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The relation between specialty choice of psychology students and their interests, personality, and cognitive abilities

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ABSTRACT

The aim of this longitudinal study was to investigate differences in interests, personality, and cognitive abilities between students majoring in the six specialties of psychology at the University of Amsterdam. Results show that students at Social Psychology and Work and Organizational Psychology were on average more extraverted than students of other specializations, that students of Psychological Methods and Psychonomics were relatively more open to experience, and that students at Clinical Psychology were on average more neurotic. Differences in cognitive ability were small, but significant, with the highest scores among students of the more research-oriented specialties. With discriminant analyses on the basis of nine interest scales, 53% of the students were correctly categorized in the specialization chosen two or years after interests were measured. Interest profiles of the specialties follow differences in interest in helping people, abstract vs. concrete topics, and technical issues. Person-specialization congruence failed to predict academic performance.

1. Introduction

At the end of their second year as Bachelor students, Dutch psychology majors choose a specialty, such as Psychonomics, Social Psychology, or Clinical Psychology. These specialties are closely associated with different topics of psychological science and diverse professional competencies related to both research and practice. The choice of specialty may be influenced by personality and cognitive ability, but is commonly thought to depend mainly on student's interests. Research among psychology majors in the US has highlighted a clear distinction between researcher and practitioner interests (Leong & Zachar, 1991; Zachar & Leong, 1992, 1997, 2000). Several studies have addressed the relatively low interest in scientific issues among many psychology majors (Bishop & Bieschke, 1998; Leong, Zachar, Conant, & Tolliver, 2007; Tinsley, Tinsley, Boone, & Shim Li, 1993; Vittengl et al., 2004), although psychology majors clearly differ in this regard. For instance, Martin, Gavin, Baker, and Bridgmon (2007) recently compared doctoral students at different specialties of psychology and found clear differences between these groups in scientist-practitioner interests. Also, Zachar and Leong (2000) found that psychology majors' researcher and practitioner interests were stable over a 10-year period and predictive of later professional behavior.

According to Holland (1973, 1985), vocational interests can be seen as a personality characteristic, which can be subsumed under six types: Realistic, Investigative, Artistic, Social, Enterprising, and Conventional (RIASEC). According to Holland, both persons and professions (or fields of education) can be characterized by a profile (or three-letter-code) that indicates the dominance of the six types. The code Investigative-Artistic-Social is viewed as dominant for the profession of psychology (Camp & Chartrand, 1992). However, psychology students who follow different routes in their curriculum or who differ in research-practitioner interests may be characterized by different RIASEC profiles. While interest in research appears to be positively related to the Investigative and the Investigative-Artistic types, practitioner interests appear to be positively related to the Social type (Mallinckrodt, Gelso, & Royalty, 1990; Zachar & Leong, 1992). Some RIASEC scales have been shown to be correlated with the five dominant personality factors (e.g., De Fruyt & Mervielde, 1997; Gottfredson, Jones, & Holland, 1993) as well as with cognitive capacities (Ackerman & Heggestad, 1997). In line with these findings, Vittengl et al. (2004) found that psychology students' interest in research was positively associated with Openness to Experience and with cognitive ability. Thus, individual differences in interests, personality, and cognitive ability may be associated with specialty choice in the academic study of psychology.

1.1. Current study

The goal of this longitudinal study is to compare psychology students of different specialties in terms of interests, personality, and

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cognitive abilities. We studied these characteristics in two cohorts of Bachelor[1] students of Psychology at the University of Amsterdam. The students had completed successfully the first 2 years of the general curriculum and had chosen one of six major specialties at the end of the second year of the curriculum. The six specialties are best characterized by focusing on the specific routes offered in each specialty. Clinical Psychology (CP) offers routes in mental health care, somatic health care, clinical research, and clinical developmental psychology. Developmental Psychology (DP) offers routes on research in developmental psychology, general developmental psychology, and clinical developmental psychology. Psychological Methods (PM) offers general psychological methods and psychometrics. Psychonomics (PN) has two routes: physiological psychology and general psychonomics (perception and memory). Social Psychology (SP) offers routes in experimental social psychology and applied social psychology. Finally, Work and Organizational Psychology (WOP) offers three routes: personnel selection, social processes in organizations, and work and health. The student administrator did not have specific information on the enrollment in these specific routes, so we were unable to distinguish between these routes.[2]

