

**Convergence of conventional and behavior-based measures:  
Towards a multimethod approach in the assessment of vocational interests**

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**Abstract**

The main aim of this study was to evaluate the usefulness of different techniques for the assessment of vocational interests. In an empirical study ( $n = 264$ ) a questionnaire, a nonverbal test, several objective personality tests, and a semi-projective test were applied in one single session in a computerized setting. All tests enable the assessment of vocational interests with regard to the theory of vocational interests by Holland (1997). Results showed that highest correlations to a Holland-type questionnaire were found for the questionnaire and the nonverbal test. In general, the objective personality tests were less homogenous and showed lower correlations to questionnaires. Nevertheless, all different measures showed potential for the assessment of vocational interests. Improvements in the test material and scoring methods of the newly constructed tests are discussed and a model for the combined use of different assessment methods is presented. Future research directions and a discussion on the role of a multimethod assessment strategy in practice are given.

Key words: vocational interests; RIASEC; objective personality tests; assessment of vocational interests

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Information on the structure of vocational interests of a client is an important part of the career counseling process. For the assessment of vocational interests questionnaires are widely used both in practice and in research (cf. Savickas & Spokane, 1999). Based on the interest structure, possible career choices or further directions in the counseling process can be discussed. Although a lot of different techniques are available in the field of psychological assessment in general (e. g., projective, semi-projective, nonverbal, or objective personality tests in the sense of R. B. Cattell) almost exclusively questionnaires are used in career counseling.

Despite the fact that the technique of “asking” the testee through a questionnaire is often (almost exclusively) used and that the validity of interest questionnaires is widely demonstrated (e. g., Fouad, 1999; Hansen & Dik, 2004), the technique can be criticized nevertheless. Results obtained by questionnaires might be biased because of response sets, social desirable answers, or other answer distortions (cf. Deller, Ones, Viswesvaran, & Dilchert, 2006; Kubinger, 2002; Viswesvaran & Ones, 1999). In the case of vocational interest the different prestige of occupations (Spoerrle & Rudolph, 2000) or internalized traditional career choices (cf. Turner & Lapan, 2005) might be an additional source of answer distortions. Furthermore, it can be assumed that even if the testee is willing to answer honestly in a questionnaire, it is not clear whether s/he is *able* to do so. The verbal ability of the testee might be too low, the questionnaire might show poor psychometric properties, or the whole test situation might be difficult for the testee (because of family or peer interactions for example). Other reasons for a biased answer might be wrong apperceptions or ideas about different vocational activities. In fact, lacking experience with a specific activity might lead to an answer in a questionnaire that might be biased by fantasies or wrong ideas about the activity. It has to be mentioned, however, that the general usefulness of questionnaires in research on vocational interests and in practice (in the career counseling process) is not doubted. Furthermore, it has to be mentioned that even if questionnaires can be faked that does not mean that subjects *are* faking them in all of the cases. Additionally, the consequences for the predictive validity of these faked answers are discussed controversially in the literature (cf. Kubinger, 2002; Viswesvaran & Ones, 1999).

However, information obtained by questionnaires might be biased by different factors. Therefore, the use of additional assessment techniques might be useful to facilitate the work of career counselors and theoretical studies on vocational interests. Thus, it is of interest to examine to what extent the results from different assessment approaches converge. If they do not converge it might be of interest to investigate the reasons for low convergences. Sex-role stereotypes or a restricted view on possible career choices due to a poor educational background might, for example, interfere with career decisions. In these cases additional information might be useful to help the client to develop new or to strengthen desired but not yet seriously thought of career aspirations.

*Developing alternative assessment techniques for the assessment of vocational interests.*

In this study, a questionnaire, a nonverbal test, objective personality tests, and a semi-projective test for the assessment of vocational interests were included. One of the basic ideas was that all test-material (all assessment strategies) should be allowing the measurement of vocational interests terms of Holland's (1997) theory of vocational interests. This theory was chosen because it is widely used in research and practice (cf. Proyer, 2007; Rayman & Atanasoff, 1999) and because its special usefulness for the test development has also been demonstrated. Results for each test will be scores for *Realistic*, *Investigative*, *Artistic*,

Social, Enterprising, and Conventional interests (RIASEC in short). The development of the tests is described in Proyer (2006a) in detail. In the following paragraphs, the basic rationale behind the strategies will be described shortly.

