IMPLICIT THEORIES OF INTELLIGENCE AND PERSONALITY: RELATIONS TO INTELLIGENCE, MOTIVATION AND PERSONALITY

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Abstract

Implicit theories (IT) reflect core beliefs about malleability of cognitive and personality human attributes. IT participate in the interpretation of the social world, regulate behaviors (through goal setting, adjustments after failures, learning strategies, etc.), and are valid predictors of achievement (Dweck, 2006). Nevertheless, little is known about the IT's relationship to the components of the intellectual and personality human potential. The purpose of this research is to examine the extent to which IT are related to cognitive (intelligence) and personality (Big-Five personality traits, motivation) structures. A sample of 307 students completed the intelligence test (ICAR), the Ten-Item Personality Inventory and the Edwards Personal Preference Schedule; additionally, GPA was obtained for 49 students. Results demonstrate similar as well as distinctive correlations between the measurements in men and women. In particular, in both men and women, malleable intelligence beliefs do not depend on intelligence level, fluid or crystallized, but are largely related to personality characteristics: conscientiousness (in both men and women), openness to experience (in women), and intraception motivation (in men). Malleability of personality beliefs correlates negatively with crystallized intelligence (only in women). Mastery goal orientation in both men and women is related to openness; academic achievement is predicted by conscientiousness. The results are discussed from the perspective of the integrated intellectual and personality potential.

Keywords: implicit theories, intelligence, personality, Big-Five, motivation, learning goals, self-assessed academic success.

Implicit theories of intelligence and personality

Implicit theories (IT) refer to core individual beliefs about malleability of human traits and characteristics; these beliefs are involved in interpretation of actions and their consequences (Dweck, 2006). C. Dweck showed that people either believe that intelligence is an inherited and fixed characteristic (entity theory) or that intelligence is malleable and can be developed through effort and education (incremental theory). IT play a definitive role in how people deal with challenging tasks, setbacks and failures, what goal orientation they pursue (Dweck, 2006; Dweck & Leggett, 1988), whether they make effort attributions (incremental IT) or fixed abilities attributions (entity IT) (Hong, Chiu, Dweck, Lin, & Wan, 1999).

Numerous studies have shown that IT of intelligence are involved in learning process regulation both directly and indirectly — through learning goals. The findings on direct association between incremental IT and higher academic achievement are inconsistent: correlation between incremental IT and higher grades is reported to be significant (Atwood, 2010) as well as not significant (Dweck & Leggett, 1988). At the same time, incremental beliefs about intelligence predict gains and entity beliefs predict declines in future grades (Dweck & Leggett, 1988; Good, Aronson, & Inzlicht, 2003).

Meta-analysis reveals associations between incremental IT and mastery goal orientation in academia, sport, leadership, management, health, etc. (Burnette O'Boyle, VanEpps, Pollack, & Finkel, 2013). Mastery vs performance goal orientation also depends on IT when IT are experimentally induced (Dinger & Dickhäuser, 2013), and on praise when praise is given for abilities vs effort (Mueller & Dweck, 1998).

IT of personality represent assumptions about malleability of personality characteristics. Those who share entity IT of personality, are inclined to make dispositional inferences, evaluate even small acts of behavior, divide people into "good" and "bad" (Hong, Chiu, Dweck, & Sachs, 1997) and are more likely to react aggressively when being provoked (Yeager, Miu, Poewrs, & Dweck, 2013). Among students, entity personality beliefs predict negative reactions to challenging situations, higher stress, poorer health and lower grades at the end of an academic year (Yeager et al., 2014).

Since IT are involved in learning processes regulation in conjunction with other components of the integrated intellectual and personality potential (Kornilova, Chumakova, Kornilov, & Novikova, 2010), it is necessary to investigate how they relate to other characteristics that have proven to be predictors of successful learning.

IT in relation to intelligence, motivation and personality

Intelligence correlates with educational levels and is a well-known predictor of academic achievement (Deary, Strand, Smith, & Fernandes, 2007). General IQ (Ridgell & Lounsbury, 2004) as well as verbal and math IQ (Kornilova, Kornilov, & Chumakova, 2009) are related to academic success measured by GPA. Incremental IT of intelligence demonstrate small negative correlation ($r = -.18$) with intelligence, while no correlation is found between IT of mathematical and sport abilities, IT of personality and intelligence (Spinath, Spinath, Riemann, & Angleitner, 2003). The existing data shows that correlations of partial and general IQ with achievement motivation are about $r = .20$ (Chumakova, 2010). Verbal and general IQ demonstrate positive associations with autonomy motivation, while general IQ is also negatively related to order motivation (Ibid.).

Motivation is the force which evokes and directs behaviors, thoughts, emotions, etc. Traditionally when motivation is studied in the academic domain, the research focus is narrowed to learning motives and strategies (Chamorro-Premuzic & Furnham, 2009), learning goal orientations (Blackwell, trzesniewski, & Dweck, 2007), intrinsic and extrinsic motivation (Ryan &

Deci, 2000), intrinsic and extrinsic goals (Vansteenkiste, Lens, & Deci, 2006). Basic needs, or motivational tendencies, and their relation to IT, intelligence and personality in the academic domain is the subject of current research.