Nonetheless, the specialties differ in terms of focus on practice or research. We expected students of Psychonomics and Psychological Methods to be more research-oriented, students at Clinical Psychology and Developmental Psychology to be more oriented towards practice, and students at Work and Organizational Psychology and Social Psychology to be oriented to both research and practice. Specifically, on the basis of previous findings on the differential characteristics of psychology majors and our own assessment of the content of the specialties, we derived expectations that are expressed in terms of the relevant scales (see below) in Table 1. Moreover, we also set out to predict choice of specialty on the basis of an interest inventory. As congruence between the person's interests and the typical interest profile of his or her profession (or education) is often hypothesized to have a positive effect on performance (Holland, 1973, 1985), we also determined whether the congruence between student's interests and the interest profile of his or her chosen specialty predicted academic performance.

Table 1

Specialty	Variable	High/low	Found*
Clinical Psychology	Interest in social work	+	+
$N=147$, 78.9% females	Responsibility for individuals	+	+
	Agreeableness (personality)	+	+
	Preference for theoretical issues	−	−
	General technical interest	−	+
	Interest in technical work	−	+
	BETA-interest (natural sciences)	−	+
Developmental Psychology	Interest in social work	+	+
$N=58$, 87.9% females	Interest in youth and upbringing	+	+
	GAMMA-interest (social sciences)	+	−
	BETA-interest (natural sciences)	−	+
	Preference for logical and abstract	−	+
Psychological Methods	Preference for theoretical issues	+	+
$N=16$, 56.3% females	BETA-interest (natural sciences)	+	+
	General technical interest	+	+
	Interest in technical work	+	+
	Cognitive abilities	+	+
	Openness to experience (personality)	+	−
	Preference for logical and abstract topics	+	+
	Interest in social work	−	+
	Responsibility for individuals	−	+
	Interest in youth and upbringing	−	−
	Interest in managerial activities	−	−
Psychonomics	Preference for theoretical issues	+	+
$N=71$, 63.4% females	General language interest	+	−
	ALPHA-interest (languages and arts)	+	−
	BETA-interest (natural sciences)	+	+
	General technical interest	+	+
	Interest in technical work	+	+
	Cognitive abilities	+	−
	Openness to experience (personality)	+	+
	Preference for logical and abstract topics	+	+
	Interest in social work	−	+
	Responsibility for individuals	−	+
	Interest in youth and upbringing	−	+
	Interest in managerial activities	−	+
Social Psychology	Interest in foreign languages	+	+
$N=78$, 71.8% females	GAMMA-interest (social sciences)	+	−
	Interest in social studies	+	−
	Interest in other cultures	+	+
Work and Organizational Ps.	Interest in managerial activities	+	+
$N=75$, 74.7% females	Entrepreneurial interest	+	+
	Extraversion (personality)	+	+
	Preference for theoretical issues	−	+
	Preference for logical and abstract topics	−	+
	BETA-interest (natural sciences)	−	−

* Indicates whether or not the specialty group scored signficantly higher or lower than other specialty groups on that particular scale.

2. Method

2.1. Participants and design

Participants were 445 (333 females) psychology students at the University of Amsterdam who were freshmen in either 1996 or 1997 and who were enrolled in a specialty of psychology in the academic year 2000–2001. Average age as freshmen was 21.4 years ($SD=5.3$).[3] The distribution of the students over these specialties is given in Table 1. Gender composition differed significantly between the specialties: $\chi^2(DF=5)=14.8$, $p<.05$. One hundred and five students (24%) were enrolled in two or more specialties, although all these students had chosen one core specialty. Due to missing data on some of the predictor variables, the sample sizes vary somewhat by analysis.

