group would make this process even more difficult. Total computerization of preparation of the feedback materials would be preferable, if it can be done at a reasonable cost.

Research should be directed toward finding an optimal "cut-off" score. What iota score represents true similarity of interests? The question seems to involve more than statistical techniques: the mean and variance of the iota scores obtained by an individual will obviously vary with the similarity of the pool of criterion persons to that individual and with the heterogeneity of the pool. For instance, the mean was probably higher and variance less when comparing an experimental group of Iowa State University students to a criterion group of Iowa State University seniors than would have been the case if the comparison group had been composed of randomly-selected adults from the general population. The fact that some subjects felt that the persons with whom they were matched were not similar to them, however, may be an indication that the iota-score level of 500 used as a cut-off point in this study was too low.
An obvious advantage of the person-to-person matching procedure is that different criterion groups can be used to meet specific needs of a particular client. For instance, a person who expects to become a physician might be compared with a criterion group composed exclusively of physicians, so that he/she can learn more about the satisfactions/dissatisfactions with this career as experienced by persons whose interests are similar to his/her own. The client's similarity to physicians in general could, of course, still be assessed by the traditional person-to-group scoring method. Thus the client might receive two different types of feedback from the same inventory.

Alternative ways of presenting the feedback need to be explored in order to find the most effective and satisfactory format. A possible beginning might be to investigate the relative merits of the short biographies used in this study with those of the materials available through Vocational Biographies, Inc. (P.O. Box 31, Sauk Centre, Minnesota 56378). The latter are considerably longer, but also include a good deal of specific information about the individuals described which may not be vocationally relevant.

It is puzzling that male experimental subjects were less likely to match with persons of their own gender than were females, even though the number of persons of each gender in the criterion group was almost identical. A similar finding was reported by Zytowski and Laing (1978), who noted that the female-normed occupational scales on the KOIS approached the level of predicting better for men than did the male-normed scales. It is possible that males in our culture match by vocational interests,
rather than sex-role interests, at a younger age than do females, and that
gender differences are less important. Conversely, it may be that voca-
tionally-mature females, as would presumably be found in a criterion
group of university seniors, are more similar to men in general than they
are to women in general.

Theoretical Considerations

The long-term predictive validity of the present KOIS feedback has
been documented by Zytowski (1976). It is not anticipated that the addi-
tion of the person-to-person feedback will add to the predictive validity
of the instrument. Certainly it is possible to match the interest pattern
of an individual more precisely by the use of persons, rather than groups,
as the criterion. However, even if the person and his/her match have
identical interest patterns on the KOIS, the chances that the client will
enter the same occupation as the criterion person are slight. Predictive
validity would be maximized by locating the occupation in which workers'
interests are most generally similar to those of the client.

One might consider the traditional KOIS feedback as analogous to
statistical prediction; the experimental feedback, analogous to clinical
prediction. Though computerized in procedure, the experimental feedback
is essentially saying to the client: "Here are some people with interests
much like your own. This is what they are doing, and what they think
about it." Since so many variables in addition to interests play a role
in occupational choice, even two persons with very similar interests are
unlikely to enter exactly the same career.
Wiggins (1973) reported that "statistical prediction was equal to or superior to clinical prediction in all instances. However, the best prediction method appeared to be that in which both judgmental and mechanical input data were available for statistical combination." It will, of course, be several years before data can be available to test whether predictive validity of the KOIS is improved, unchanged, or lessened by a statistical combination of the two types of feedback.

Once again, it should be stressed that prediction is not, in fact, the goal of vocational counseling. Super (1957) suggests that "Since in vocational counseling a great variety of data are evaluated, and since so many occupations are likely to be considered that regression data are not available . . . the relative validity of regression and appraisal techniques needs to be considered in selection, but not in counseling, programs." Testing in the vocational counseling process is described as follows (Super, 1949): "The use of tests by a vocational counselor is therefore of necessity generally not a predictive process (in the actuarial or statistical sense) but rather a clinical procedure."