Among Big-Five personality traits (extraversion, agreeableness, conscientiousness, emotional stability and openness to experience) unique variance of GPA is explained by emotional stability (Ridgell & Lounsbury, 2004) and openness (Farsides & Woodfield, 2003). Incremental intelligence beliefs correlate weakly with agreeableness (r = .11) and incremental personality beliefs correlate with extraversion (r = .11), openness (r = .13) and conscientiousness (r = .13) (Spinath et al., 2003).

Although intelligence tests are constructed with an intention to measure unrelated to personality "pure intelligence skills", the IQ scores are still found to be dependent on personality. High neuroticism predicts lower than expected IQ scores if the test was taken under stress (Dobson, 2000). Test motivation also affects intelligence test's performance. Meta-analysis shows that material incentives increase IQ scores, and when test motivation is taken into account, the predictive validity of IQ scores for life outcomes is reduced (Duckworth Quinn, Lynam, Loeber, & Stouthamer-Loeber, 2011).

Aim and hypotheses

The review has shown that it is broadly investigated how IT perform in an academic setting. What was partially studied is how IT relate to actual intelligence and personality, which is the goal of present research.

We propose several hypotheses:
1. Incremental IT of intelligence is related to intelligence;
2. Incremental IT of intelligence is negatively related to achievement motivation; malleable IT of personality is negatively related to aggression and dominance;
3. Incremental IT of intelligence and personality are positively associated with extraversion and openness to experience;
4. Intelligence correlate with achievement motivation and self-assessed academic success;
5. Incremental IT of intelligence and personality, as well as conscientiousness are related to GPA.

Method

Sample. Participants all together were 307 under- and postgraduate students (231 female) from different faculties at Lomonosov Moscow State University. The mean age was 20.51 (SD = 2.45) with a range from 17 to 28. The number of participants within every particular measurement varies and therefore is presented in the intercorrelations' matrices.

Measurements

Implicit Theories of Intelligence and Personality were measured with the Implicit Theories and Learning Goals Questionnaire in Dweck-Smirnov's adaptation (Kornilova et al., 2008). The Questionnaire contains Scales for IT of Intelligence and for IT of Personality, Learning Goals Scale (performance goal orientation vs mastery orientation) and Self-Assessed Academic Success Scale (refers to the

subjective evaluation of one's academic success).

Basic Needs, or motivational tendencies, were measured with the Edwards Personal Preference Schedule, EPPS (Edwards, 1976; Kornilova, 1997) that is based on Murrey's conceptualization of basic needs. The questionnaire includes 8 Scales for the following motivation tendencies: Achievement, Aggression, Autonomy, Dominance, Endurance, Abasement, Intraception, and Order. The inventory is designed in an ipsative form forcing the participants to make the sequence of choices between two alternative needs according to their preference.

Personality traits were measured with the use of Ten-Item Personality Inventory (Gosling, Pentfrow, & Swann, 2003; Kornilova & Chumakova, 2016). The Inventory consists of 10 items each containing a pair of traits; 2 items load each of the five factors.

Fluid intelligence was tested with the two subtests from International Cognitive Ability Resource (ICAR) (Condon & Revelle, 2014). First subtest contains 24 Three-dimensional Rotation figures. The figures are cube images and the task is to choose the possible rotation of the cube from the six proposed options. Second subtest is 11 Matrix Reasoning items similar to Raven's Progressive Matrices stimuli. The stimuli are geometrical figures composed as 3×3 elements with one of the nine elements missing. Participants are instructed to identify which of the six proposed elements is a better fit to complete the figure.

Crystallized verbal intelligence was measured using two subtests. The first subtest represents 34 items each of which contains the target word and participants should choose the word closest in meaning to the target word from the six proposed choice options (Kornilov & Grigorenko, 2010). The second subtest includes 30 items consisting of word pairs and the task is to indicate whether the words in pairs are synonyms or antonyms (Ibid.).

The score for Fluid Intelligence is the sum of the first two subtests' results and the score for Crystallized Verbal Intelligence is the sum of scores for the third and fourth subtests.

GPA (Grade Point Average) scores for two sequential terms were obtained for 49 third grade students at Psychology Department.

Participants were tested individually or in small groups (up to 15 participants). Intelligence subtests were administered in timed condition.

Results

Descriptive statistics and intercorrelations for IT and learning goals, intelligence, motivation and Big Five personality traits

Descriptive statistics for all variables are presented in Table 1. Female and male students did not differ significantly in FIQ, VIQ, IT of intelligence or IT of personality. Female students were significantly less oriented on mastery in learning, but had higher SAS than male students. Females also showed higher levels of Order motivation and Agreeableness, and lower levels or Aggression motivation and Emotional Stability, compared to males.