We used a longitudinal design; Data on interests, personality, and cognitive abilities were gathered during the freshmen's testing program, while the choice of specialty takes place 2 or 3 years later. The student administrator office provided data on students' specialty choice as of late 2000 and their total number of course credits for the five academic years during which the students followed specialty courses (i.e., 1998–1999 to 2002–2003). Because of the large number of different courses and changes in course codes over the years, it was infeasible to distinguish between courses. However, the total number of course credits is an established measure of academic success at Dutch universities. All data were collected and analyzed in accordance

[1] We refer to the study of psychology at the University of Amsterdam as a Bachelor education, although it should be noted that the Dutch universities had not yet adopted the Bachelor–Master system at the time of data collection. Nonetheless, the changes due to this adoption were not large. At the time of the study, the study program that led to a Drs. degree (comparable to today's Master of Arts degree) consisted of 4 years of study, although most students actually took longer to complete their degree.

[2] In addition, there is a route clinical neuropsychology, which is part of CP, DP, and PN. Students who follow this route or the clinical developmental route (CP and DP) are enrolled in more than one specialty but did choose one primary specialty. The curriculum of these students is predominantly focused on their primary specialty choice, so in our analyses they were assigned to these specialties. Also, due to changes in student administration systems over the years it was not feasible to determine at which specialty the students had eventually graduated.

[3] Age at the time of testing differed somewhat between the specialty groups: $F(5, 439)=3.65$, $p<.01$. We did not take into account age differences, because age was not strongly related to the dependent variables and age differences between the specialties were relatively small.

with ethical guidelines of the Psychology Department.[4] Note that we do not consider here the rather heterogeneous group of students who had dropped out before 2000, because of our interest in specialty choice and because dropout proved hard to predict.

2.2. Measurements

2.2.1. Personality

The Big Five personality factors were measured with the Dutch "Vijf Persoonlijkheids Factoren Test" (5PFT; Elshout, 1999; Elshout & Akkerman, 1975). The five scales have 14 items each that are scored on a seven-point Likert scale. Cronbach's Alphas of the scales varied between .79 and .86 in the current sample. The scales showed good convergent validity with the NEO-PI-R (Hoekstra, Ormel, & De Fruyt, 1996) in a sample of psychology freshmen ($N = 500$): Extraversion: $r = .76$, Neuroticism $r = .82$, Agreeableness $r = .71$, Openness to Experience $r = .55$, and Conscientiousness $r = .71$.

2.2.2. Cognitive capacity

During group-testing, students completed the Amsterdam Cognitive Ability Battery (Elshout, 1976), which consists of six subtests with the following reliabilities (KR-20): Conclusions: .94; Verbal Analogies: .72; Vocabulary: .62; Number Series: .85; Arithmetic: .97; and Hidden Figures: .72. Conclusion measures logical reasoning on the basis of symbols, Verbal Analogies measures logical reasoning with words, Vocabulary measures knowledge of the meaning of uncommon words, Number Series measures logical reasoning with number series that have to be completed, Arithmetic is a speeded test of arithmetic ability, and Hidden Figures measures spatial visualization by a search of simple figures in a complex pattern. The tests were based on Guilford's theory (Elshout, 1976) and have been found to be predictive of academic success in the freshmen year (Busato, Prins, Elshout, & Hamaker, 2000).

2.2.3. Interests

Interests were measured with the Dutch "StudieKeuze-InteresseTest" (SKIT-6; Vorst, 2002), which consists of 44 scales. The SKIT was developed for measuring interests in majors at college and universities among higher-level high school students. The SKIT has shown strong predictive and concurrent validity in numerous studies (Vorst, 2002). For instance, across eight large-scale studies, SKIT scales were found to correlate highly with relevant scales on the basis of Holland's theory, the SKIT differentiated well between different fields of study, and high school students' interest as measured with the SKIT predicted well their later choice of university education. We selected a priori 20 scales on the basis of their relevance to the six specialties in psychology (see Table 2). These scales are composed of a balanced set of either 8 or 10 items and have Alpha reliabilities between .54 and .89 ($M = .79$).