It seems, then, that predictive validity is used as partial justification for the use of tests in vocational counseling, although prediction is not the purpose of such use. Given the procedure involved in person-to-person matching, it is not likely that predictive validity will be high; thus, it is necessary to seek some other rationale for the use of this procedure, if it is to be used.
Effects of the Inventory Experience

Cherry (1974) suggests that vocational-counseling outcomes may be examined on two dimensions. First, there is the "affective" dimension: How did the client perceive the experience? Did he/she sense some degree of personal satisfaction?

Second, she proposes evaluating vocational counseling on an "effective" dimension: What changes in behavior are attributable to the client's having had the experience?

Since interest inventories are intended to be used in vocational counseling, it seems reasonable to evaluate the interest-inventory experience on these same dimensions.

Affective dimension

The results of this study indicate that the combination of traditional and experimental feedback was at least as satisfactory as the traditional feedback alone, with several subjects expressing a preference for the combination. In that sense, it appears that the additional information did not decrease, and in some instances may have increased, satisfaction with the KOIS.

However, it seems clear that the use of the person-to-person matching procedure alone was less satisfactory than the traditional feedback. Even though it is not intended to be used alone, but as supplemental information, one might speculate on a variety of factors which may have contributed to this finding:

(1) the criterion group was relatively homogeneous;

(2) the iota score chosen as a cut-off point may have been too low;
(3) the feedback provided to subjects may not have explained clearly that this approach is not intended to suggest specific vocational choices, but rather to indicate the types of experiences which persons with similar interests have found satisfying;

(4) subjects' expectations of what an interest inventory should provide may not have been met; according to Shrauger (1975), this could have an adverse impact on acceptance of results (given the number of inventories administered annually, it is highly probable that the majority of subjects were familiar with traditional feedback).

Effective dimension

No differences attributable to treatment were found on any of the dependent measures used in this study. Although a control group was not included in the design, the fact that the pre- and posttest means were virtually identical would seem to indicate that no effects were demonstrated for traditional, experimental, or combination feedback.

A presentation made by Tittle (Note 9) in 1979, after the completion of this study, indicates that these results are not atypical. She points out that experimentally verified effects of interest inventories have tended to be rare, and of small magnitude when present. Since her discussion includes only published studies, it may be that overall research findings on effects of interest inventories are even more discouraging.

Since interest inventories are able to distinguish among occupational groups, and have demonstrated predictive validity, it seems clear that they are measuring something. However, it is less clear that knowledge of
this "something" has any effect on clients—in spite of the three and a half million inventories scored per year.

Most studies have used questionnaire data, and not behavioral measures, to assess effects. However, the findings of Walsh and Maxey (1972) suggest that this method is reasonably valid.

The lack of statistically significant findings might be attributable to the analogue nature of most of the interest-inventory studies. Typically, the experimenter identifies a population which he/she feels could profit from the results of an interest inventory (such as college freshmen who have not declared majors; persons who sign up when offered free interest inventory results; etc.). Whether the subjects in such experiments are in agreement with the experimenter about their needs is typically not clear. Certainly, for the most part, the investigator has sought out the subjects, and not vice versa. Zytowski (1977) has found effectiveness of the inventory experience to be greater for persons who are more interested in the results of such testing.

Another possible explanation of the lack of demonstrated effects may be that interest inventory interpretation, when it is not part of more complete vocational counseling, is relatively ineffective. Goldman (1972a) suggests that "most counselors (do not) use available knowledge and methods for obtaining from tests what the tests are capable of yielding." It may be that, when integrated into skillful vocational counseling, the tests are effective; but most studies are not designed to test this specific hypothesis.
Certainly this question needs to be addressed, for if interest inventories in fact prove ineffective, it seems rather inappropriate to administer three and a half million of them per year. Conversely, if they are effective only under certain conditions, these conditions need to be identified. A promising line of research might be that of Cooper (1976), who found that the effectiveness of interest inventories was improved by the use of certain auxiliary materials.

Summary

The results of this study indicate that the person-to-person matching procedure is technically feasible. Prior to making this material a routine part of KOIS feedback, however, further investigation needs to be conducted. Specific experimental questions might include:

(1) What iota score denotes practical "similarity" between the interests of two individuals?

(2) How can the feedback best be presented?