Each of the different assessment strategies has certain advantages and disadvantages. The nonverbal test, for example, can be criticized because the pictures used might be ambiguous and interpreted differently by the test-takers. However, empirical results show that it is possible to develop valid nonverbal measures for personality constructs (e. g., Paunonen, Jackson, & Keinonen, 1996) but there are only a few published nonverbal interest tests (Geist, 1948; Toggweiler, Jungo, & Stoll, 2004). As described in Proyer (2006a), expert judgments were applied to reduce effects of different judgments from test-takers and for a clear assignment of each picture to one of the six Holland-types in the nonverbal test used in this study. In previous studies (Proyer, 2006b; Proyer & Häusler, in press), this nonverbal test converged well with the standard Holland-type questionnaire from the German language area (General-Interest-Structure-Test Revised; Bergmann & Eder, 2005). However, each method can be criticized for various reasons and some of them might be better suited for different test situations (e. g., nonverbal tests in working with clients with low verbal abilities). However, the combination of different approaches might be useful to reduce some of the problems inclined in the methods themselves.

*Objective measures of vocational interests.* Objective personality tests (Cattell & Warburton, 1967; Ortner, Proyer, & Kubinger, 2006; Proyer & Häusler, 2007; Santacreu, Rubio, & Hernández, 2006) use performance-related tasks (based on memory or attention, for example). From the way the testee reacts to these tests conclusions might be drawn on his/her personality. It is important to mention that the term *objective* here refers not only to the test criteria but also to a specific construction principle. "Objective means not only that the test performance should be similarly scored by two different psychologists, but also that the test stimulus situation and the whole mode of response should be such that the testee himself could not fake the response, or distort it to fit his subjective self-concept or his desire" (Cattell & Warburton, 1967, p. 15).

*What is the rationale behind an objective interest measurement?* Crites (1999) discusses different assessment methods for vocational interests than questionnaires. Amongst others he describes so-called experimental interests and describes them as follows: "Experimental interests denote measures of interests defined by behavioral responses to objects that represent various occupations, and the voluntary or involuntary responses are measured by experimental techniques such as reaction time and galvanic skin response" (p. 168). In literature, there is more support on the hypothesis that behavioral measures can be used for the assessment of vocational interests. A classification of such strategies can be found in Cattell and other authors that described so-called *objective interest indices* (Cattell, 1950, 1957; Fryer, 1931) that are potentially useful for the assessment of interests. They can be used as a theoretical framework for a test construction. Cattell's classification comprises interactive criteria-methods (e. g., money or time spent on certain things), attention-memory-(learning-)methods (e. g., short-term memory of certain things), methods that assess the relevant cognitive and dynamic structure (e. g., information regarding certain questions), "autism"-methods (e. g., wrong apperception [illusion] regarding certain things), and psychological and physiological activity-level-methods (e. g., fluidity of the verbal reaction to specific stimuli or galvanic reaction to certain statements). Interestingly, similar ideas were realized in the *Daydreams*-section of the Self-Directed-Search (SDS; Holland, 1994). Here, the aspi-

rations of the testee may provide important information for the career counselor as well (cf. Reardon & Lenz, 1999). However, it has to be mentioned that the daydreams are classified as expressed interests according to the classification given in Crites (1999).

In Proyer (2006a), a detailed literature review on the theoretical rationale behind the objective tests used for the assessment of vocational interests in this study is given. There, older approaches (e. g., Burt & Ives, 1923; Cattell, 1935; Fryer, 1931; Super & Roper, 1941) in the use of objective methods are also reviewed and embedded in newer results from different research areas. Based on this review, the objective measures were constructed in a Cattellian tradition. They should provide information on potentials and limitations of this assessment strategy compared to others in the field of vocational interests.

