Report on the outcomes of a Short-Term Scientific Mission[1]

Action number: CA19102

Grantee name: Amelie Sophie Robrecht

Details of the STSM

Title: How Memory Cues Prevent Decay of Established Knowledge within Dialog Interactions

Start and end date: 09/10/2023 to 27/10/2023

Description of the work carried out during the STSM

The aim of this STSM was to gather insights on how explanation cues can improve the direct understanding and prevent forgetting in a verbal explanation. For the STSM, my colleague Lina Mavrina and I (*Social Cognitive Systems Group,* Bielefeld University) visited the *DI_Lab* (TU Delft, Catharine Oertel and her PhD students Morita Tarvirdians and Deborah van Sinttruije) for three weeks. We started the Scientific Mission with a lot of literature review. While I focussed on memory and forgetting[2], Lina concentrated on generation and testing effects[3]. Together, we did research on the four cues we wanted to use in our study: Repetition, Saliency, Generation and Values[4]. This theoretical knowledge in mind, we created two instruments to measure objective understanding and edited the study design slightly, to be able to capture testing effects. By the end of our first week, we finished the explanation text and published a pre-study. 40 participants were listening to a verbal explanation on Large Language Models (LLMs) and answered one of the understanding instruments (20 participants per instrument) along with value scenarios, which our colleagues from Delft designed. After evaluating the pre-study, we combined the test items that performed well to one unified understanding questionnaire containing knowledge and transfer items on different information. Next, we discussed our results and worked out the final study design with a larger group of people. Based on that feedback, we preregistered our study on OSF[5] before we started the data collection of the

[2] Ebbinghaus, H. (1885). Memory: A Contribution to Experimental Psychology. Teachers College, Columbia University, New York., Murre, J. M. J. and Dros, J. (2015). Replication and Analysis of Ebbinghaus' Forgetting Curve. PLOS ONE, 10(7):e0120644.

[3] Delaney, P. F., Verkoeijen, P. P. J. L., & Spirgel, A. (2010). Spacing and Testing Effects: A Deeply Critical, Lengthy, and At Times Discursive Review of the Literature. In *Psychology of Learning and Motivation* (Vol. 53, pp. 63–147). Elsevier. https://doi.org/10.1016/S0079-7421(10)53003-2

[4] Van Lancker Sidtis, D. and Wolf, R. (2015). Pragmatic verbal repetition: review and application of a new method of quantification. Text & Talk, 35(2), Constant, M. and Liesefeld, H. R. (2021). Massive Effects of Saliency on Information Processing in Visual Working Memory.

[5] https://osf.io/akz4c

main study. In the study, we measure understanding (directly after the explanation) and recall (after 7 days), which is why we will not finish the whole data collection within our stay. It will be completed within November.

Our STSM is slightly different from others, as Lina and I work together very close. Nevertheless, we are interested in different questions and worked on slightly different parts of the analysis and design. I am mainly focussed on the understanding, which is received directly after the explanation. I invented the understanding instruments and did the evaluation of the pre-study as well as the data preprocessing for the main data collection. Lina was rather working on setting up server and website for the online study.

Apart from the time we spent working on our study, we also gained great insights into how research works at other universities. We had the chance to watch a PhD defence, visit the DI_Labs colloquium and participate in a meeting on social AI. These insights were very interesting and helpful for further carrier planning and possible future collaborations.

Description of the STSM main achievements and planned follow-up activities

In our proposal we promised three things: A model of the interaction partner's knowledge decay over time in interactions, guidelines on how to create instruments to measure knowledge decay in empirical studies and empirical results on how memory cues prevent such a decay. We knew we would not be able to reach all these goals within three weeks. Nevertheless, we started working on all the tasks while mainly focusing on guidelines and results, as the model needs us to have the final data analysis. We plan to publish our results in a paper. Currently we discuss whether a larger journal paper combining all the outcomes or multiple conference papers match the results better. We plan to hand in this publication in the beginning of 2024.

We mainly considered our work to be associated with working group 8 (language variation, pragmatics and interaction) in the proposal. By including values as a fourth cue, our results might also be interesting for working group 6 (ideologies, beliefs, attitudes).

Our output even estimated our expectations. We did the literature research, study design, pre-study and a large part of the data collection. We were also able to prepare the data preprocessing and analysis scripts and had first insights into the highly promising results. We see this STSM as a start of a great collaboration, with a corporate publication in the beginning of 2024 as a short-term goal, but with a couple of follow-up studies in long-term perspective.

Something that was interesting and important for me was that this STSM was the first time working in a women-only computer science team. In conclusion I had three very challenging, but also productive and interesting weeks. I would highly recommend everyone to apply for an STSM.