Meta-Learning and Individual Differences (Part 2)

Unit 1 Week 3

Individual differences in personality traits have also been linked to **differences in academic achievement (i.e., your course grade).** In many learning situations **personality can have an impact on learning outcomes greater than intelligence.** While intelligence (your cognitive capacity) is important especially in subjects such as programming, personality usually accounts for more variance in academic achievement. **This is because different personality traits and personality profiles are linked to different attitudes and behaviors in learning**. Understanding your own personality profile is therefore useful in planning to be a better learner.

What personality traits can help predict your grade?

- **Agreeableness and Openness** have produced mixed findings with many research studies finding no significant impact on academic achievement. However, most subjects require students to have an "open mind" to receive new information and ideas. Several studies how reported that Agreeableness is not useful for learning. Agreeable people might ask fewer questions in-class and passively accept information rather than challenge and explore new ideas.

- **Extraversion** has been shown to have a negative correlation with academic success within the context of higher education. This is because more extraverted students spend more time socializing than studying. High levels of Extraversion are useful in subjects and situations that require lots of talking and interaction with others (e.g., presentations or group work). Extraverted students tend not to enjoy studying alone or without the external stimulation of other people.

- **Neuroticism** has been viewed as having negative or non-significant links with academic achievement. More neurotic students suffer anxiety in relation to assessment, testing and performance. However, during the COVID-19 pandemic and the change to online learning, Neurotic students were more accepting of the lack of face-to-face social interaction. These students are often happy to study alone and without the stress of other people and social situations.

- **Conscientiousness** has been shown as the strongest predictor of academic achievement having an influence **five times greater than intelligence.** It has been described as the most crucial non-cognitive predictor of academic success.

Conscientiousness is CRUCIAL FOR LEARNING SUCCESS

Original Article

Conscientiousness Is the Most Powerful Noncognitive Predictor of School Achievement in Adolescents

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Abstract. Much research has demonstrated that intelligence and conscientiousness have a high impact on individual school achievement. To figure out if other noncognitive traits have incremental validity over intelligence and conscientiousness, we conducted a study on 498 eighth-grade students from general secondary schools in Austria. Hierarchical regressions for three criteria (GPA, science, and languages) were performed, including intelligence, the Big Five, self-discipline, grit, self-efficacy, intrinsic-extrinsic motivation, and test anxiety. Intelligence and conscientiousness alone accounted for approximately 40% in the variance of school achievement. For languages and GPA, no other personality and motivational predictors could explain additional variance; in science subjects, only self-discipline added incremental variance. We conclude that – in addition to intelligence as powerful cognitive predictor – conscientiousness is *the* crucial noncognitive predictor for school achievement and should be focused on when supporting students in improving their performance.

Keywords: school achievement, intelligence, Big Five, motivation, anxiety

Predicting academic success in higher education: what's more important than being smart?

Rutger Kappe · Henk van der Flier

Abstract This study investigated the combined predictive validity of intelligence and personality factors on multiple measures of academic achievement. Students in a college of higher education in the Netherlands ($N=137$) completed a survey that measured intelligence, the Big Five personality traits, motivation, and four specific personality traits. Student performance was measured with grade point average (GPA) and time to graduation, as well as with five specific performance measures: regular exams, skills training, team projects, internships, and a written thesis. Results show that 33% of the variance in GPA and 30% of the variance in time to graduation can be explained by combining intelligence, personality, and motivational predictors. Conscientiousness is the best predictor across a broad spectrum of academic achievement measures and explains five times as much variance in GPA as does intelligence. The practical implications are that institutes of higher education should collect personality data on students at the outset and then help students accordingly. Highly conscientious students who are organized and internally motivated might potentially be offered more challenging honours programs with corresponding special commendations on their diplomas, whereas students who score low on conscientious would receive more structure through student study groups, frequent deadlines, shorter assignments, group assignments, clearly defined learning goals, and less second chances for passing examinations.
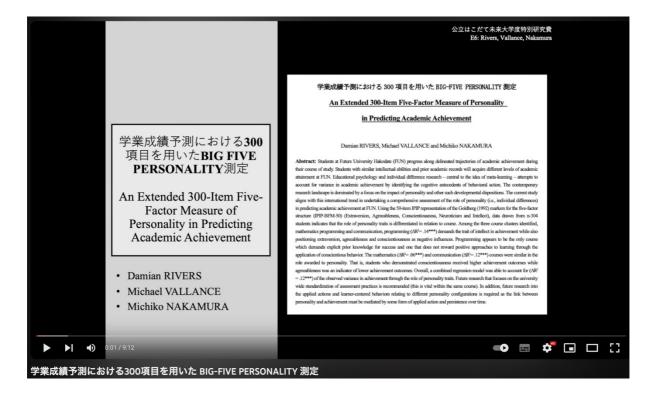
From the information above you should know that **the personality trait of Conscientiousness is the most important in predicting academic success**. Over many years of research at FUN, it is always the case that students who act conscientiously are the ones who achieve the highest grades in most subjects.