(3) How large, and how homogeneous, should the criterion group be?

(4) Might it be preferable to have a variety of criterion groups, rather than one?

(5) What are the effects of the person-to-person matching feedback, and how can they be maximized?

Moreover, it seems that question (5) could still profitably be asked about interest inventories in general. "Effects" studies of interest inventories are a fairly recent phenomenon. If, as Goldman suggests, the relationship between tests and counseling is analogous to a marriage, it
seems that more should be known about what each partner is contributing to the union. Improved methodology and studies done with actual vocational-counseling clients may provide some of the answers.
REFERENCE NOTES


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ACKNOWLEDGMENTS

Special thanks are due to all the members of my doctoral committee (listed in reverse alphabetical order, as a special concession to the Z's of the world):

Don Zytowski, who has been, at some time or another in the past four years, my major professor, teacher, supervisor, research director, mentor, counselor, and friend;

Bob Strahan, who with his brilliance, patience, and humor proved to me that statistics can be fun (we're still working on computers);

John Speer, who challenged me to write with more clarity and less jargon;

Norm Scott, who was the first ISU faculty member I met, and whose encouragement led to my beginning this program, as well as persisting in it;

Dick Hughes, who reminded me that psychology is a fascinating discipline even for the nonfollowers of S. Freud, C. Rogers, et al.
APPENDIX A: SAMPLE KOIS REPORT FORM
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APPENDIX B: SAMPLE PERSON-TO-PERSON MATCHING MATERIALS

Recently you completed the Kuder Occupational Interest Survey. Your responses were used to find the people whose interests are most like yours from among a group of advanced students in the College of Science and Humanities at ISU. All the students in this group took the KOIS, and also filled out a questionnaire about themselves and their majors, during the past year.

On the following pages, you will find copies of the questionnaire responses of the persons in the group whose interest patterns are most similar to your own. As you read through them, consider how these students are like you, and how they are different from you. For instance, would you expect to find similar activities satisfying and/or annoying?

Although these persons are the most similar to you in their interest patterns, no two people are ever exactly alike. You will probably find that you are like these students in some ways and dissimilar in others.

You will notice that, while the other students are not identified by names, their major fields of study are listed on their questionnaires. Of course, in choosing your own major, you will need to consider more than interests—for instance, your abilities, the amount of time you expect to spend in training, and the probability that a job will be available for someone with that background are also important factors.

You should remember that you were matched on the basis of interests; your aptitudes and skills may be very different from those of the people who were matched with you. Also, all of the persons in the matching pool were majors in the College of Sciences and Humanities; therefore, you
cannot determine, from this information, how your interests might compare with those of students majoring in other colleges.

If certain majors especially appeal to you, you can learn more about them by talking with students and faculty in those areas. College catalogs offer detailed information about requirements and courses of study for college-major fields. The Student Counseling Service, located on the third floor of the Student Health Building, has information about salaries, job outlooks, etc., for different occupations.
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Weekly routine in the major

English is basically a lot of reading (about 2 hours per day), as well as a lot of writing. I can't comment on how long it takes to write papers because it varies with each person. I, myself, spend about 3 hours on each paper. If you do all of the reading, there is very little time spent in preparation for tests. Most of the work is mental. There is a lot of interaction with students and teachers in and out of class.

Important skills and attitudes

You must love to read and write, and you must have a very vivid imagination as well as an open mind. You can't be afraid to challenge any teacher, or any author. You must possess a critical mind and at the same time you must be willing to speak out in class and be able to defend your stand.

My other activities

I have been involved in many extracurricular activities which relate to my major: Sketch, writers' roundtable, and I have tutored for the ISU Athletic Department. Other than that, I am involved in sorority activities and many French activities.

Satisfactions of the major

The chance to think and write creatively. I am also satisfied with my performance, and I appreciate the way the teachers value each student's opinion.

Dissatisfactions of the major

The usefulness of my major in the "real world." I am also unhappy about the way that the job market was pretty well ignored in respect to what I really wanted to know.