2.3. Analyses

We compared interests, personality factors, and cognitive abilities by using a two-way (M)ANOVA with (primary) specialty and gender as factors. Gender was taken into account because of differences in gender distribution across the specialty groups and because the majority of variables showed gender differences. We considered main effects and compared specialty groups pairwise by means of Bonferroni's procedure, with $p < .05$ as the overall significance level. We present the mean differences between specialty groups by using the marginal means after correction for gender. To arrive at interpretable results, we subtracted the grand mean from these marginal means and divided the difference by the overall standard deviation. Thus, the mean differences presented are comparable to effect sizes pitted against the grand mean, after correction for gender differences. We checked for homogeneity of variances and checked whether gender interacted with specialty group. In both check analyses, we found violations in only 3 of 31 variables. However, these violations were not severe, so their impact is taken to be minor.

The interest scales were submitted to discriminant analysis with specialty choice as dependent variable. The discriminant functions were based on students who were enrolled in one specialty only, although we also used the discriminant functions to predict specialties of all students (while taking into account group sizes). To establish the generalizability of the results, we used cross-validation on the basis of the leave-one-out method. Because the number of variables to arrive at discriminant functions should not become too large (Stevens, 1996, p. 262), we selected a smaller number of interest variables in stepwise fashion. We selected variables with the highest Wilk's lambda up to the point that performance of cross-validated prediction of group membership no longer improved. In addition, we

Table 2
ANOVA results for main effect of specialty and significant pair-wise differences.

Scale	Significant differences between specialties	$F(5, 327)$	p
General language interest*	None	0.411	0.841
Interest in foreign languages	DP < SP; PN > PM, SP	2.996	0.012
Interest in systematic numerical work	WO > CP, DP, SP; PM > CP, DP, SP	2.831	0.016
Interest in computers	PM > CP, DP, SP, WO; PN > CP, DP, SP, WO	4.618	0.000
Interest in individuals	CP > WO, PM, SP	4.508	0.001
	CP > WO, PM, PN, SP; DP > PM, PN;	6.433	0.000
Responsibility for individuals	PN < WO, SP		
	CP > WO, PN, SP; DP > WO, PN, SP;	6.269	0.000
Interest in youth and upbringing	PN < WO, SP		
	CP > DP, PM, PN, SP, WO; DP > PN, PM;	10.887	0.000
Interest in social work	WO > PN, PM		
Interest in social studies	CP > PN	3.006	0.011
Interest in managerial activities	WO > CP, DP, PN	1.991	0.080
Interest in other cultures	PM < CP, DP, PM, SP, WO	3.016	0.011
Entrepreneurial interest	WO > CP, DP, PM, PN	2.040	0.073
General technical interest	PM > CP, DP, PN, SP, WO; PN > CP, DP	2.607	0.025
Interest in technical work	PM > CP, DP, SP, WO; PN > CP, DP, SP, WO	3.358	0.006
Preference for logical and abstract topics	PM > CP, DP, SP, WO, PN; PN > CP, DP, SP, WO	4.749	0.000
Preference for orderly work	WO > CP, DP, PN, SP	1.697	0.135
Preference for theoretical issues	PM > SP; WO < CP, DP, PM, PN	4.554	0.000
ALPHA interest (languages and arts)*	None	2.396	0.038
BETA-interest (natural sciences)*	PM > DP, SP; PN > CP, DP, SP,	3.501	0.004
GAMMA-interest (social sciences)*	None	1.113	0.353

Note: based on sample sizes: CP: 110, DP: 43, PM: 11, PN: 54, SP: 63, and WOP: 58, except for *$N = 315$, with F tests with 5 and 303 degrees of freedom; N per specialty for these variables: CP: 103, DP: 40, PM: 10, PN: 48, SP: 60, and WOP: 54; CP: Clinical Psychology; DP: Developmental Psychology; PM: Psychological Methods; PN: Psychonomics; SP: Social Psychology; WO: Work and Organizational Psychology.