For example, the video presentation shown at https://youtu.be/OD5G0OeBpv8 is research undertaken at FUN into "学業成績予測における 300 項目を用いた BIG-FIVE PERSONALITY 測定".

You can watch the full presentation to access each of the presentation slides.

The most important information shown in this study relates to **the role of personality traits in predicting academic achievement.**

In the study we measured the personality trait profiles of FUN students and then looked at the predictive (causal) relationship with course grades in maths, communication, programming, and overall final grades.

3

The analysis shows the following:

Two personality traits have a predictive relationship with achievement in maths at FUN. **Agreeableness has a negative relationship (-.18**)** whereas **Conscientiousness has a positive relationship (.20**)**. This means that the **more agreeable a student was, the lower the maths achievement score was**. It also means that **the more conscientious a student was, the higher the maths achievement score was**.

Personality + Mathematics			
	Mathematics Achievement		
	B	**SE B**	**β**
Extraversion	-.007	.006	-.074
Agreeableness	**-.022**	**.007**	**-.181****
Conscientiousness	**.024**	**.007**	**.201*****
Neuroticism	-.002	.006	-.024
Intellect	.006	.008	.046
R	.25		
ΔR²	.06***		
F	4.159***		

*** Students who are more conscientious score higher on maths.

Three personality traits have a predictive relationship with achievement in communication at FUN. **Agreeableness has a negative relationship (-.23***). Conscientiousness has a positive relationship (.31***). Neuroticism has a negative relationship (-.15***).** This means that the **more agreeable or neurotic a student was, the lower the communication achievement score was**. It also means that **the more conscientious a student was, the higher the communication achievement score was (to a greater degree than in maths).**

Personality + Communication			
	Communication Achievement		
	B	**SE B**	**β**
Extraversion	.000	.007	.001
Agreeableness	**-.034**	**.009**	**-.230*****
Conscientiousness	**.045**	**.008**	**.318*****
Neuroticism	**-.020**	**.007**	**-.159****
Intellect	.016	.010	.101
R	.35		
ΔR²	.12***		
F	8.576***		

*** Students who are more conscientious score higher on communication.

Four personality traits have a predictive relationship with achievement in programming at FUN.

Extraversion has a negative relationship (-.23***).

Agreeableness has a negative relationship (-.23**).

Conscientiousness has a negative relationship (-.11*). **Intellect (or Openness) has a positive relationship (.31***).** This means that **the more extraverted, agreeable or conscientious a student was, the lower the programming achievement score was.** It also means that the **more intellectual a student was, the higher the programming achievement score was**. The reason that programming is different is because this subject requires more explicit procedural knowledge than maths and communication. In programming we can say that intelligence plays a more important role in achievement than in maths or communication.

*** Students who are more intellectual score higher on programming.

Personality + Programming

	Programming Achievement		
	B	**SE B**	**β**
Extraversion	-.032	.008	-.239***
Agreeableness	-.024	.010	-.143**
Conscientiousness	-.018	.009	-.112*
Neuroticism	-.011	.008	-.073
Intellect	.061	.011	.317***
R	.38		
ΔR²	.14***		
F	10.366***		

Unit 1 Week 3: Homework Task

Homework Tasks = 25% of the Communication IV Grade

Part 1: Look at the image on the next page which shows the relationship between **personality traits and overall achievement at FUN** (combined grades of students for the first two years of study). You should look in the **standardized beta column** (the β symbol in column three). You can see numbers such as **-.155*, -.250***, .162**, -.121* and .233***.** These numbers can range from **-1 to +1** and show the causal relationship between each personality trait and

overall achievement at FUN. If the number has a – (minus) sign it means that the greater the personality strength, the lower the achievement. If the number has a + (positive) sign it means that the greater the personality strength, the higher the achievement. The * (asterisk) symbols refer to **degree of significance**. One * means the data is significant at 90% certainty, two ** mean that the data is significant at 95% certainty, and three *** means that the data is significant at 99% certainty. Obviously, three *** suggests a more reliable result.

Part 2: Select one of the questions below and provide a **50-word English answer on HOPE**. The answer should be based on your own opinion and supported by the data shown in the image below.

- What does the data show?
- Which personality traits have a negative impact on achievement?
- Which personality traits have a positive impact on achievement?
- What traits are the most important for academic achievement?
- What conclusions can you make about personality and achievement?

Personality + Achievement

	Overall Achievement		
	B	*SE B*	*β*
Extraversion	-.013	.005	-.155*
Agreeableness	-.027	.006	-.250***
Conscientiousness	.017	.006	.162**
Neuroticism	-.011	.005	-.121*
Intellect	.028	.007	.233***
R	.35		
ΔR²	.12***		
F	8.584***		