

COMMENTARY TO HABILITATION THESIS

PhDr. Martin Jelínek, Ph.D.

The presented habilitation thesis represents an annotated set of published studies generally focused on various approaches to psychological testing, such as item response theory, adaptive testing, innovative approaches to measuring specific capabilities or advanced statistical data processing techniques. The set of studies is thematically divided into two primary areas - methods and procedures used in personality assessment and methods and procedures in cognitive performance testing. In the case of personality assessment, research efforts aimed at the adaptation of widely used personality questionnaires grounded in the Big Five theory framework. Study A was focused on estimation of psychometric properties of the Czech version of the NEO-PI-3. The results of the study provided comprehensive evidence that the Czech adaption did not alter factorial structure and internal consistency at the level of basic dimensions and also dimensional facets. I contributed mainly by performing confirmatory factor analysis of the instrument and factor congruence analysis, which enabled direct comparison with the American normative structure, writing the Results section and resolving methodologically related peer review points raised. Study B, which was also focused on the Big Five theory, brought highly demanded Czech standardization of BFI-44, since this instrument represents one of the world-wide most used personality questionnaires. The study features extensive sample size of more than 6000 participants. Since data were gathered from separate projects, my contribution consisted of data curation and performing statistical analyses, which were focused on factorial structure and temporal stability. Part of the study was devoted to highly discussed shortened version of the inventory BFI-10. Within the Results section, I described the ability of BFI-10 to represent the information from the full version. In the Discussion section, we discussed pros and cons of both versions of the scale. In addition to the adaptation studies, the theoretical knowledge base in the field of measurement was enriched by studies exploring the possibilities of adaptive testing of personality characteristics, applying mathematical modelling to response strategies, as well as study proposing new statistical procedures for assessing the accuracy of measuring stereotypes in intercultural psychology. In Study C we explored the possibilities of adaptive administration of personality test with polytomous items. It was found that adaptive administration successfully and more effectively reconstructs the level of measured traits in comparison with full scale administration. In this study we also used software CATo (which I and my

colleagues developed) for adaptive administration. My role was in planning the methodological design of the study and also in resolving mathematical-statistical problems with IRT parameters estimation. Study D aimed at the problem of careless or inconsistent responding in personality inventories. We utilized IRT framework for detecting aberrant responding and compared two aberrancy performance indices (z_3 , F_2). Similarly, as in case of the previous study, I designed the study conceptualization and performed statistical calculations. Regarding Study E, I was part of an international research team, which aimed at comparison of different methodological approaches to measurement the accuracy of national stereotypes. I cooperated on the application of newly developed statistical procedure for determining national stereotype accuracy that overcomes limitations of previous studies.

In the area of cognitive performance testing, three studies were devoted to spatial ability testing. In Study F we utilized previous experiences with equivalency studies (computer vs. standard paper/pencil administration comparisons) and incorporated the equivalency issue into the process of psychometric evaluation of originally developed instrument for testing spatial ability. On top of that I executed formal statistical analyses (structural equation modelling and general linear models). Study G suggested novel, innovative item principles utilizing the advances of modern information technology. I collaborated on designing individual test items and conceptualization of the study. I organized research activities and supervised writing and editing of the article. I was also responsible for statistical analyses (moderation and regression analysis). The goal of the Study H was to identify groups of respondents which differ in the probability of successful solving individual items comprising test of spatial abilities. In general, the study was focused on long-lasting debate regarding engaging verbal-analytical or visual-analogue processes in solving spatial ability test items. My contribution to this study was mainly in suggesting and implementing latent class analysis approach in the data analysis process. Study I connects measuring cognitive abilities from the beginnings of scientific psychology to the present and focuses on the equivalence of measurement in the historical context. Apart from contributing in writing and editing of the article, I specifically employed linear mixed model analysis with Maximum Likelihood Estimation method to be able to adequately capture the time factor in tachistoscope measurement. Our findings clearly suggest, that tachistoscopic measurements are systematically biased by type of instrument used in particular research project.

| | STUDY | | | | | | | | |
|--|-------|-----|----|----|----|----|----|----|----|
| | A | B | C | D | E | F | G | H | I |
| Conceptualization and supervision | 30 | 30 | 70 | 80 | 5 | 40 | 60 | 80 | 20 |
| Data curation | 60 | 50 | 80 | 50 | 70 | 50 | 75 | 60 | 50 |
| Formal analysis | 90 | 100 | 90 | 80 | 30 | 50 | 90 | 90 | 90 |
| Methodology | 60 | 60 | 70 | 60 | 10 | 50 | 70 | 60 | 50 |
| Supervision | 30 | 30 | 60 | 70 | 5 | 40 | 70 | 70 | 30 |
| Writing and editing | 40 | 30 | 50 | 60 | 10 | 30 | 60 | 70 | 40 |
| Project administration | 20 | 5 | 40 | 40 | 0 | 20 | 50 | 0 | 20 |

Note. The contribution to the study is expressed in percentages.

- STUDY A Hřebíčková, M., & Jelínek, M. (2019). NEO osobnostní inventář 3: Základní psychometrické charakteristiky české verze NEO-PI-3. *Československá psychologie*, 63(2), 160-176.
- STUDY B Hřebíčková, M., Jelínek, M., Blatný, M., Brom, C., Burešová, I., Graf, S., ... Zábrodská, K. (2016). Big Five Inventory: Základní psychometrické charakteristiky české verze BFI-44 a BFI-10. *Československá psychologie*, 60(6), 567–583.
- STUDY C Jelínek, M., Květon, P., & Vobořil, D. (2011). Adaptivní administrace NEO PI-R: Výhody a omezení. *Československá psychologie*, 55(1), 69–81.
- STUDY D Jelínek, M., Květon, P., & Vobořil, D. (2010). Assessment of response pattern aberrancy in Eysenck Personality Inventory. *Annales Psychologici*, 58(14), 37–46.
- STUDY E Hřebíčková, M., Möttus, R., Graf, S., Jelínek, M., & Realo, A. (2018). How accurate are national stereotypes? A test of different methodological approaches. *European Journal of Personality*, 32(2), 87–99.
- STUDY F Květon, P., Jelínek, M., & Vobořil, D. (2014). Testing of spatial ability: Construction and evaluation of a new instrument. *Studia Psychologica*, 56(3), 233–251.

- STUDY G Jelínek, M., Květon, P., & Vobořil, D. (2015). Innovative testing of spatial ability: Interactive responding and the use of complex stimuli material. *Cognitive Processing*, 16(1), 45–55.
- STUDY H Jelínek, M., Květon, P., & Vobořil, D. (2013). Skryté aspekty v testování prostorové představivosti: Identifikace uplatňovaných stylů řešení položek. *Československá psychologie*, 57(4), 297–306.
- STUDY I Vobořil, D., Jelínek, M., & Květon, P. (2014). Experimental evaluation of tachistoscopic measurement: A step beyond Wundt's criticism. *American Journal of Psychology*, 127(2), 245–252.