*A semi-projective test.* In addition to a questionnaire, a nonverbal test, objective personality tests, and a semi-projective test were constructed. The special criterion of semi-projective tests is that the testee has to interpret ambiguous (visual) stimuli. The testee is not supposed to associate freely but has to answer to already formulated statements like in a regular questionnaire. Thus, the idea behind semi-projective tests is to combine advantages of projective techniques (e.g., less susceptible to faking) and advantages of questionnaires (e.g., objectivity of the scoring). In recent times, there were some new test developments using this approach. Sokolowski, Schmalt, Langens, and Puca (2000), for example, introduced a semi-projective test for the measurement of motives (in their hope and fear components). The special advantage of this assessment technique is that semi-projective measures are less susceptible to answer distortions than questionnaires.

*Aims of the present study.* The main aims of the present study are twofold. First, it will be explored to which extent the different approaches are similar. For these purposes, participants will complete a questionnaire, a nonverbal test, seven objective tests, and one semi-projective test. All tests were developed for the use in a computerized setting. Second, the correlations of the different approaches to a well-established vocational interests questionnaire will be explored. It is expected that the conventional tests (questionnaire and nonverbal test) will show higher correlations with the vocational interests questionnaire than the objective or semi-projective tests. Regarding the nonverbal test, there are results from a study by Toggweiler, Jungo, and Stoll (2004) who compared their nonverbal test with General Interest-Structure-Test (Bergmann & Eder, 2005). They report correlations from  $r = .33$  to  $r = .80$  ( $p < .05$ ) between the questionnaire and the nonverbal test. Similar results are expected for the nonverbal test used in this study. The highest correlations are expected between similar strategies; i.e., the two questionnaires. To the knowledge of the author there are no published results on the relation between objective personality tests or semi-projective tests for the assessment of vocational interests and interest questionnaires. However, it is expected that correlations will be lower for these different approaches. In literature (e. g., Cattell, 1990; Cattell & Kline, 1977; Kubinger & Litzenberger, 2003; Skinner & Howarth, 1973), only low to moderate correlations between objective tests and questionnaires are reported. Overall, it is expected that identical/similar measures (questionnaire, nonverbal test) will show higher correlations with the questionnaire than other measures (objective personality tests and semi-projective tests).

## Method

### *Sample*

The sample consists of  $n = 264$  persons (64 males, 197 females) between 20 and 48 years ( $M = 26.51$ ;  $SD = 5.06$ ;  $Md = 25.00$ ). The data was collected at the Universities of Zurich ( $n = 66$ ) and Vienna ( $n = 198$ ). Since the two samples did not differ regarding the distribution of sex and age, nor regarding the educational status, the data was collapsed into one sample.

### *Measures*

Based on literature described in the previous section, ten tests for the assessment of vocational interests were developed and applied in a computerized setting in one single session. Table 1 provides an overview on the tests and their rationale.

Table 1 shows that tests 1 and 3 can be scored either conventionally as nonverbal (1c) test or as questionnaire (3c), or if using reaction time as scoring algorithm, they can be scored as objective tests (1o, 3o). Using reaction times, it should not be possible for the testee to fake his or her answer or distort it to fit his or her subjective self-concept or desire (cf. Cattell & Warburton, 1967). As Table 1 indicates, all tests are based on different (scoring and) assessment methods, but all were developed to provide measures of vocational interests based on Holland's (1997) theory of vocational interests.

In the introduction, a classification of objective interest indices was given. Each objective test can be associated with one of them. The objective tests 1o ("Pictures II") and 3o ("Word list II") can be classified as methods that assess the relevant cognitive and dynamic structure and psychological activity-level-methods, the test 2 ("Viewing time") as psychological activity level-method, test 4 ("Distribution task") as interactive-criteria-method and as a psychological activity level-method, tests 5 ("Memory"), 6 ("Distractibility"), and 7 ("Embedded words") as attention-memory-(learning-)methods.

The tests are described in Proyer (2006a) in more detail, but they will be shortly outlined here in order to give an overview on their construction principles. Test 1c ("Pictures I") is a nonverbal test consisting of 60 pictures showing people in stick-drawn figures doing vocational activities. The testee has to answer according to his or her interest in the respective activity. There is no neutral answer category. A sample item is given in Figure 1.