Why I chose this major

Since I was in second grade I have had the desire to become a writer. I have loved reading and writing since that time, and I was encouraged simply by the school I attended which believed in the creativeness of its students and the individuality of each child.
Post-graduation plans

I am going to France for two months, then I will hopefully be returning to a teaching job. After getting a few hours' practical experience, I hope to either go to graduate school, or—better yet—find a job in publishing.

Suggestions to prospective majors

Definitely begin to plan what you want to do during your freshman year and aim towards that. Find something other than English to study, but never never never let anyone downgrade either you or your major.

Weekly routine in the major

Generally I attended 15 hours of class/week. A typical day was 3 hours of class during the day; at the beginning of the week I would read the week's assignment (from the syllabus) so I would know what was to be discussed in class. Generally, most papers took 1 week from start to finish. Keeping 1 week ahead in reading was necessary, especially at the end of the quarter. I generally tried to do current readings as well as at least one of the recommended readings that interested me. Any time I felt like discussing some historical question I would corner the appropriate professor. I did not have much academic interaction with students.

Important skills and attitudes

Writing and reading (fast and comprehensible) are necessities. Also, the ability to type is handy. You must like to ramble through the card catalog and other research sources. A knack for remembering trivia is also handy (while not a necessity). Also, an open mind helps while researching so you determine what the facts show, not how you can use them to back up your arguments.

My other activities

I work at a restaurant/bar some 30 hours/week. I also collect stamps and coins, and am extremely interested in old languages and writing forms, and how people communicate.

Satisfactions of the major

It makes me feel like I'm part of a grand tradition, that I'm part of some vast structure of humanity, that makes more sense to me through the study of history. History is especially nice because in a sense it is everything that's ever happened and no matter what a person is interested
in, he can learn more about it and thereby feel closer to it through the study of history. In effect, I get to do what I want.

**Dissatisfactions with the major**

Writing term papers over subjects that don't interest me, or just for the sake of writing them.

**Why I chose this major**

I just decided that I wanted to do something that I really enjoyed and since I always had a knack for history and always found reading about it extremely interesting, I decided to try it as a profession.

**Post-graduation plans**

After graduation, I'm continuing my education, with the eventual goal of becoming a college professor in mind. The special area of emphasis will be Scandinavian and medieval history.

**Suggestions to prospective majors**

It's a nice major if you enjoy looking at the world, but not extremely useful unless you're going to teach or be in some history-related field (i.e., archivist). Pick something more practical if you're worried about a job.

**Weekly routine in the major**

The majority of my time is spent working problems, either by hand or on the computer. Test preparation isn't very extensive because statistics tests don't require much memorization, just a good understanding of the material. Lab time varies depending on the course. I'm involved in some extracurricular stat activities so I have quite a bit of interaction with other students and faculty.

**Important skills and attitudes**

A mathematical mind is of utmost importance because stat is almost entirely concerned with numbers and evaluating a set of them. The ability to grasp concepts and not just memorize methods is also important. Stat is not a particularly easy major, so a student who isn't willing to study quite regularly probably should look to some other field of study.
My other activities

I am quite involved with music here—I accompany several music majors (voice) at their voice lessons. I'm also involved in some social activities—Little Sister at a fraternity.

Satisfactions of the major

I enjoy working with numbers and "figuring things out." This is probably the most satisfying part of my major. I also like seeing how applicable statistics is to other fields. It is a skill which can be used in almost any area.

Dissatisfactions with the major

The theory portion of statistics sometimes gets a bit involved and complicated. I find the difficulty of some statistical topics troublesome sometimes.

Why I chose this major

I had 3 weeks of statistics in high school my senior year. I enjoyed it so much that I thought it might be an interesting major. I came to ISU as a math major but after taking the introductory stat course I decided that stat was more practical than math and I found it more interesting. I switched majors at the beginning of my sophomore year.

Post-graduation plans

I hope to go into marketing research and development. I have a business minor so I want to use that knowledge in addition to my statistical skills. Marketing research definitely needs statisticians and this seems to be an area that would be interesting and would provide room for advancement.