[4] The freshman testing program is part of the curriculum. Students are entitled to make an alternative assignment, but only a few students make use of this alternative. Students' identities are carefully protected and the link between academic variables and other variables was made anonymously. Students are carefully debriefed after each session. Approximately ten students did not allow their academic information to be used for research purposes and data of a few students were deleted at their request at the end of the testing program. Apart from these students, the samples are comprehensive for the two cohorts.

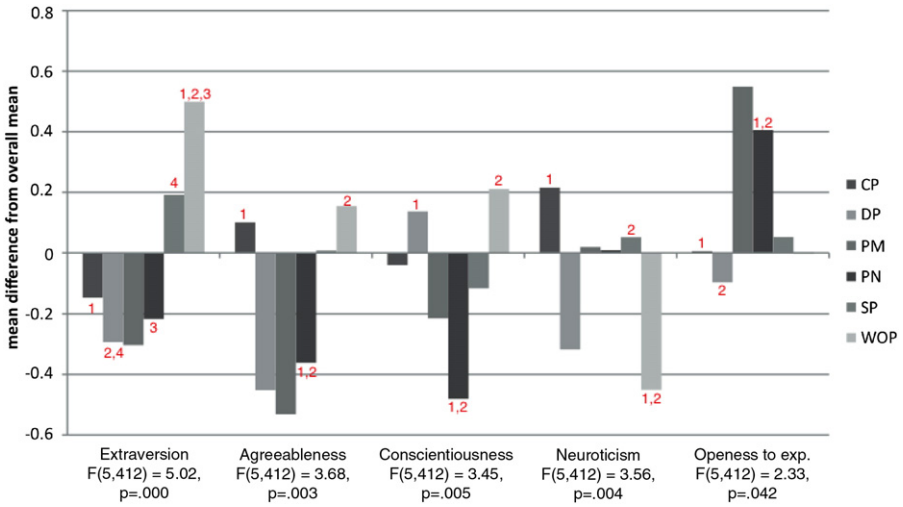

Fig. 1. Mean differences on the personality variables and ANOVA results.

operationalized congruence on the basis of the similarities between person's discriminant scores and the mean discriminant scores in their chosen specialty.

3. Results

The gender-corrected means (pitted against the grand mean) of the specialties on the five personality factors are given in Fig. 1. The multivariate main effect was significant: $F(25, 2032) = 3.96$, $p < .0001$ All personality factors showed significant main effects for specialty. The numbers in Fig. 1 indicate per variable which specialty groups showed significantly differences after Bonferroni correction. For instance, on Extraversion WOP students scored significantly higher than students specializing in CP, DP, and PN. Our expectation regarding Agreeableness was partly supported, with CP students outscoring significantly students at DP. PN students scored lowest on average on Conscientiousness. Students of CP scored highest on Neuroticism and WOP students the lowest. As expected, students at PN and PM showed high averages on Openness to Experience.

Fig. 2 displays the results for cognitive abilities. The MANOVA gave a main effect for specialty: $F(30, 1698) = 1.73$, $p = .008$. Univariate main effects were significant for Vocabulary, Conclusion, and Hidden Figures. As expected, students at PN and PM averaged the highest scores, although only one of the pair-wise differences reached significance.

Fig. 3 displays for the results for the interest scales. The multivariate main effect was significant: $F(100, 1412) = 2.40$, $p < .0001$. Table 2 displays the results of ANOVA and lists all significant pair-wise differences. The majority of predicted differences for interests were supported (cf. Table 1).