In the total sample (including both males and females) IT of intelligence and IT of personality were not associated with FIQ and VIQ or motivation scales (Table 2). VIQ was significantly

Mean ranks and standard deviations for the total sample and for both sexes separately

	M (SD)	M (SD), females	M (SD), males	Mann-Whitney U
1. ITI	6.0 (6.63)	6.1 (5.78)	5.6 (8.71)	15407.5
2. ITP	1.1 (6.53)	0.9 (6.12)	1.7 (7.63)	15031.0
3. GO	3.3 (5.19)	3.0 (5.09)	4.2 (5.40)	13476.0*
4. SAS	5.4 (6.07)	6.1 (5.64)	3.5 (6.88)	12036.5*
5. FIQ	93.2 (12.36)	92.3 (11.91)	94.8 (13.12)	4646.5
6. VIQ	88.0 (15.99)	88.7 (15.45)	87.0 (16.84)	3320.5
7. Ac	7.8 (2.25)	7.9 (2.08)	7.6 (2.59)	1865.5
8. Or	5.7 (3.02)	6.1 (2.99)	4.8 (2.93)	1499.5*
9. Au	8.0 (2.77)	7.7 (2.94)	8.7 (2.27)	1637.5*
10. In	8.9 (2.84)	9.1 (2.71)	8.3 (3.07)	1762.0
11. Do	7.0 (2.98)	6.6 (2.82)	7.7 (3.23)	1608.0*
12. GF	7.3 (2.76)	7.6 (2.53)	6.8 (3.16)	1707.0
13. En	6.3 (3.06)	6.3 (2.99)	6.1 (3.24)	1955.0
14. Ag	5.1 (2.52)	4.7 (2.42)	6.1 (2.47)	1449.0
15. E	8.3 (2.51)	8.4 (2.44)	8.1 (2.79)	4900.5
16. A	8.8 (2.11)	9.0 (2.08)	8.0 (2.08)	3857.0*
17. C	9.5 (3)	9.6 (2.94)	9.3 (3.23)	5014.5
18. ES	7.5 (2.77)	7.1 (2.52)	9.3 (3.02)	2911.5*
19. O	10.7 (2.01)	10.7 (1.91)	10.6 (2.38)	5112.0

Note. 1) ITI = malleable implicit theory of intelligence; ITP = malleable implicit theory of personality; GO = mastery goal orientation; SAS = self-assessed academic success; FIQ = fluid intelligence; VIQ = verbal (crystallized) intelligence; Ac = Achievement; Or = Order; Au = Autonomy; In = Intraception; Do = Dominance; GF = Guilt Feeling; En = Endurance; Ag = Aggression; E = Extraversion; A = Agreeableness; C = Conscientiousness; ES = Emotional Stability; O = Openness to experience; 2) * $p < .05$ (two-tailed); 3) GPA was not compared between sexes due to the small number of GPA obtained from male students.

positively associated with Achievement motivation. FIQ was significantly negatively associated with Endurance ($r = -.18$, p < .05) and mastery GO ($r = -.16, p < .05$).

SAS showed significant positive correlations with three basic needs: Achievement ($r = .20, p < .05$), Order ($r = .27, p < .05$) and Endurance ($r = .44, p < .01$), and negative correlations with Autonomy ($r = -.34, p < .01$) and Aggression ($r = -.40, p < .01$).

Students endorsing malleable IT of intelligence were more Extraverted ($r = .15, p < .05$) and Conscientious ($r = .20, p < .01$) (Table 3). Students

Table 2 44

Intercorrelations of IT, intelligence and motivation in the total sample (Spearman's ρ)

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
1. ITI	1													
2. ITP	.50** 307	1												
3. GO	.15** 307	.14* 307	1											
4. SAS	.14* 307	.13* 307	.40** 307	1										
5. FIQ	.07 148	−.01 148	−.16* 148	−.13 148	1									
6. VIQ	.02 148	−.08 148	.18* 148	.15 148	.16* 161	1								
7. Ac	−.04 122	−.03 122	.10 122	.20* 122	.09 113	.30** 113	1							
8. Or	.01 122	.12 122	−.13 122	.27** 122	−.02 113	.09 113	−.11	1						
9. Au	.02 122	−.04 122	.04 122	−.34** 122	.004 113	−.15 113	−.06 130	−.44** 130	1					
10. In	.11 122	.11 122	.04 122	−.11 1 22	.05 113	−.08 113	−.26** 130	.05 130	−.03 130	1				
11. Do	.01 122	−.04 122	.04 122	.07 122	.14 113	−.13 113	−.08 130	−.37** 130	−.005 130	−.34** 130	1			
12. GF	−.07 122	−.02 122	−.16 122	−.14 122	−.01 113	.12 113	−.12 130	.16 130	−.45** 130	−.01 130	−.27** 130	1		
13. En	.04 122	−.003 122	.29** 122	.44** 122	−.18* 113	.04 113	−.03 130	.09 130	−.16 130	−.24** 130	−.19* 130	−.15 130	1	
14. Ag	−.09 122	−.16 122	−.13 122	−.40** 122	−.08 113	−.10 113	−.17 130	−.51** 130	.22* 130	−.15 130	.26** 130	−.15 130	−.38** 130	1

Note. 1) * p < .05 (two-tailed); 2) Second lines present the number of participants.