If reaction time is considered, the test can be scored as an objective personality test (1o; "Pictures II"). Here, the testee cannot distort his or her answers because the scoring rationale is disguised. In test 2 ("Viewing time"), six hand-drawn pictures of typical vocational environments for the RIASEC-themes (a repair shop, a laboratory, a studio, a doctor's practice, a shop, and an office) are presented. Each of the pictures is based on a similar structure and contains the same number of details (e. g., in each picture there is a table, a chair, or a garbage can in different designs). Different viewing times are the score for different expressions of interest in the respective theme. Test 3c ("Word list I") is a regular questionnaire consisting of 96 items. As in test 1, the answer format is dichotomous and no neutral answers are possible. Test 3o ("Word list I") is based on the same idea as test 1o, taking the reaction times into account as well. The score in test 1o and 3o is a mean score of the reaction times

**Table 1:**

A questionnaire, a nonverbal test, seven objective tests, and a semi-projective test for the assessment of vocational interests

<b>Test</b>	<b>Classification</b>	<b>Short description</b>
1c Pictures (I) 60 Items	Nonverbal Test	The testee has to react to pictures showing persons or things related to the RIASEC-dimensions regarding his or her interest or non-interest.
1o Pictures (II)	Objective Test	Same as above, but the reaction time is taken into account as well. Reaction time is calculated only if the testee has given more than one "interesting"-answer per category.
2 Viewing time 6 Items	Objective Test	Task of the testee is to look at six pictures (the instruction says: as long until he or she "has seen everything") that represent vocational environments of the RIASEC-dimensions.
3c Word list (I) 120 Items	Questionnaire	The testee has to react to words related to vocational activities according to his interest or non-interest.
3o Word list (II)	Objective Test	Same as above, but the reaction time is taken into account as well. Reaction time is calculated only if the testee has given more than one "interesting"-answer per category.
4 Distribution task 6 × 6 organizations	Objective Test	The testee has to distribute 100 000€ to different organizations or associations (that are adjusted to the RIASEC-dimensions).
5 Memory 43 Items	Objective Test	The testee has to answer questions to the pictures used in subtest 2 (this was not announced in the instruction of subtest 2).
6 Distractibility 6 Texts	Objective Test	The testee has to mark senseless or not fitting words in six texts (one for each RIASEC-dimension) within a time limit of one minute.
7 Embedded words 10 Matrices	Objective Test	The testee has to find embedded words in an apparently randomly chosen structure of letter-matrix.
8 Tachistoscope 20 Items	Semi-projective Test	The testee has to react on ambiguous tachistoscopically shown stimuli with one out of six given interpretations (related to the RIASEC-dimensions).

*Note:* Subtests 1 and 3 can be scored in two different ways, which are marked with a "c" (= conventionally scored as nonverbal test or as questionnaire respectively) or an "o" (= scored as objective personality test).



**Figure 1:**

Item sample from test 1o/1c („Pictures“) showing a waiter/waitress (Enterprising interests).

(taking the total number of “interesting”-answers into account). The scoring algorithm set up for this study indicates that a score for the two tests is calculated only if there is more than one “interesting”-answer. The “Distribution task” (test 4) is based on the idea that interests manifest themselves in the amount of money (divided by available money) that is spent for certain things (an interactive criteria method). Here, the testee has to imagine being responsible for the distribution of 100 000 Euro for a private company depending on his/her interest among six different organizations, six societies, or six institutions. Each of them stands for one of the RIASEC-dimensions. Item samples for the six Holland-themes are: a society that organizes exhibitions for young artists (Artistic interests), or an organization that develops new computer-based systems for filing historical documents (Conventional interests). At the end, the amount of money spent for each of the six themes is the indicator of interest in the respective theme. Additionally, the subject is instructed not to spend all the money for one single organization and that s/he has to select at least three different recipients. Test 5 (“Memory”) refers to the pictures of the typical environments shown in test 2. The items (43 in total) are memory questions referring to details on the pictures. The number of correct answers represents the score for the six themes. In test 6 (“Distractibility”), the testee has to read six texts dealing with descriptions of daily routines for typical vocations for each theme. The text contains words that do not fit to the rest of the sentence; either nonsense words (e. g., “urf”, “fof” etc.) or not fitting real words. All texts have the same lengths and contain the same amount of target words. The testee has to mark the non-fitting words. Scores are calculated according to the number of marked respectively not-marked target words within a time limitation of one minute. Test 7 (“Embedded words”) consists of ten randomly chosen letter matrices with a size of  $40 \times 30$  letters. The matrices contain twelve target words (two for each of the six themes) in comparable lengths. The testee has to mark as many meaningful words as possible within a time limit of one minute. The score is the total number of marked words for each interest theme. In test 8 (“Tachistoscope”) blurred, ambiguous, visual stimuli are presented tachistoscopically on the computer screen. Thereafter, the testee can choose

afterwards from six different answer possibilities in a multiple-choice form. Each answer possibility is assigned with one interest dimension and the score is the total number of chosen answers for an interest dimension. The mean reliabilities for conventional and objective tests and the semi-projective test are given in Table 2.