3.1. Prediction of specialty choice

Since differences between specialties in interests were large, we used the interest scales to predict specialty choice in a discriminant analysis. Eigenvalues and correlations between the four discriminant functions and the nine selected interest scales are given in Table 3. The first function appears to be related to helping people, the second to concrete topics, the third to abstract issues, and the fourth to technical topics. Table 3 provides the mean Z-scores on the discriminant functions for the specialties. CP students score high on the first function (helping people), PM students score high on the third (abstract) and fourth (technical) functions, Students at PN score high on the third function (abstract) and low on the first function (helping people). With these discriminant functions, 132 of the 247 students

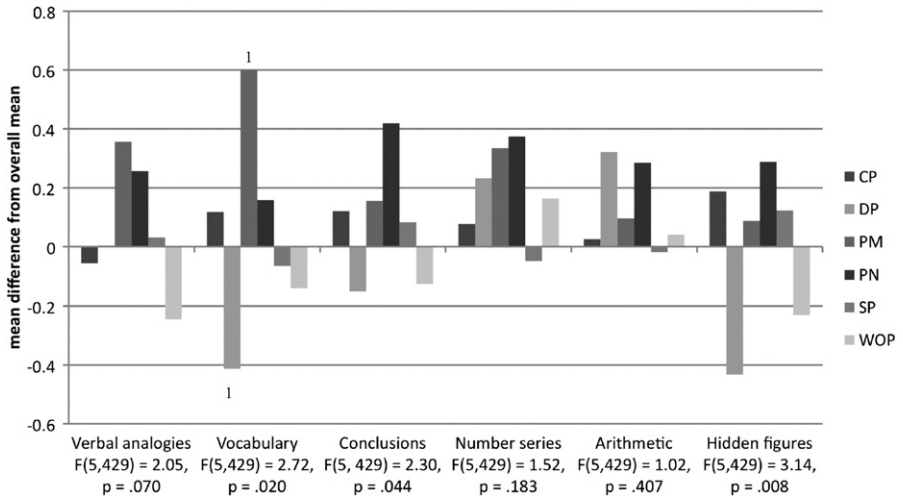

Fig. 2. Mean differences on the cognitive variables and ANOVA results.