Suggestions to prospective majors

I would highly suggest specializing in an area in addition to stat. I wish that I had specialized sooner. As I mentioned earlier, stat is very useful, but prospective employers want someone with a specific interest. This could be in the area of agriculture, marketing, economics, biology, computer science, or some others. Also, if a student doesn't wish to major in stat, it does make an excellent minor.
Anthropology 002

Weekly routine in the major

I am on campus from 9 AM to 5:30 PM daily, with 1/2-1 hour for lunch, alone. I usually read 3-6 hours daily. Interaction with students and professors occurs before and after each class, for 5-15 minutes once or twice a day. I spend maybe 3 hours weekly in lab. I work steadily each day preparing for exams, reading, preparing papers, attending classes. I treat the school day as a work day—I try to work at my studies 8-10 hours daily.

Important skills and attitudes

Ability to read, criticize, synthesize, and write well, using numerous sources. Critical attitude towards pertinent literature. Ability to discuss topics and to express thoughts succinctly.

My other activities

I hold an executive state office in an international organization of single parents.

Satisfactions of the major

Intellectual stimulation
Recognition in writing and speaking
Learning about ancient and modern man, culture, history
Research with people-oriented projects, literature searches

Dissatisfaction with the major

Laboratory work, statistical analyses

Why I chose this major

I have been interested in this field all my life.

Post-graduation plans

I will be attending graduate school, eventually earning a Ph.D. I hope to teach and do research, or do museum work, or work in cultural resources management.

Suggestions to prospective majors

Be committed. Employment is dim for the next decade. You must be completely engrossed with anthropology/archaeology if you expect to be successful. Give yourself as broad a background as possible; familiarize
yourself with all areas of anthropology. Geology, agronomy, and statistics are useful, as well as psychology, social sciences, and languages.

Botany 008

Weekly routine in the major

- 6-20 hours lab work
- 10 hours reading
- 25 hours special projects and work (seed lab)—my specialty area is seed maturation
- 20 hours interacting with students and professors

Important skills and attitudes

This is a people major. Being able to mingle, or at least wanting to, is necessary. Botany is a field which people associate with horticulture so they always ask questions about their house plants, weed problems, anything associated with plants. Diseases are also subjects which people want to know about. This all leads to a person trying to be able to remember as many facts as possible in a number of different areas.

My other activities

I participated in the Botany Club which has many (if not most) non-majors in it. I am married and tried to work my class work around my spouse and our activities.

Satisfactions of the major

I enjoy the area of study—how plants grow—the people in the field are especially great. A well-rounded education in the area of plant growth is satisfying. The people in the area are especially helpful and considerate of you as an individual.

Dissatisfactions with the major

The area is general and one is better equipped if one pursues an outside area of interest, e.g., genetics (breeding), seed technology, illustration, etc. A person who is strictly a botany major and who pursues no outside interests will find the job market very limited.

Why I chose this major

I was interested in the area of plant growth, particularly how agricultural crops grow. I was (and still am) interested in the beginnings of plant growth—the seed.
Post-graduation plans

I am currently working in the new ISU Seed Science Center in Seed Pathology.

Suggestions to prospective majors

Go into the area with an open mind. After a couple of quarters if he/she finds an area associated with botany be sure to pursue it. Get to know the professors—they have a lot of connections and influence.

Math 028

Weekly routine in the major

I spend no time in labs and very little preparing for exams. I spend about 15 hours per week doing work in my major. About half of this is reading time and about half is spent working problems. I interact with math students about 3 hours per week and about 30 minutes per week I spend talking with math professors.

Important skills and attitudes

You must think analytically and logically. It is necessary to be able to form mental images of geometrical objects easily and to form these images of each concept learned in math. You must be able to concentrate well.

My other activities

I study physics a lot and do computer programming.

Satisfactions of the major

Mastering a new concept—being able to understand something well enough to see how it could be used.

Dissatisfactions with the major

There are a lot of details to verify in reading proofs. These get tedious easily.

Why I chose this major

It was a natural, gradual shift. I kept liking my math classes more and more so I kept wanting to take more difficult courses. It was obvious after just a year that I should have a math major and after two more years it was clear that I should go to grad school in math.
Post-graduation plans

I am going to graduate school in math. I'm working toward a Ph.D.