**Table 2:**  
Mean reliability of the conventional and objective tests and the semi-projective test

Dimension	conventional	objective	semi-projective
R	.85	.68	.52
I	.69	.60	.50
A	.65	.58	.67
S	.64	.64	.58
E	.56	.61	.60
C	.70	.59	.78

*Note:* R = realistic; I = investigative; A = artistic; S = social; E = enterprising; C = conventional; s-p = semi-projective; Cronbach-alpha coefficients were calculated for the conventional tests and the objective tests; split-half reliabilities were calculated for the semi-projective test; test 2 (viewing time) is a single-measure (one picture was used for each interest-dimension; test 5, memory, depends on this measure) and test 4 (Distribution task – because of the construction principle the reliability needs to be calculated in a retest-study which is currently conducted) were not included in the computation of the mean reliability.

Table 2 shows that the mean reliability coefficients for the different approaches differ in size. Additionally, differences regarding the six themes were found. However, there is a need for improvement of the reliability of the measures before using them in practice. Further implications are discussed in the following sections.

*Allgemeiner Interessen-Struktur-Test (AIST; General Interest-Structure-Test; Bergmann & Eder, 2005).* The AIST is a 60-item Holland-type questionnaire. Answers are given on a five point Likert-scale (from 1 = “I’m not interested in, I don’t like” to 5 = “I’m very interested in, I really like”). For this study, the computerized version was used with norm data from the year 2003. In the handbook, reliabilities (Cronbach-alpha) between  $\alpha = .79$  and  $\alpha = .85$ , and retest-reliabilities between  $r = .83$  and  $r = .96$  (2 days) and between  $r = .60$  and  $r = .75$  (2 years) are reported. Reliabilities (Cronbach alpha coefficient) in the current sample were:  $\alpha = .82$  (Realistic),  $\alpha = .84$  (Investigative),  $\alpha = .81$  (Artistic),  $\alpha = .79$  (Social),  $\alpha = .85$  (Enterprising), and  $\alpha = .82$  (Conventional). The AIST is a widely used instrument for the assessment of vocational interests in research and in practice in the German language area and the manual provides conclusive information on its validity.

### Procedure

All tests were administered in a computerized setting. The test-takers were psychology students, or persons who were contacting an information center at the University of Vienna for an analysis of their potentials and skills. They were mainly students from different faculties at the University of Vienna. All tests were administered in group-settings. The testing session took approximately 90 minutes for the ten tests and the AIST. An individual feed-



back was given, either personally after the test session, or through a letter a few days after the session, depending on the available time. The test-takers were not paid for their services.

## Results

Correlations will be investigated through (sum) scores for (a) a total score for all tests (1c, 1o, 2, 3c, 3o, 4, 5, 6, 7, 8), (b) all conventionally scored tests (1c, 3c), (c) all objectively scored tests (1o, 2, 3o, 4, 5, 6, 7), and (d) for the semi-projective test (8). Sum scores were calculated after standardization of the test scores.

*Relations among the different assessment techniques.* Table 2 indicates that the reliabilities of the tests need to be improved. Therefore, all correlations are calculated using the correction for attenuation formula (the observed correlation is divided by the square root of the product of the two test's reliabilities). Table 3 shows the correlations amongst the different assessment techniques for each interest dimension.

**Table 3:**  
Correlations (corrected for attenuation) among different assessment techniques for the RIASEC interest-dimensions

<b>Dimension</b>	<b>c-o</b>	<b>c-sp</b>	<b>o-sp</b>
R	.22	.00	.17
I	.16	.30	.14
A	.41	.24	.09
S	.01	.23	.01
E	-.20	.12	.18
C	.25	.23	.14

*Note:* R = realistic; I = investigative; A = artistic; S = social; E = enterprising; C = conventional; c-o = correlation between conventional and objective tests; c-sp = correlation between conventional and semi-projective test; o-sp = correlation between objective and semi-projective test.