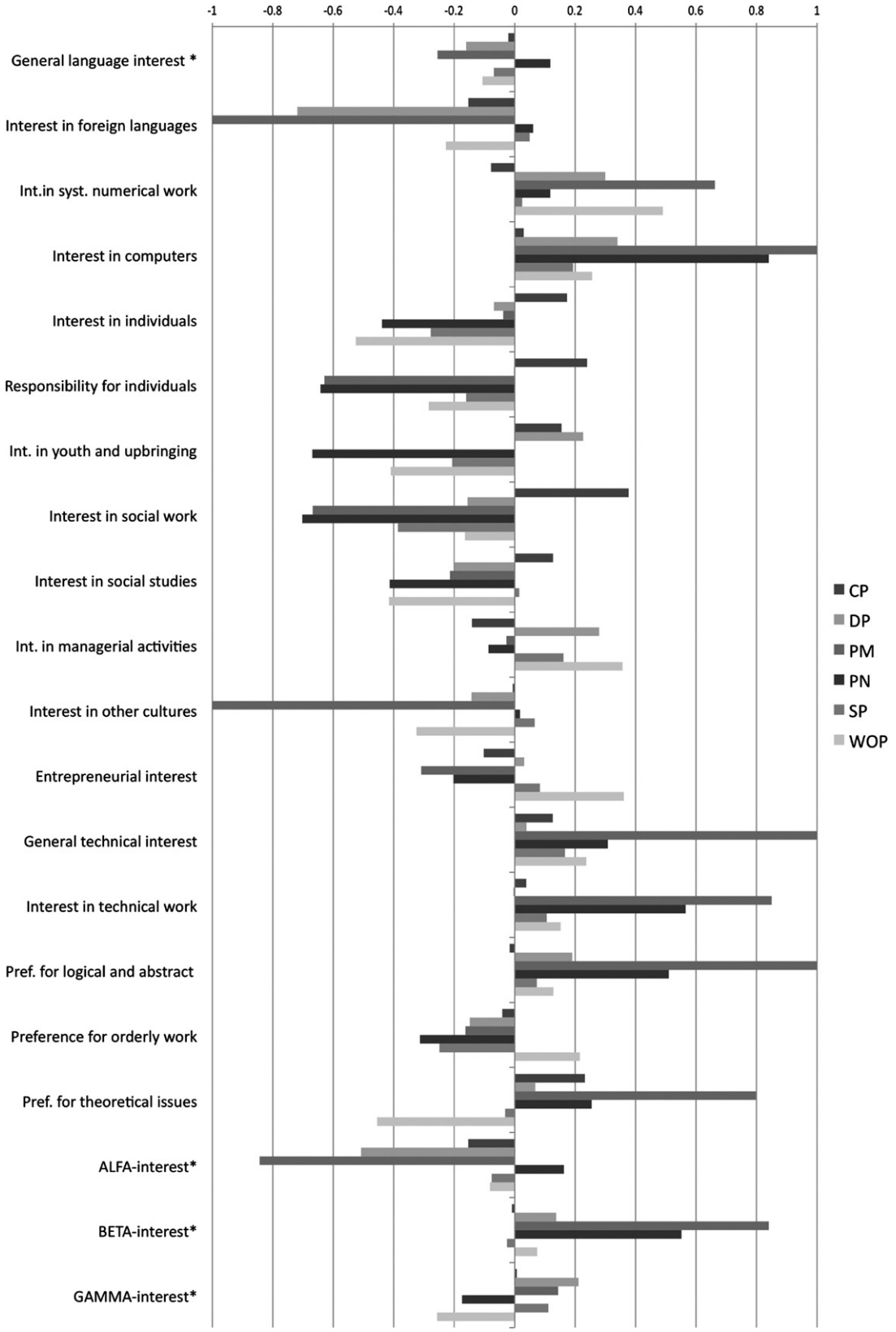

Fig. 3. Mean differences between specialties on interest scales.

enrolled in one specialty only were correctly classified in their chosen specialty (53.4%). The cross-validation showed a hit-rate of 47.0%. For the 68 students who were enrolled in two specialties, 25 (36.8%) were classified in their primary specialty, and 11 (16.2%) in their secondary specialty. Thus, of the students who had more than one specialty, 52.9% were classified in one of their two specialties. Since the chance prediction would be 16.7% (or 18% if group sizes are taken into account), the discriminant functions predict later specialty choice

Table 3
Correlations between interests and discriminant functions (top) and Means of specialty groups on the discriminant functions (bottom).

	Function 1	Function 2	Function 3	Function 4
	Helping people	Concrete	Abstract	Technical
Eigenvalues (% variance explained)	.42 (52%)	.19 (23%)	.10 (12%)	.08 (10%)
*Correlations with predictors**				
Interest in social work	**0.86**	0.12	0.19	−0.28
Interest in youth and upbringing	**0.63**	−0.20	−0.23	0.15
Entrepreneurial interest	−0.05	**0.59**	0.05	0.28
Preference for theoretical issues	0.00	**−0.55**	0.26	0.30
Beta interest (natural sciences)	**−0.31**	−0.08	**0.71**	0.22
General technical interest	**−0.34**	0.01	**0.46**	**0.39**
Interest in systematic numerical work	−0.25	**0.39**	**0.31**	**0.57**
Interest in other cultures	−0.02	−0.01	**−0.35**	**−0.41**
ALPHA interest (langues and arts)	−0.13	0.16	0.12	−0.20
Specialties				
Clinical Psychology	0.73	−0.09	0.23	−0.08
Developmental Psychology	0.27	−0.51	−0.55	0.08
Psychological Methods	−0.81	−1.00	0.52	1.67
Psychonomics	−1.05	−0.21	0.30	−0.22
Social Psychology	−0.38	0.07	−0.32	−0.08
Work and Organizational Psychology	−0.06	0.87	−0.02	0.22

Note: based on students with one specialty only ($N = 246$). * Correlations in bold are larger than |.30|.

quite well. The addition of personality scales and cognitive abilities did not appreciably improve the prediction of specialty choice.