Suggestions to prospective majors

Definitely take a calculus sequence, but don't get discouraged if it is not what you want. Try a few other courses as well. I didn't especially like freshman calculus myself. Try to get to know a few math students and professors and talk with them about your interests.

Biochemistry 005

Weekly routine in the major

I spend several hours a week reading, very little on problems after the math and physics sequences were through. I try to spend as much time in the lab as possible, but basically I have done my independent lab work in the summer (independent research is not required, however). I spend probably 5 hours a week preparing for tests and attend approximately 1 seminar per week (about 1 1/2 hours).

Important skills and attitudes

It is most important that one really enjoys biochemistry. The department is made up of people who are very enthusiastic, and to take advantage of this and get the most from the major one should get involved in biochemistry.

My other activities

I play basketball, lift weights, and read (especially psychology and social science philosophy).

Satisfactions of the major

The most important and satisfying part of my major is my interaction with my advisor. I work in his lab on an independent project, and I find this most fulfilling.

Dissatisfactions of the major

I dislike the amount of course overlap. I have taken a number of biology courses, and I have seen some of the material on numerous occasions. I also dislike the fact that my schedule is broken up—this makes it difficult to get time for lab work, which requires longer stretches of uninterrupted time.
Why I chose this major

My first advisor suggested Biochemistry 101, and in that class I realized that biochemistry should be my major (the enthusiasm for the subject exhibited by the professor was also attractive).

Post-graduation plans

I will attend graduate school in biochemistry and hope to pursue a career in research.

Suggestions to prospective majors

If you are bright and want to do independent research, this is an excellent major—there are many possibilities. Biochemistry is a relatively difficult major, but it is excellent preparation for a large number of fields. The department is small and close—if you want to get the most out of it, get involved.
APPENDIX C: PRETEST SURVEY

Directions: You are about to fill out the Kuder Occupational Interest Survey. It is an inventory which will not tell what you are "good at," but what college majors and/or careers you might be more likely to find satisfaction in. On this sheet are a number of questions which will help evaluate the usefulness of the inventory. Please fill out the inventory and this sheet thoughtfully and honestly. None of your answers will be revealed to anyone, but you will receive feedback about how your interests compare to those of other people.

Motivation (Check one)

___ I actually doubt that I can get any good out of taking this inventory.

___ I don't think this will be very interesting to me, but I'm willing to take it and see.

___ Maybe taking the inventory will do me some good, maybe not.

___ I have reasons to be pretty interested in the results of an interest inventory.

___ I am very much interested in what the interest inventory might tell me.

College Major Decisiveness (Check one)

___ I have definitely decided what college major I want to go into.

___ I have tentatively decided what college major I want to go into.

___ I am moving toward a decision about a college major, but have not made even a tentative decision at this time.

___ I have a college major in mind, but am not at this time moving toward a decision to pursue it.

___ I am completely undecided about what career I want to pursue.

Choice Satisfaction (Check one)

___ I am fully satisfied with my college major choice.

___ I think I have made about the best possible choice about a college major.
I am fairly satisfied with my college major choice, but have some doubts.

I am not really satisfied with my career plans and am reconsidering my decision.

No decision has been made yet about my college major.
APPENDIX D: ALTERNATIVES QUESTIONNAIRE

List all of the college majors you are considering right now.

1. ____________________________

2. ____________________________

3. ____________________________

4. ____________________________

5. ____________________________

6. ____________________________

7. ____________________________

8. ____________________________

9. ____________________________

10. ____________________________
APPENDIX E: VOCATIONAL EXPLORATION BEHAVIOR CHECKLIST

Directions: Read each of the items. Then check the "Yes" column if you have engaged in that particular behavior in the past two weeks or check the "No" column if you haven't engaged in that particular behavior. If you checked the "Yes" column, then record the number of times you engaged in that behavior in the past month in the last column.