Table 3 shows that the measures did not show high convergences among each other. The conventional and objective assessment techniques correlated on a low to medium level. Contrary to the expectation, there was a negative correlation for Enterprising interest ( $r = -.20$ ) and there was a zero-correlation for the Social theme. Overall, the results from the objective tests and the conventional measures did not converge well in the present sample. Regarding the correlations between the conventional and the semi-projective technique, there was a zero correlation and a low correlation for Realistic and Enterprising interests. The other themes correlated between  $r = .23$  and  $r = .30$ . Again, the two measures (conventional and semi-projective) converged not well. While there were close to zero and low correlations between the mean sum score of the objective tests and the semi-projective test for Artistic and Social interests, the other correlations were between  $r = .14$  and  $r = .18$ .

*Relations to a Holland-type questionnaire (AIST).* While the relation among the different assessment techniques provides important information on the similarity of the approaches, another important criteria in the evaluation of the usefulness of these techniques are correlations to a Holland-type questionnaire. Correlations among the different approaches and the AIST are presented in Table 4.

**Table 4:**  
Correlations (corrected for attenuation) among the AIST and the scores for the eight tests

<b>AIST</b>	<b>total</b>	<b>conventional</b>	<b>objective</b>	<b>sp</b>
R	.38	.60	.08	.01
I	.59	.74	.23	.35
A	.60	.71	.41	.19
S	.61	.72	.35	.27
E	.29	.63	.00	.00
C	.65	.68	.40	.29

*Note:* AIST = General Interest Structure Test (Allgemeiner Interessen-Struktur-Test); R = realistic; I = investigative; A = artistic; S = social; E = enterprising; C = conventional; total = total score of all subtests; conventional = score of all conventionally scored tests; objective = score of all objectively scored tests; sp = semi-projective (score of test 8).

Table 4 shows that there were medium to high correlations between the total score for all eight tests and all AIST scales. Highest scores were found for Conventional interests ( $r = .65$ ) and lowest for Enterprising interests ( $r = .29$ ). However, the sum score should only be interpreted as general information and does not provide in depth information on differences among the measures. Thus, the mean scores for the different measures are of greater importance. As expected, all AIST-interest dimensions correlated highly with the conventional tests (1c, 3c). The percentage of shared variance ranged from 36 % ( $r = .60$ ) to 54 % ( $r = .74$ ). After splitting the scores for the questionnaire and the nonverbal test, the correlation coefficients were higher for the questionnaire-questionnaire relation (between  $r = .57$  and  $r = .80$ ) than for the questionnaire-nonverbal test relation (between  $r = .50$  and  $r = .66$ ). Regarding the objective tests, there were medium correlation coefficients for the interest dimensions I, A, S, and C (between  $r = .23$  and  $r = .41$ ); the Realistic and the Enterprising theme showed correlation coefficients up to  $r = .08$ . A highly similar result was found for the semi-projective test. Correlation coefficients ranged from  $r = .00$  to  $r = .35$ . As expected, the correlations were higher between the conventionally scored tests (1c, 3c) and the questionnaire than the others were. Comparing the average correlations between the AIST and the conventional tests, the mean correlation was  $r = .68$ ,  $r = .52$  between the AIST and the total score,  $r = .25$  between the AIST and the objective tests, and  $r = .19$  between the AIST and the semi-projective test.

## Discussion

The main aim of this study was to examine the similarity of different assessment strategies for vocational interests. A questionnaire and a nonverbal test as conventional measures, seven objective personality tests, and a semi-projective test were set together and applied in one single session in a computerized setting. As expected, the results show that correlations with a Holland-type questionnaire (the General-Interest-Structure-Test, AIST) were highest for the conventional tests. Reliability analyses showed relatively low coefficients for the objective and the semi-projective measures. Thus, all correlations were corrected for attenuation. This approach was chosen for examining the applicability of different assessment methods for a common construct. However, the low reliability coefficients indicate that improvements (regarding the test material and the scoring methods) are needed before the tests might be used in practice.