3.2. Does congruence predict academic performance?

Our congruence measure was based on the Mahabalonis distance between the student's discriminant scores and the mean discriminant scores of the student's chosen (primary) specialty (Table 3). The correlations between this measure and the total number of course credits per academic year were generally close to zero and all but two correlations were non-significant (full results are available upon request). We conducted a host of additional correlational and multilevel analyses (e.g., separately for cohort and specialty) but failed to find an indication of a linear relation between congruence and the number of course credits.

4. Discussion

The results of our longitudinal study showed that there were systematic differences in personality, cognitive abilities, and interests between students at different specialties in the study of psychology, that differences in interests were sufficiently large to predict the choice of specialty 2 or 3 years after the interest inventory was administered, and that congruence failed to predict academic success. Differences were strongest for interests, followed by personality, and cognitive abilities.

Although all specialties in psychology at the University of Amsterdam have a strong focus on scientific skills, and despite some heterogeneity due to routes followed within the specialties, the different specialties do differ in terms of the degree to which they stress scientific versus practical topics. Overall, Clinical Psychology and Developmental Psychology are more practitioner-oriented, while Psychonomics and Psychological Methods are more research-oriented. This is clearly reflected in the interests of the students who chose these specialties. Students of Work and Organizational Psychology and Social Psychology appear to be lie in the middle of the science-practitioner-continuum. Students of WOP display more interest in societal, managerial, and entrepreneurial topics, and less interest in social and technical (scientific) issues. Students at Social Psychology show relatively more interest in foreign languages and cultural topics. The picture emerging from group differences in personality and cognitive abilities is consistent with previous findings in the US (Bishop & Bieschke, 1998; Horn et al., 2007; Leong et al., 2007; Mallinckrodt et al., 1990; Martin et al., 2007; Tinsley et al., 1993; Vittengl et al., 2004). The different specialties of psychology can best be characterized in terms of different Holland codes. For DP and CP, Social appears to be the dominant code, while for WOP Enterprising appears to be dominant. For PM and PN, the Investigative-code is dominant.

Our results show that interests measured early in the students' freshmen year were quite good predictors of their eventual choice of specialty 2 or 3 years later. On the basis of nine interest scales, approximately 50% of the students were assigned to the correct specialty, even after cross-validation. Our results suggest that these interests are relatively stable (Horn et al., 2007; Zachar & Leong, 2000) and may have already crystallized quite early in the study.

Another aim was to predict academic success on the basis of the congruence between students' interests and the typical interest profile of their chosen specialty. The congruence measure, however, failed to predict the number of course credits per academic year, even after we corrected for several factors. This result is in line with meta-analytic findings (Tranberg, Slane, & Ekeberg, 1993).

One potential limitation of the current study concerns the criterion for academic success. Because we lacked specific data with which grade point averages could be computed, we used the total number of course credits per year. In light of the heterogeneity in (level of) courses taken, this measure was necessarily crude. For instance, the number of course credits may be confounded with additional courses taken at other specialties. Nonetheless, this measure is a well-established criterion for academic success at Dutch universities. It does measure the speed with which students complete obligatory and additional courses, and it certainly reflects poor performance due to drop out.

Strengths of our study include its longitudinal design and the fact that the sample was almost entirely comprehensive for two cohorts of undergraduates at a large university. However, one of the specialties had a relatively small number of students, and the number of statistical tests (31) is large. However, of the 46 hypothesized differences, 35 (76%) were significant. The significant differences that we had not hypothesized in advance can best be regarded exploratory and require replication.

4.1. Conclusion

To summarize, we found that interests, personality, and cognitive abilities vary systematically between undergraduate students majoring

in different specialties of psychology. The interests of students measured early in their freshman year predicted quite well their later choice of specialty, although congruence failed to predict academic success within the specialties. Although it is likely that differences in terms of scientist-practitioner interests may be smaller for graduate (PhD level) students in the various specialties, the dominant interest profiles of specialties that we found among undergraduates may be used in future work to develop an interest inventory for vocational counseling of undergraduate psychology students.

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