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Review on the habilitation thesis by Dr. Martin Takáč

Dr. Martin Takáč has submitted a cumulative habilitation thesis consisting of four publications in peer reviewed journals and two publications in peer reviewed conferences. Those publications describe several connectionist models of major aspects of language learning, such as the learning of word meanings, the learning of a language's syntax, on one hand, and models of short episodic and long term memory. Dr. Takáč is the first and corresponding author on all six publications (in one case even the sole author).

The work represented in this habilitation thesis is situated in the area of cognitive science, in general, and connectionist modeling (connectionism), in particular. Connectionism is a major method from informatics to contribute to advances in cognitive science.

Overall the thesis can be considered as research of very high quality. Not only has it been published in journals that are top in this field (with impact factors ranging from about 1.2 to around 4) and at the leading cognitive science conference world-wide, it is characterized by many important contributions to science. In the case of language, the papers cover many important areas including phonology (the role of neighborhood density in phonetic spaces in word learning), syntax (the advancement of recurrent neural networks for a more naturalistic syntactic theory) and semantics (the grounded learning of word meanings). In addition, the work on memory provides important contributions to representation in cognition.

This work by Dr. Takáč is characterized not only by its high impact, but also by thorough contributions not only in modeling but also in comparing models to empirical data and in proper methodology to statistically validate such comparisons. Altogether this firmly establishes the value of informatics in cognitive science. Among others this culminated in a publication in the journal *Cognition*, which is known to be rather averse to connectionist approaches – thus this paper constitutes a special international acknowledgement of Dr. Takáč's overall work.



One open question concerning Dr. Takáč's research work is the following:
How would learning in the model in Takacs et al. (2016) be affected if
meaning was input as distributed representations? Would there be a similar
effect of neighborhood density? Also, how does the model compare with
other models of early word meaning acquisition - does it, for instance,
exhibit a vocabulary spurt as observed in children?

The six publications contained in the habilitation thesis are complemented by
a number of further relevant papers in international conferences, as well as a
few journal and book articles, with a respectable citation history, completing
an overall impressive scientific record.

For the reasons mentioned above I want to herewith express my explicit
recommendation for promotion of the title "Docent" in informatics to Dr.
Martin Takáč.

Sincerely,


Georg Dörffner, PhD
Associate Professor