Intercorrelations of IT and Big Five traits, total sample (Spearman's ρ)

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. ITI	1									
2. ITP	.50**	1								
3. GO	.15**	.14*	1							
4. SAS	.14*	.13*	.40**	1						
5. E	.15*	.02	.08	.09	1					
6. A	.02	.05	.04	.06	.07	1				
7. C	.20**	.02	.10	.47**	−.01	.01	1			
8. ES	.06	.09	.18**	.09	−.03	.14*	.22**	1		
9. O	.10	.13*	.33**	.02	.33**	.14*	−.12*	.09	1	
10. GPA	.04	.20	−.03	.63**	−.11	−.26	.13	−.14	−.15	1

Note. 1) $* p < .05$, $** p < .01$ (two-tailed); 2) Correlations between IT, goals, SAS and personality traits were obtained on 235 participants; correlations between GPA and personality traits were obtained on 45 participants.

with malleable IT of personality showed higher Openness ($r = .13$, $p < .05$). SAS correlates with GPA ($r = .63$, $p < .01$) and conscientiousness ($r = .47, p < .01$).

Sex differences in correlations between IT, intelligence, motivation and personality

Since personality characteristics underlie some gender effects (Feingold, 1994), analysis of correlations was also performed for both sexes separately.

Females' malleable personality beliefs showed negative correlation with VIQ ($r = −.22, p < .05$) (Table 4), FIQ showed positive correlation with Dominance ($r = .31, p < .05$), and mastery GO showed positive correlation with Endurance ($r = .31, p < .01$).

Males' malleable intelligence beliefs correlated positively with Intraception ($r = .33, p < .05$), VIQ and FIQ correlated positively ($r = .29, p < .05$), mastery GO negatively correlates with Guilt Feeling, VIQ correlated positively with Achievement motivation ($r = .40, p < .01$).

Females showed significant positive correlations between incremental IT of intelligence and Extraversion, Conscientiousness and Openness; both IT of personality and mastery GO were associated with Openness, SAS showed correlation with Conscientiousness. Males showed significant positive correlations between incremental IT of intelligence and Conscientiousness, mastery GO with Emotional Stability and Openness, SAS — with Conscientiousness.

Discussion

IT of intelligence showed no correlation with fluid or crystallized intelligence

Table 4 46

Intercorrelations between IT, intelligence and motivation for females and males (Spearman's ρ)

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
1. ITI	1	.46** 219	.08 219	.12 219	.11 88	−.09 88	−.04 78	−.03 78	.02 78	−.02 78	−.01 78	.08 78	.10 78	−.11 78
2. ITP	.54** 88	1	.17** 219	.18** 219	.02 88	−.22* 88	−.02 78	.09 78	−.04 78	.13 78	−.06 78	−.03 78	.11 78	−.21 78
3. GO	.28** 88	.05 88	1	.46** 219	−.08 88	.15 88	.21 78	−.11 78	−.05 78	.05 78	−.14 78	.09 78	.31** 78	−.22 78
4. SAS	.17 88	.05 88	.39** 88	1	−.05 88	.18 88	.20 78	.24* 78	−.48** 78	−.13 78	.09 78	−.004 78	.43** 78	−.35** 78
5. FIQ	−.02 61	−.07 61	−.27* 61	−.19 61	1	.04 89	.13 63	−.04 63	.04 63	−.01 63	.31* 63	−.16 63	−.22 63	−.05 63
6. VIQ	.11 61	.11 61	.24 61	.14 61	.29* 65	1	.14 63	.17 63	−.21 63	.02 63	−.07 63	.19 63	.02 63	−.17 63
7. Ac	−.03 44	−.01 44	.03 44	.11 44	.03 43	.40** 43	1	.02 79	−.08 79	−.27* 79	.06 79	−.23* 79	−.07 79	−.31** 79
8. Or	.12 44	.19 44	.002 44	.23 44	.09 43	.06 43	−.29 44	1	−.53** 79	.19 79	−.35** 79	.21 79	−.03 79	−.55** 79
9. Au	.01 44	−.06 44	.09 44	−.08 44	−.06 43	−.18 43	−.15 44	−.09 44	1	−.002 79	−.003 79	−.44** * 79	−.26* 79	.34** 79
10. In	.33* 44	.12 44	.07 44	−.14 44	.11 43	−.28 43	−.22 44	−.33* 44	.06 44	1	−.57** 79	.07 79	−.21 79	−.18 79
11. Do	−.04 44	.001 44	.24 44	.16 44	−.10 43	−.16 43	−.28 44	−.22 44	−.11 44	.06 44	1	−.28* 79	−.12 79	.19 79
12. GF	−.24 44	−.007 44	−.46** 44	−.40** 44	.13 43	.05 43	.05 44	−.04 44	−.37* 44	−.22 44	−.29 44	1	−.04 79	−.21 79
13. En	−.02 44	−.17 44	.29 44	.46** 44	−.09 43	.05 43	.01 44	.25 44	.02 44	−.29 44	−.30 44	−.31* 44	1	−.25* 79
14. Ag	−.18 44	−.21 44	−.13 44	−.37* 44	−.16 43	−.003 43	−.02 44	−.32* 44	−.14 44	−.08 44	.23 44	.09 44	−.53* * 44	1

