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prof. Ing. Václav Bunc, CSc.
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RE: Martin Musálek, Ph.D.

Dear Prof Bunc and members of the Habilitation Committee:

Please accept my thanks once again for appointing me as one of the three reviewers of the Habilitation Thesis "Human Motorics as a Guide in Research: From Handedness to Normal Weight Obesity" prepared by PhDr. Martin Musálek.

My opinion of the thesis and of the history of research by Dr Musálek is that it represents a high level of professional competence and important scientific contributions. Over the years, Dr Musálek's research has embraced several diverse topics but always related to the underlying themes of fundamental motor skills and body composition.

There are some problems with the organization of the thesis. A general Introduction chapter is needed that explains the purpose of the thesis as a review of research ideas and productivity in support of the author's application for Habilitation. Some background about the author's academic preparation and academic employment might also help the reader to understand the Habilitation process. The Introduction should also explain to the reader the way the material is to be presented. As written, the first section on 'Laterality' begins too abruptly and it took me some time to understand the purpose and meaning of the presentation. Another concern for me is that too much information is repeated. The Methods and Results sections of the published articles are repeated in the text of the thesis. There is really no need for this repetition and the thesis could be much shorter. Lastly, the thesis could benefit from a final chapter or section with a clear conclusion of the author's academic and intellectual development since earning his PhD and the value of his research productivity.

The above comments are offered as suggestions for improvement of the presentation of the thesis. The scientific content of the thesis is strong, and I am favourably impressed by the author's research creativity and productivity.

The thesis does not present the research topics in strict chronological order, rather as themes. The first theme relates to articles published in 2015 and 2016 on laterality. These are mostly descriptive and methodological in nature and provide useful appraisals of the methods available to assess laterality of both the hands and the feet. The next theme is the association between motor skills and attention-deficit/hyperactivity disorder (ADHD) and its diagnosis. Because of the high prevalence of mild-to-moderate ADHD in many populations a sensitive and reliable test to detect its presence at early ages, when treatments may be most effective, is very important. This 2013 research is Dr Musálek's earliest in the thesis. I hope that will return to this topic and continue the research to improve such tests of detection.

I was also impressed by the development of new research technology in the studies of cerebellar dominance (2015). The section of the thesis that describes the state-of-the-knowledge of cerebellar dominance was well written. I understood that Dr Musálek's interest in cerebellar dominance is a natural progression from his work on laterality. I was disappointed, however, that this section of the thesis did not come to a clear and strong conclusion. Perhaps this is due to that fact that Dr Musálek has not published an article on the general topic of cerebellar dominance. I urge him to develop further the overview given in the thesis into a formal review article with a clear statement of his position on the importance of cerebellar dominance studies.

It seems that in the year 2017 Dr Musálek begins to focus more intensely on fundamental motor skills (FMS) and how these may be associated with sex and body composition. These themes represent his most academically mature research. The analyses of associations between percent body fat with FMS, and of normal weight obesity (NWO) with FMS, are fascinating as intellectual topics. They are also of much applied importance given the ever-increasing prevalence of overweight and obesity worldwide. The topic of NWO is, itself, of critical value.

I was a bit surprised and confused by the research on the validity of the Movement Assessment Battery for Children - 2nd Edition (MABC-2). The 2018 article on this topic finds that the MABC-2 test may not be valid for all age groups and for both sexes. This brings into question the findings of some of Dr Musálek's previous published research. I did not read a clear statement about this in the thesis. Dr Musálek needs to be a bit more self-critical and to re-assess his earlier studies using this instrument. I was left wondering if the previous findings between NWO and poor motor skills were due to a biological association or due to the problems with the MABC-2 instrument. Despite this, I was impressed that Dr Musálek questioned the validity of the instrument used in his previous work – too many researchers are not willing to self-question and re-assess their work. This is a good sign of honesty and maturity in research.

Dr Musálek's reviews of the different definitions of NWO help to explain the conflicting findings of previous research. His anthropometrically defined definition of NWO is a useful contribution to resolve the conflicts and bring some order and uniformity to the field.

I am currently writing the new edition of my book *Patterns of Human Growth* (Cambridge University Press). I am including Dr Musálek's findings reported in his 2018 article "Poor skeletal robustness on lower extremities and weak lean mass

development on upper arm and calf: Normal weight obesity in middle-school-aged children (9 to 12)” in my new edition. I have long been critical of the body mass index (BMI) as a predictor of body fatness. The findings from Dr Musálek’s research on normal weight obesity provide some of the strongest evidence to date that the BMI is a poor diagnostic tool and often results in mis-leading diagnosis of body composition.

In summary allow me to repeat my original assessment that the habilitation thesis prepared by Dr Musálek represents a high level of professional competence and important scientific contributions. Dr Musálek ranks in the top 15% of research academics at a similar stage of their career. I feel that your university is fortunate to have Dr Musálek on its staff, that you are lucky to have him as a colleague, and that he is deserving of habilitation and promotion.

Sincerely yours,

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