Regarding the similarities of the different approaches, correlations were calculated for each interest dimension and a combination of two approaches. Interestingly, the correlations for the nonverbal test and a Holland-type questionnaire (AIST) are similar but below the ones reported by Toggweiler et al. (2004) for the correlations between the AIST and the nonverbal Photo-Interest-Test (FIT 2003, Toggweiler & Stoll, 2002). Differences between the nonverbal test (1c) and the FIT 2003 can be discussed with respect to the test material. While the FIT 2003 uses professionally made color photographs of persons in vocational activities, the test material of the nonverbal test used here consists of simple (more or less) stick figures drawn by hand (no faces are shown to avoid effects of interpreted sympathy, or attractiveness, or empathic interpretations whether the person enjoys his or her job or not). Additionally, the testee has to answer in a three categorical format in the FIT 2003 (with a neutral category) and in a dichotomous format in the nonverbal test (1c). Furthermore, it has to be mentioned that the test 1c consists of 60 pictures while the FIT 2003 consists of 133. Results for the semi-projective test are similar to the ones reported above.

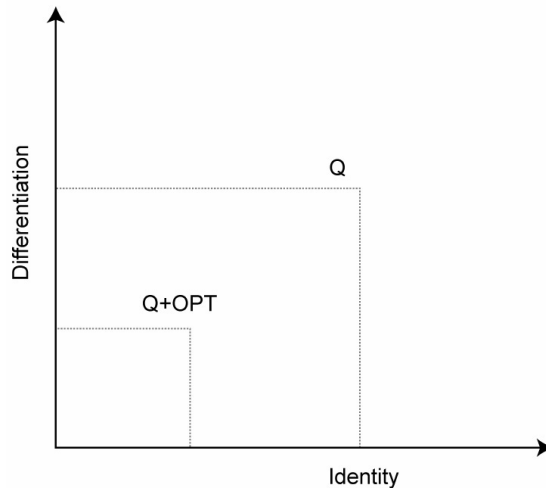
As expected (cf. Cattell, 1990; Cattell & Kline, 1977; Kubinger & Litzenberger, 2003; Skinner & Howarth, 1973), the correlations between objective and conventional scores were low to moderate and in some cases zero-correlations were found. The unexpected negative correlation for Enterprising interests may be interpreted as another sign that the test material can be improved for this interest dimension. Though it was assumed that the different approaches would differ in their relation among each other, it was expected that all of them would correlate positively. However, next to an improvement of the test material, it also has to be discussed whether all of the six Holland-themes are equally suitable for the assessment with objective tests. Overall, Realistic and Enterprising interests showed the lowest relations to other measures. Thus, in a further evaluation of the objective tests the applicability of the strategies for the assessment of Realistic and Enterprising interests need to be examined again. However, not only a negative correlation was found in the study but also several (close to) zero correlations. There is one important point that has to be discussed with respect to the objective tests. In terms of Eysenck's personality theory (e. g., Eysenck, 1966), the objective tests used in this study are measures of *specific responses* (the lowest level of behavior-organization in his model), while questionnaires are in terms of Eysenck typically measuring *habitual responses*. Thus, if comparing objective tests and questionnaires, one has to take into account that they are measuring on different (hierarchical) levels. Therefore, it cannot be expected that they show correlations comparable in size to measures at the same

level (e. g., two questionnaires). However, the question to be answered is whether the different approaches in the assessment of vocational interests are all (equally) useful for both research and practice.

