REVIEW

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on the scientific works for participation in a competition for the academic position of Professor in Professional Field 3.2 Psychology, Master's Faculty, Department of Cognitive Science and Psychology. The competition was announced in SGI

51 / 18.06.2021, with candidate Assoc. Prof. Dr. Maurice Avram Greenberg

Assoc. Prof. Dr. Maurice Greenberg is the only candidate for participation in the competition for the academic position of Professor in the professional field 3.2. Psychology , . The submitted documents meet the requirements of ZRASRB.

The candidate participates in the competition with a monograph and 26 publications, reviewed in Scopus or reviewed in foreign issues. With the provided evidence such as publications, citations, participation in the tutorship of doctoral students, graduates, project activities, etc. Assoc. Prof. Greenberg satisfies and exceeds the minimum national requirements under NACID.

The research work has been conducted over several years, as well as after the habilitation in 3 main fields, outlined in the contribution self-assessment, which is relevant to the content of the respective publications.

With regard to the first direction of development of cognitive architectures for the description of cognitive processes such as analogy: including their application for artificial agents on the Internet, new mechanisms for describing reasoning by analogy and development and implementation of prediction mechanisms based on analogy, as well as their application in cognitive robotics, a sufficient number of publications in authoritative scientific journals are presented. For example, in Greenberg, M. (2011) A cognitive approach to web-based intelligent agents: The

TRIPLE architecture. Web Intelligence and Agent Systems: An International Journal, 9 (1), 69-79 ” the whole model of the hybrid cognitive architecture TRIPLE with the connections between the individual components, the mechanisms driving the processes between the components, as well as its use for web-based agents. is presented, explained and elaborated. The goal, however, is to implement it as close as possible to the mode of action in humans. An important direction in the development of the modules of the Triple model is the emphasis on the integration of emotions and the affirmation of their importance for the more efficient course of cognitive processes.

The works on analogies and a further development of this issue in relation to the prediction mechanisms, as well as its application in cognitive robotics are within the scope and meaning of the first scientific field.

The third thematic area that has been developed in the candidate's scientific works includes empirical research in experimental economics. The publications cover experiments on decision-making in the game “Prisoner's Dilemma”.

Also, the theory of relational models of A. Fiske is presented for the first time through game theory. Experimental data suggest that assuming a relational model, both the way of playing and the level of cooperation could change. Scrutiny in this area has been unfolded in eight scientific publications.

Of particular interest is the second thematic area: Models of decision-making with reinforcement in experimental economics, in which the main contribution is established through the monograph: Greenberg, M. (2020) Social dilemmas. Cognitive perspective. It combines and summarizes many of the achievements made so far; it also includes new discoveries in the studied issues. Part One presents in detail both the already classic Game theory and the most commonly conducted experiments such as “The Prisoner's Dilemma”.

The approaches developed in the last few decades in the field of cooperation and through the terminology and tools of the Game theory are correctly presented and critically analyzed. Despite the formalized rules and variants for the solution of the Dilemma, in its numerous "play-offs" the results are not completely predictable -

the participants often find themselves in an unfavourable position and after a varying number of attempts they eventually reach cooperation and mutual gains.

Part Two of the monograph presents a variety of models in which games are tied to different expectations - they may be shared or mutual when it comes to the usefulness of the results, or the behavior of players may be determined by what characteristics they associate with the other player. There may also be a third scenario - the intentions being based on reciprocity, on the intentions between the players, and depending on what intentions are attributed, the behavioural pattern to cooperate or not, is determined. Thus, socio-psychological factors are being introduced, as the author notes in his analysis. Factors external to Game theory, and they exert their influence when determining the "usefulness of the possible outcomes of the game."

However, when talking about socio-psychological factors, it is good to keep in mind that the development of relations between players, e.g. in “The Prisoner's Dilemma”, do not go beyond it, i.e. the game situation should be seen rather as discrete unit in time and space, that ultimately expresses competition, cooperation, profit, loss, etc.

When exploring models with interdependent preferences, Assoc. Prof. Greenberg expands and enriches the analysis with more motivational, personal characteristics, altruism, meanness, as well as the socio-psychological context formed by these mutual attributions and expectations. All of this affects the expectations and the usefulness of the results of the game.

