

## Links between the personalities, styles and performance in computer programming

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**Abstract:** There are repetitive patterns in strategies of manipulating source code. For example, modifying source code before acquiring knowledge of how a code works is a depth-first style and reading and understanding before modifying source code is a breadth-first style. The objective of this study is to understand the influence of personality on programming styles. We did a correlational study with 65 programmers at the University of Stuttgart. We measured academic achievement, programming experience, attitude towards programming and five personality factors via a self-assessed survey. We assessed the programming styles in the survey or mined them from software repositories. Performance in programming was composed of defect-proneness of programmers which was mined from software repositories, the grades they got in a software project course and their estimate of their own programming ability. In the statistical analysis, we found that Openness to Experience has a positive association with breadth-first style and Conscientiousness has a positive association with depth-first style. We also found that in addition to having more programming experience and better academic achievement, the styles of working depth-first and saving coarse-grained revisions improve performance in programming.

**Keywords:** Programming styles, personality, five-factor model

### 1 Overview

This short article summarises a study published in The Journal of Systems and Software [KBG16]. Our starting point for study was the apparent lack of studies on the effect of programming styles on the performance in programming. Also they influence personality has onto these programming styles has not been studied.

We use the concept *programming styles* in the sense as introduced by Cox and Fisher [CF09]. The define the term programming styles to describe recurring strategies in manipulating source code. For example, programming can be done top-down and/or bottom-up. In top-down programming, more tasks might be done in model space and in bottom-up programming, more tasks might be done in code space.

In our correlational study, we answered two research questions:

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RQ1: Which human factors affect certain programming styles?

RQ2: Which factors, human factors and programming styles affect performance?

As sample for the analysis, we took students from the University of Stuttgart enrolled in the software engineering programmes (Bachelor or Master level). They all did different kinds of project work developing realistic software systems. Therefore, we had access not only to the students themselves but also the project repositories and their project grades. Most of the data we collected came from a questionnaire including questions on their programming style and the German translation of IPIP-50, a validated questionnaire to assess personality according to the Five Factor Model.

## 2 Results

The main results we found are that experience in terms of years at the university is positively correlated with the *large revisions* programming style. The personality trait *conscientiousness* is positively correlated with the *depth first* programming style. Those two programming styles as well as experience in terms of the number of programming languages, age and academic achievement are all positively correlated with performance.

## 3 Conclusions

Overall, we saw that it can be useful to include the construct programming styles in the theories and studies concerning personality and programming performance. Yet, our study alone is not enough to make conclusive statements about those relationships. We only found first indicators to support the theory of Cox and Fisher.

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