Note. 1) $^* p < .05$, $^{**} p < .01$ (two-tailed); 2) Correlations on females are shown above the diagonal, correlations for males – below the diagonal; 3) Second lines present the number of participants.

Intercorrelations between IT and personality traits for females and males (Spearman's ρ)

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. ITI	1	.46**	.08	.12	.16*	.06	.14*	.001	.15*
2. ITP	.54**	1	.17**	.18**	.04	.09	−.02	.06	.23**
3. GO	.28**	.05	1	.46**	.12	.06	.08	.11	.32**
4. SAS	.17	.05	.39**	1	.14	−.007	.42**	.12	.10
5. E	.13	−.02	−.06	−.07	1	.06	−.009	.04	.32**
6. A	−.01	−.09	.19	.03	.10	1	−.008	.19**	.15*
7. C	.36*	.16	.22	.50**	.42**	.05	1	.19**	−.10
8. ES	.17	.08	.30*	.19	−.18	.32*	.42**	1	.15
9. O	−.02	−.20	.31*	−.13	.35*	.15	−.16	.03	1

Note. 1) * $p < .05$, ** $p < .01$ (two-tailed); 2) Correlations on females are shown above the diagonal (IT intercorrelations are obtained on 219 participants, between IT and personality — on 189), correlations for males — below the diagonal (IT intercorrelations are obtained on 88 participants, between IT and personality — on 46).

on both total and separate sex samples, therefore the first hypothesis received no confirmation. This result, however, supports previous findings obtained using a different intelligence test, the IST-70 (Kornilova et al., 2009). The finding can be primarily explained by fundamental independence of these characteristics meaning that beliefs about malleability of intelligence or personality have no correlation with the current intelligence level. Second assumption also refers to the absence of correlations between IT of intelligence and personality, and academic achievement. The point is that while IT can predict trajectories of academic achievement — incremental beliefs predict maintaining, raising or steeper growth trajectories whereas fixed beliefs predict declining trajectories — their simultaneous correlation with achievement or intelligence could be nonexistent (Blackwell et al., 2007).

IT of personality demonstrated relations with intelligence in the female sample assuming that beliefs about malleability of personality characteristics play a regulative role only in women's self-regulative processes while having no impact on self-regulation in men. In particular, female students with higher crystallized intelligence share entity beliefs about personality, considering it a rigid and unchangeable structure.

IT of intelligence was unrelated to achievement motivation, as was IT of personality to aggression and dominance, contrary to our second hypothesis. Nevertheless, intelligence beliefs correlated with intraception motivation in the male sample. The need to think over the reasons of people's actions, to analyze one's feelings and behaviors is related to incremental beliefs about intelligence. Since the design of this research is correlational, we

cannot draw causal inferences. But our assumption is that reflection triggered by intraception motivation is the process which leads to the understanding that intelligence can grow and expand in order to meet specific demands of different tasks and situations.

Along with the third hypothesis, incremental beliefs about intelligence correlate with extraversion and openness in women, and with conscientiousness in both sexes. Extraversion implies being active and involved in social situations, openness means being intellectually curious, having preference of varying activities over well-known routine. All the characteristics mentioned above might serve the purpose of forming growth beliefs about intelligence and its flexibility. Conscientiousness is connected to being organized and self-disciplined, to preferring scheduled rather than spontaneous behaviors, which might at first seem to contradict incremental IT views. But malleable intelligence beliefs imply understanding effort as meaningful, and effort is also about being able to organize and discipline one's work, so conscientiousness can be related to incremental intelligence beliefs through effort attribution.

Intelligence showed distinctive correlations with motivation in men and women. In men crystallized verbal intelligence is related to achievement motivation (as expected in the fourth hypothesis) and in women fluid intelligence is related to dominance. It means that male students use their intellectual experience for dealing with complex problems, for self-actualization through the achievement of something significant. Female students use their fluid intelligence for the purposes of being a

leader, seeking for acknowledgement as such, taking responsibility for others and making decisions for them, dictating to others what to do, etc. Thus, in males intelligence driven by the force of achievement need is involved in the processes of solving problems and success achievement, while in females intelligence use is driven by the dominance motivation to self-affirmation, establishing and confirming their own place in interpersonal life dimension. In the total sample fluid intelligence was negatively associated with endurance motivation. This link can exist because of the compensatory role motivation takes over intelligence when intellectual potential inefficiency occurs. Because fluid intelligence is closely related to executive functions of control and working memory (Nisbett et al., 2012), it is anticipated that in cases of lowered fluid intelligence some other characteristic should compensate. And endurance motivation performs exactly those executive functions through tenacity and the need to keep at a job until it is finished (Edwards, 1976).