Part Three presents and comparatively analyzes a number of game models both within the “Prisoner's Dilemma” and through those based on reinforcement learning. As Greenberg points out, they are involved in the analysis of various scientific disciplines such as social psychology, behavioral economics and as an application of a connectionist approach in the games field. The variety of possible strategies, expected results and the complexity of programming possible outcomes, as well as the different contexts lead to the adoption of social models primarily as cognitive models. It is assumed that this will facilitate the prediction of experimental results in

which participants make their decisions. Ultimately, the author's theoretical and experimental experience lead him to a logical conclusion and the elaboration of an innovative approach, namely to study social interactions "founded upon simulations based on multi-agent systems that model not only the actions of the individual agent in a given situation, but also a series of interactions in societies of artificial agents." The type and structure of these interactions are modeled through games that correspond to real social interactions" (p.172)

Part Four of Maurice Greenberg's monograph presents the method of agent-based modeling with reinforcement learning, as well as a multi-agent model that experimentally proves how collaboration appears. The effects of Simpson's paradox are also presented for the first time by the author. This part demonstrates how more relevant matches of simulated situations are achieved, how and with what strategies sustainable cooperation is achieved, etc.

In general, it can be stated that different models of decision making in an interdisciplinary perspective and from a cognitive point of view in different social dilemmas are analyzed, the content of which attracts contextual knowledge from sciences such as economics, experimental economics, social psychology, cognitive psychology.

In a widely open real phenomenology of the implementation of cooperation in society at different levels - micro to macro societal level - the author takes a serious challenge to seek the dominance of social cooperation over selfishness and competition, through the specific principles and essence of Game theory. More precisely, through games with mixed motivation such as “The Prisoner's Dilemma”, “Game of Deer Hunting”, “Leader”, “Ultimatum game”, “Public Good game” and others.

Despite reservations that may arise in the field of research in social psychology about the possibility of relevant transfer of the principles of games to real social dilemmas and situations, it must be acknowledged that M. Greenberg succeeds to present convincingly the prospects for such transfer. It is important that the author works with elements derived from behavioral economics, social psychology,

cognitive science. At the same time, the experimental verification of game models has been brought to perfection over the years of research experience. Here the good tradition of the research team with which Assoc. Prof. Greenberg works should be acknowledged.

After all, the important and focal point is to what extent the simulated situation, the gaming context, the introduced models (regardless of whether in an experimental, digital manner etc.) can be recreated, performed in order to influence real life social dilemmas and conflict situations. If models and experimental game settings can provide a solution of how to put collaboration to the front of social interaction, then this approach would be highly important for finding solutions within real competitive-cooperative alternatives.

With a high degree of positivity is the fact that the work is focused on social dilemmas, and not just on the dilemmas and situations in which individuals find themselves, individuals in their daily lives. The monograph focuses on models based on reinforcement learning, which are sought through cognitive features - assessment processes, decision-making based on comparison of alternatives and others. It really requires both research courage and high competence in the field of game theories, experimental work, the combination of aspects from different scientific fields. Moreover, through principles of a rather economic theory such as Game Theory are being sought solutions that lead to the predominance of cooperation and collaboration between "players". In fact, Greenberg proves the strong enough arguments from various authors about the "need to unite a game theory and models in behavioral sciences" (p. 28). The monographic work of Assoc. Prof. Greenberg is indeed the first of its kind in the field of interdisciplinary, complex elaboration of a theory of games and especially of the “Prisoner's Dilemma”, with innovatively developed new models and experimental situations.

In connection with the professional development, teaching and leadership of Assoc. Prof. Dr. Maurice Greenberg: after being an Assoc. Prof. in Physics and Cognitive science (2000-2010), at New Bulgarian University, Department of Cognitive Science and Psychology, Research Center for Cognitive Science, since 2010 he is

Associate Professor in Physical Sciences at the Department of Cognitive Science and Psychology, Research Center for Cognitive Science, New Bulgarian University. He leads courses both in the Master's program in Cognitive Science and in the Bachelor's program in Psychology. He has held various management positions over the years, such as: Director of the Laboratory of Artificial Cognitive Systems at the Department of Cognitive Science and Psychology HiLab at the Department of Cognitive Science and Psychology, Director of the research bachelor's program for outstanding students for qualification in scientific research, director of the master's program in cognitive science, etc.

The report on the contributions of the scientific works of Assoc. Prof. Maurice Greenberg fully corresponds to the real achievements reflected in the publications included in the competition procedure. The citations in refereed and indexed editions have an impressive number – over 60.

In conclusion, on the basis of the presented scientific papers, as well as according to the proven professional achievements, teaching, implemented projects, program management, etc., I strongly suggest to the esteemed Scientific Jury to award the academic position of "Professor" to Assoc. Prof. Dr. Maurice Greenberg.

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