<table>
<thead>
<tr>
<th>No</th>
<th>Yes</th>
<th>How many times?</th>
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<tbody>
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</table>

a. reading occupational information in the career library
b. sending for brochures of books on occupations
c. interviewing someone about career opportunities in one or more fields of work
d. thinking about specific college majors or occupations
e. talking to professors or academic advisors about your vocational plans
f. talking to your parents or other relatives about your vocational plans
g. talking to friends about your vocational plans
h. visiting places of employment
i. watching TV programs, seeing exhibits, shows, or listening to radio programs relevant to occupations
j. thinking about what college major would be best for you
k. talking to a vocational counselor
l. talking with other students about your vocational plans and/or what to major in
m. going to an employer and applying for a job
APPENDIX F: VOCATIONAL DECISION SCALE

Directions: Please use the scale below in responding to the following items:
1 - not at all like me
2 - somewhat like me
3 - very much like me
4 - exactly like me
Write your responses to the left of each item, using any whole number from 1 to 4.

___ 1. I have decided on a college major and feel comfortable with it. I also know how to go about implementing my choice.

___ 2. If I had the skills or the opportunity I know I would be a _______ but this choice is really not possible for me. I haven't given much consideration to any other alternatives, however.

___ 3. Several majors have equal appeal to me. I'm having a difficult time deciding among them.

___ 4. I know I will have to go to work eventually but none of the careers I know about appeals to me.

___ 5. I'd like to be a _______ but I'd be going against the wishes of someone who is important to me if I did so. Because of this, it's difficult for me to make a career decision right now. I hope I can find a way to please them and myself.

___ 6. Until now, I haven't given much thought to choosing a college major. I feel lost when I think about it because I haven't had many experiences in making decisions on my own and I don't have enough information to make a career decision right now.

___ 7. I feel discouraged because everything about choosing a major seems so "iffy" and uncertain; I feel discouraged, so much so that I'd like to put off making a decision for the time being.

___ 8. I thought I knew what I wanted for a major, but recently I found out that it wouldn't be possible for me to pursue it. Now, I've got to start looking for other possible majors.

___ 9. I want to be absolutely certain that my college major choice is the "right" one, but none of the majors I know about seems ideal for me.

continue on next page, please
10. Having to make a college major decision bothers me. I'd like to make a decision quickly and get it over with. I wish I could take a test that would tell me what kind of major I should pursue.

11. I know what I'd like to major in but I don't know what careers it can lead to that would satisfy me.

12. I can't make a college major choice right now because I don't know what my abilities are.

13. I don't know what my interests are. A few things "turn me on" but I'm not certain that they are related in any way to my college major possibilities.

14. So many things interest me and I know I have the ability to do well regardless of what major I choose. It's hard for me to find just one thing that I would want as a major.

15. I have decided on a career but I'm not certain how to go about implementing my choice. What do I need to become a __________, anyway?

16. I need more information about what different occupations are like before I can make a college major decision.

17. I think I know what I want to major in but feel I need some additional support for it as a choice for myself.
APPENDIX G: SATISFACTION OPINIONNAIRE

Directions: Please use the scale below in responding to the following items so that you can give feedback about what you got out of your participation in the interest inventory experience. Write your answers to the left of each item. Use any whole number from 1 to 5 to indicate your opinion.

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<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<tbody>
<tr>
<td>1</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neutral</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
</tbody>
</table>

___ a. Some of the college majors I found seemed reasonable to me.

___ b. I have some clearer ideas about possible college majors for myself.

___ c. I did not learn anything about college majors through the interest inventory experience.

___ d. I have some clearer ideas about unsuitable college majors for myself.

___ e. I learned some things about myself through this experience.

___ f. This interest inventory experience was not a good use of my time.

___ g. I would recommend the interest inventory experience I had to a friend.

___ h. This interest inventory experience encouraged me to find out information about some college majors.

___ i. The results of this inventory are confusing.

___ j. The results of this inventory are unsatisfactory.
Recently you took the Kuder Occupational Interest Inventory and received two different types of results. We would be interested in learning how you would compare these results. Please rank below which type of results you prefer (1 = most preferred; 3 = least preferred).

____ The computerized report form comparing me to groups of people in different occupations and college majors.

____ The personal college-major histories of the people whose interest inventory results were most like mine.

____ The combination of both the computerized report form and the college-major histories.

Please explain briefly why you ranked the results as you did.