Intelligence showed no significant correlation with self-assessed academic success, as predicted. We suggest that to clarify the link between intelligence and SAS we should enter GPA as a possible mediator. The sample size did not allow us to do so in current research, so the exploration of this suggestion remains to future investigation.

Self-assessed academic success correlated positively with conscientiousness on both total and divided by sex samples. The more the student evaluates him- or herself as disciplined, deliberate and dutiful, the more successful he or she reports to be, and vice versa. Moreover, SAS strongly ($r = .60$)

correlates with academic achievements, GPA, supporting previous findings (Kornilova et al., 2008; Kornilova et al., 2009). This result means that in general students are quite accurate in assessing their accomplishments. Nonetheless, SAS is related to both conscientiousness and GPA, but there is no correlation between the two of them, contrary to previous results (Poropat, 2009). Because self-assessed success is a component of general self-evaluation process, along with objective feedback about one's grades it is also affected by personality variables.

Mastery goal orientation is related to openness in men and women, but shows distinctive links to motivation in these two subgroups. Openness includes values of imagination, creativity, intelligence, etc. (DeYoung, Quilty, Peterson, & Gray, 2014), the characteristics that might nurture intentions to explore complex problems and work on mastery and professionalism. Correlation of openness with the use of deep learning strategies was also obtained by Chamorro-Premuzic & Furnham (2009). Mastery goal orientation was also negatively associated with abasement in male students, meaning that a higher guilt and the need to evaluate oneself as worse than others are observed in those students who choose performance goals in learning. In social-cognitive approach to motivation C. Dweck describes this phenomenon as an "ego threat", which is associated with orientation on performance and the need to demonstrate high results (Dweck & Leggett, 1988). In females mastery goal orientation was positively related to endurance, the need to work on the task till it is over. The first impression is that this result is paradoxical, because endurance characteristics seem to correspond to performance orientation. Nevertheless, we suppose that endurance motivation might serve as an "energy supply" for a long-term and complex process of mastery acquirement in a chosen profession.

Contrary to the fifth hypothesis, GPA showed no significant correlations with IT of intelligence and personality, and conscientiousness. Perhaps, analysis of subgroups divided by sex would reveal some of the proposed links, but due to the small number of GPAs for male students we did not include GPA in subgroups analysis.

Conclusion

The present study examined the extent to which implicit theories of intelligence and personality are related to other structures of the integrated intellectual and personality potential. The results suggest that, first, implicit theories are more related to personality than to intelligence, which is interesting since numerous studies have shown them playing a crucial role in the intelligence development; second, there are sex differences in regulative role implicit theories play in self-regulation. The main findings are the following:

1. Incremental IT of intelligence shows no correlation with fluid or crystallized intelligence;

2. Incremental IT of personality demonstrates negative relation to crystallized intelligence in the female sample;

3. Incremental IT of intelligence correlate with intraception motivation in the male sample;

4. Incremental IT of intelligence correlate with extraversion and openness in

women, and with conscientiousness in both sexes;

5. IT of personality are associated with openness to experiences in female students;

6. Crystallized verbal intelligence is related to achievement motivation in men; fluid intelligence is related to dominance motivation in women;

7. Self-assessed academic success correlates positively with conscientiousness and GPA;

8. Mastery goal orientation is positively related to openness in men and women, endurance motivation in female students, and is negatively related to guilt feeling motivation in male students.

The main limitation of this research is the analysis of correlations only between pairs of variables. To understand the entire structure of the links, our next step will be to integrate components of intellectual and personality potential in a unifying structural model.

References

Atwood, J. R. (2010). Mindset, motivation and metaphor in school and sport: Bifurcated beliefs and behavior in two different achievement domains. *Online Submission*. Retrieved from http://files.eric.ed.gov/fulltext/ED509344.pdf

Blackwell, L. S., Trzesniewski, K. H., & Dweck, C. S. (2007). Implicit theories of intelligence predict achievement across an adolescent transition: A longitudinal study and an intervention. *Child development, 78*(1), 246-263. doi: 10.1111/j.1467-8624.2007.00995.x

Burnette, J. L., O'Boyle, E. H., VanEpps, E. M., Pollack, J. M., & Finkel, E. J. (2013). Mind-sets matter: A meta-analytic review of implicit theories and self-regulation. *Psychological Bulletin, 139*, 655–701. doi:10.1037/a0029531

Chamorro-Premuzic, T., & Furnham, A. (2009). Mainly Openness: The relationship between the Big Five personality traits and learning approaches. *Learning and Individual Differences, 19*(4), 524–529. doi:10.1016/j.lindif.2009.06.004

Chumakova, M. A. (2010). Lichnostnye predposylki ratsional'nogo vybora v usloviyakh neopredelennosti [Personal prerequisites of rational choice under uncertainty] (Extended abstract of PhD dissertation). Moscow State University, Russian Federation. Moscow.

