Evaluating Semantic CoCreation in Cognitive Representation Models

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To date the functional scope of applications in artificial intelligence is severely restricted. One reason is that the meaning of symbols isn't understood successfully by software agents [1]. Therefore, symbolic and subsymbolic representations alone do not provide a comprehensive picture of the required semantic relations. For this purpose, the integration of both representation levels is intended and an intermediate representation layer on concepts is included [2][3][10]. The aim of this work is to compare three existing cognitive representation models with different but complementary approaches to formalize this kind of concept integration. Kelly's Personal Construct tries to anticipate future events [4]. The planned nature of this anticipation determines how you draw a distinction of instances. For modelling fuzziness inherently the Linguistic Variable by Zadeh as a second approach attempts to deduce conceptualization directly from natural language [5]. The Conceptual Space by Gärdenfors is based on analyzing structure similarities of concepts in a geometrical manner [2]. These three approaches complement one another given that Personal Constructs explicate arbitrary distinctions, Linguistic Variable takes fuzziness into account and Conceptual Space is able to model concept relations. Despite this, each type of concept representation claims to be the only one with universal validity. By using an universal valid conceptual representation it can be expected that Semantic CoCreation takes place [6]. The conceptualization should be able to deduce a searched inference independent of the chosen reasoning-technique, because the concept meaning was co-created interpersonally. So the question is, how suitable is a specific way of concept representation to co-create concept semantic between several people? To answer this question, we have the ability to provide a basis to decide whether an integration of these three compared representation models is appropriate. In our opinion, none of these conceptual representation (in itself) is able to effectively co-create semantics irrespective of the chosen reasoning-task. To evaluate this hypothesis we use a simple language game between two players within an identification task. One player has to guess and another to assist them. The guessing player must guess the missing constructs within a sentence structure which is an inference [8]. To achieve this, the guessing player is getting hints from the assistent player based on other inferences. The fewer hints the guessing player requires to guess the inference, the more points are achieved in this round of the game. Every conceptual representation type is evaluated by the guessing player and the assistent player in several rounds. In each round the performance of conceptualization is measured by the characteristics of the gaming behaviour. These where measured by the amount of hints used to guess the inference, the conceptual distances between the constructs and the needed time for task completion. The empirical research design is implemented with a

customized questionary software tool. Every representation form is described by using its own geometrical context i. e. BiPlot or Conceptual Space [7] [9].

Keywords: Semantic CoCreation, Personal Construct, Conceptual Space, Linguistic Variables, Language Games, Conceptual Representation Models

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