Based on the literature it is assumed that all the different approaches have a potential for the assessment of vocational interests but on different levels. What are the implications from these different assessment levels? Objective tests are focused on the actual behavior of the testee in a specific (test) situation. According to the Cattellian tradition these tests should be understood as *miniature situations* that might address different responses than other assessment strategies (e. g., using the strategy of asking for a self-description in a questionnaire). This study was conducted to evaluate their usefulness in the assessment of vocational interests within a theoretical framework. The result that the correlations between the AIST (a Holland-type questionnaire) and the objective tests were lower than the ones for the total score and the ones for the conventionally scored was expected. While the questionnaire (AIST and test 3c) and the nonverbal (test 1c) are “asking” for self-descriptions on a general level, the objectively scored tests assess interest manifestations on the level of actual *behavior*. Since interests shown by behavior might differ from the ones reported, correlations were expected to be low (respectively lower). The rationale behind the semi-projective test can be argued quite similar. To summarize these thoughts, it can be said that the value of this information might be to open new views for discussion when fields of interest seem to be attractive to a person only at the level of behavior, but not at the level of self-description. Therefore, the gain in using a multimethod approach in the assessment of vocational interests might be that various facets of interests can be considered in the process of career counseling and in the further exploration of the construct. This is similar to the idea of working with the Daydreams-section of Holland’s Self-Directed-Search (SDS; 1994). Thus, the aspirations of the test-taker may provide important information for the career counselor in his work (cf. Reardon & Lenz, 1999). It was shown that additional information like the Daydream-section from the SDS is useful for increasing the predictive efficiency when the person’s career aspirations are combined with information from an interest inventory (Borgen & Seling, 1978; Holland & Gottfredson, 1975; Touchton & Magoon, 1977). However, future research will show whether objective or semi-projective tests are as equally powerful in the prediction of vocational behavior as the others. In practice, the congruency between the different approaches might be a useful information for the career counselor for the deduction of different interventions. However, this interpretation of the results might be criticized by arguing that the different tests are actually measuring *different traits*. At the current status this alternate explanation cannot be ruled out. Further data and studies are needed to draw a clearer distinction between these explanations.

*Outlook.* The main question to be answered for future research and possible practical applications is whether it is reasonable to use questionnaires and alternative measures in a common setting. It might be useful to take two additional concepts into account for the discussion of this topic. The interest profiles of persons differ in their degree of *differentiation*. Thus, a person that has high interests in many different RIASEC-types could be described by a low differentiated profile whereas a person with a single high expression in one of the six themes will have a highly differentiated profile. A second concept to be discussed is the (vocational) *identity*. In short, Holland (1997) defines the identity as “the possession of a clear and stable picture of one’s goals, interests, and talents” (p. 5; for a full review on the concept see Holland). Both concepts are useful for the description of the interest structure of

a person. However, there are several outcomes that should be highlighted for the evaluation of the usefulness of different assessment strategies in a common setting that might be best illustrated graphically (see Figure 2).



**Figure 2:**

Model of the usefulness of questionnaires (Q) and alternative measures (OPT) in the assessment of vocational interests.

Figure 2 shows a model of the relation among differentiation, identity, questionnaires, and alternative measures (objective personality tests) in the assessment of vocational interests. According to the model, alternative measures are useful in all cases where clients show low expressions of differentiation and/or identity. If a client has a well-differentiated interest profile and shows high scores in the (vocational) identity dimension it is assumed that the questionnaire reflects the actual structure well. In cases in which the profile shows a low differentiation and/or a low identity additional measures (e. g., objective tests) could be used for a further exploration of the clients' interest structure. This seems to be in line with the results presented by Kubinger and Litzenberger (2003) who showed that objective tests were able to measure certain facets of personality (the study was conducted with respect to the five factor model of personality) that go beyond the questionnaire-based measurement. Regarding vocational interests, the additional information collected by additional measures could be helpful in, for example, uncovering yet not thought of vocational interests or more generally spoken in a further differentiation of the profile. Whereas strategies for the improvement of the identity are an important part of the general career counseling process. However, the (practical) usefulness of this model needs to be tested empirically. A first study is currently conducted.

*Limitations of the study.* The sample used in this study was very homogenous. For further research projects a larger and more representative sample consisting of extreme groups and persons seeking advice from career counselors will be needed. Additionally, long-term stud-

ies are needed to be able to comment on the predictive validity of the presented approaches. Before these different assessment strategies might be used in practice, the test material and scoring algorithms for some of the tests need to be further improved. Furthermore, future studies should include external criteria for the evaluation of the usefulness of the different assessment methods in this study. One might think of longitudinal studies on career-choices, satisfaction with the career-choice, work-satisfaction, (subjective and objective) success at work and so forth. However, Kuder (1969) suggests that an appropriate way of studying the degree to which interest inventories agree would be “to find the way to which they lead to similar results in the counseling situation” (p. 100). Studies following these suggestions are on the schedule for future research projects.

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