Condon, D. M., & Revelle, W. (2014). The International Cognitive Ability Resource: Development and initial validation of a public-domain measure. *Intelligence, 43*, 52–64. doi: 10.1016/j.intell.2014.01.004

Deary, I. J., Strand, S., Smith, P., & Fernandes, C. (2007). Intelligence and educational achievement. *Intelligence, 35*(1), 13–21. doi: 10.1016/j.intell.2006.02.001

DeYoung, C. G., Quilty, L. C., Peterson, J. B., & Gray, J. R. (2014). Openness to experience, intellect, and cognitive ability. *Journal of Personality Assessment, 96*(1), 46–52. doi:10.1080/00223891.2013.806327

Dinger, F. C., & Dickhäuser, O. (2013). Does implicit theory of intelligence cause achievement goals? Evidence from an experimental study. *International Journal of Educational Research, 61*, 38–47. doi: 10.1016/j.ijer.2013.03.008

Dobson, P. (2000). An investigation into the relationship between neuroticism, extraversion and cognitive test performance in selection. *International Journal of Selection and Assessment, 8*(3), 99–109. doi:10.1111/1468-2389.00140

Duckworth, A. L., Quinn, P. D., Lynam, D. R., Loeber, R., & Stouthamer-Loeber, M. (2011). Role of test motivation in intelligence testing. *Proceedings of the National Academy of Sciences, 108*(19), 7716-7720. doi: 10.1073/pnas.1018601108

Dweck, C. S. (2006). *Mindset: The new psychology of success.* New York: Random House.

Dweck, C. S., & Leggett, E. L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review, 95,* 256–273.

Edwards, A. (1976). *Edwards Personal Preference Schedule. Manual.* New York.

Farsides, T., & Woodfield, R. (2003). Individual differences and undergraduate academic success: The roles of personality, intelligence, and application. *Personality and Individual Differences, 34*(7), 1225–1243. doi:10.1016/S0191-8869(02)00111-3

Feingold, A. (1994). Gender differences in personality: a meta-analysis. *Psychological Bulletin, 116*(3), 429. doi:10.1037/0033-2909.116.3.429

Good, C., Aronson, J., & Inzlicht, M. (2003). Improving Adolescents' Standardized Test performance: An intervention to reduce the effects of stereotype threat. *Applied Developmental Psychology, 24*(6), 645–662. doi:10.1016/j.appdev.2003.09.002

Gosling, S. D., Rentfrow, P. J., & Swann, W. B. (2003). A very brief measure of the big-five personality domains. *Journal of Research in Personality, 37*(6), 504–528. doi:10.1016/S0092-6566(03)00046-1

Hong, Y. Y., Chiu, C. Y., Dweck, C. S., Lin, D. M. S., & Wan, W. (1999). Implicit theories, attributions, and coping: A meaning system approach. *Journal of Personality and Social Psychology, 77*(3), 588–599. doi:10.1037/0022-3514.77.3.588

Hong, Y., Chiu, C., Dweck, C. S., & Sacks, R. (1997). Implicit theories and evaluative processes in person cognition. *Journal of Experimental Social Psychology, 33,* 296–323. doi: 10.1006/jesp.1996.1324

Kornilov, S. A., & Grigorenko, E. L. (2010). *Metodicheskii kompleks dlia diagnostiki akademicheskikh, tvorcheskikh i prakticheskikh sposobnostei* [Procedural complex for assessment of academic, creative and practical abilities]. *Psikhologicheskij Zhurnal, 31*(2), 90–103.

Kornilova, T. V. (1997). *Diagnostika motivacii i gotovnosti k risku* [Diagnostics of motivation and readiness to take risks]. Moscow: Institute of psychology of RAS.

Kornilova, T. V., & Chumakova, M. A. (2016). *Aprobatsiya kratkogo oprosnika Bol'shoi pyaterki (TIPI, KOBT)* [Development of the Russian version of the brief Big Five questionnaire (TIPI, KOBT)], *Psikhologicheskie Issledovaniya, 9*(46), 5.

Kornilova, T. V., Chumakova, M. A., Kornilov, S. A., & Novikova, M. A. (2010). *Psikhologia neopredelennosti: Edinstvo intellektualno-lichnostnogo potentsiala cheloveka* [The psychology of uncertainty: The unity of the intellectual and personality potential in humans]. Moscow: Smysl.

Kornilova, T. V., Kornilov, S. A., & Chumakova, M. A. (2009). Subjective evaluations of intelligence and academic self-concept predict academic achievement: Evidence from a selective student population. *Learning and Individual Differences, 19*(4), 596–608. doi:10.1016/j.lindif.2009.08.001

Kornilova, T. V., Smirnov, S. D., Chumakova, M. V., Kornilov, S. A., & Novototskaya-Vlasova, E. V. (2008). *Modifikatsia oprosnika implitsitnikh teoriy C. Dweck (v kontekste izuchenia akademicheskikh dostizheniy studentov)* [A modification of C. Dweck's implicit theories questionnaire (in the context of studying student academic achievement)]. *Psikhologisheskii Zhurnal, 29*(3), 106–120.

Mueller, C. M., & Dweck, C. S. (1998). Praise for intelligence can undermine children's motivation and performance. *Journal of Personality and Social Psychology, 75*(1), 33. doi:10.1037/0022-3514.75.1.33

Nisbett, R. E., Aronson, J., Blair, C., Dickens, W., Flynn, J., Halpern, D. F., & Turkheimer, E. (2012). Intelligence: new findings and theoretical developments. *American Psychologist, 67*(2), 130. doi:10.1037/a0026699

Poropat, A. E. (2009). A meta-analysis of the five-factor model of personality and academic performance. *Psychological Bulletin, 135*, 322. doi:10.1037/a0014996

Ridgell, S. D., & Lounsbury, J. W. (2004). Predicting academic success: General intelligence, "Big Five" personality traits, and work drive. *College Student Journal, 38*(4), 607–619. doi:10.1016/S0191-8869(02)00330-6

Ryan, R. M., & Deci, E. L. (2000). When rewards compete with nature: The undermining. In C. Samsone & J. M. Harackiewicz (Eds.), *Intrinsic and extrinsic motivation: The search for optimal motivation and performance* (pp.13–54). San Diego, CA: Academic Press. doi:10.1016/B978-012619070-0/50024-6

Spinath, B., Spinath, F. M., Riemann, R., & Angleitner, A. (2003). Implicit theories about personality and intelligence and their relationship to actual personality and intelligence. *Personality and Individual Differences, 35*(4), 939–951. doi:10.1016/S0191-8869(02)00310-0

Vansteenkiste, M., Lens, W., & Deci, E. L. (2006). Intrinsic versus extrinsic goal contents in self-determination theory: Another look at the quality of academic motivation. *Educational Psychologist, 41*(1), 19–31. doi:10.1207/s15326985ep4101_4

Yeager, D. S., Johnson, R., Spitzer, B. J., Trzesniewski, K. H., Powers, J., & Dweck, C. S. (2014). The far-reaching effects of believing people can change: Implicit theories of personality shape stress, health, and achievement during adolescence. *Journal of Personality and Social Psychology, 106*(6), 867. doi:10.1037/a0036335

Yeager, D. S., Miu, A. S., Powers, J., & Dweck, C. S. (2013). Implicit theories of personality and attributions of hostile intent: A metaanalysis, an experiment, and a longitudinal intervention. *Child Development, 84*(5), 1651–1667. doi:1 0.1111/cdev.12062

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Имплицитные теории интеллекта и личности: связи с интеллектом, мотивацией и личностными чертами

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Резюме

Имплицитные теории (ИТ) отражают представления о сущности когнитивных и личностных характеристик человека (стабильной либо изменчивой) и участвуют в интерпретации людьми событий и регуляции их деятельности (через процессы целеобразования, реагирования на неудачи, стратегии при обучении и пр.), а также позволяют предсказывать достижения (Dweck, 2006). Однако связи ИТ с компонентами интеллектуально-личностного потенциала человека изучены недостаточно. Целью данного исследования является прояснить, как ИТ связаны со стабильными структурами – когнитивными (интеллект) и личностными (черты Большой Пятерки, глубинная мотивация). Участниками исследования выступили 307 студентов и аспирантов, выполнявших тест интеллекта ICAR, Краткий опросник Большой Пятерки (TIPI) и список личностных предпочтений Эдвардса (EPPS); для 49 респондентов был получен показатель успеваемости (GPA). Результаты демонстрируют как сходные, так и различающиеся связи между измеренными показателями для мужчин и для женщин. В частности, и у мужчин и у женщин представления об интеллекте как развиваемом или константном не зависят от уровня интеллекта – как флюидного, так и кристаллизованного, — но находятся в тесной связи с личностными характеристиками: сознательностью (у мужчин и женщин), открытостью новому опыту (у женщин) и мотивацией самопознания (у мужчин). Представления о личности как обогащаемой или стабильной обнаружили негативную связь только с кристаллизованным интеллектом (у женщин). Выбор целевой ориентации на мастерство на общей студенческой выборке связан с открытостью новому опыту, а предиктором успеваемости выступила добросовестность. Результаты обсуждаются с позиции единства интеллектуально-личностного потенциала человека.

Ключевые слова: имплицитные теории, интеллект, личность, Большая Пятерка, мотивация, самооценка обучения.

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