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Exploring Data Agency and Autonomous Agents as Embodied Data Visualizations

Problem Definition

Data visualizations are becoming more **experienceable through both touch and interaction** [1,2]. Simultaneously, researchers are investigating applications for autonomous **agents that collect, transform and display data**. However, no prior research has investigated how data representations might affect the user's perception and interaction due to agency. We encourage the research community to look at the **Data-Agent Interplay** and **Data Agency** based on two reasons:

1. First, it is necessary to investigate potential interaction effects and perceptual changes due to the fact that **data is embodied and visualized through an agent**.
2. Second, agency is defined by an increase in **interactivity, autonomy, and adaptability** [3]. Data visualizations that achieve, match and support those criteria might be perceived as an agent itself.

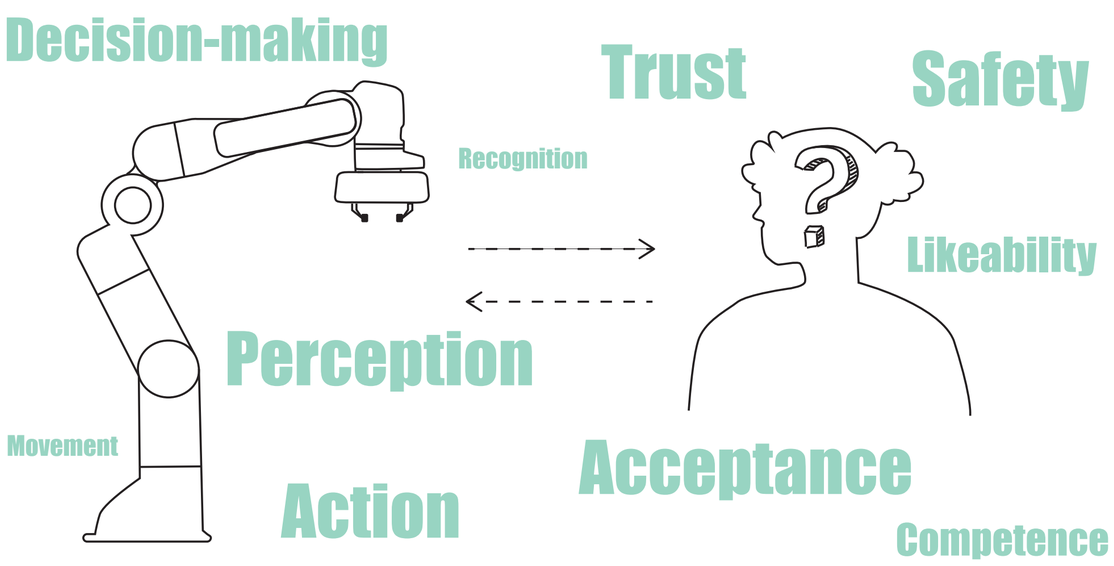
Data Agency

Data Agency describes a phenomena that occurs when humans perceive **data representations as physical or virtual agents due to their increasing interactivity, autonomy, and adaptability**.

Data Agent Interplay

Data-Agent Interplay describes potential **interaction effects or perceptual changes** based on the fact that **data is visualized and represented through an agent's behaviour**.

user experience · data visualization · information visualization · theory · human-robot interaction · agency



Robot as the Embodied Interactive Agent

Contrary to data physicalizations, robots are perceived as agents as a consequence of their autonomy, interactivity and adaptability [3]. Further, a **robot's appearance, motion or behaviour affects the user's likeability, acceptance, trust and whether or not users perceive a robot as intelligent** [4]. If data is being mapped onto a robot's parameter and conveyed through a robot ...

? How does its agency affect the interaction and user's perception towards the conveyed data?

[1] Y. Jansen and P. Dragicevic. An interaction model for visualizations beyond the desktop. IEEE Transactions on Visualization and Computer Graphics, 19(12):2396–2405, 2013. doi: 10.1109/TVCG.2013.134
[2] K. A. Satriadi, J. Smiley, B. Ens, M. Cordeil, T. Czauderna, B. Lee, Y. Yang, T. Dwyer, and B. Jenny. Tangible globes for data visualisation in augmented reality. In Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems, CHI '22. Association for Computing Machinery, New York, NY, USA, 2022. doi: 10.1145/ 3491102.3517715
[3] R.B. Jackson and T. Williams. A theory of social agency for human-robot interaction. Frontiers in Robotics and AI, 8, 2021. doi: 10. 3389/frobt.2021.687726
[4] E. Roesler, D. Manzey, and L. Onnasch. A meta-analysis on the effectiveness of anthropomorphism in human-robot interaction. Science Robotics, 6(58):eabj5425, 2021. doi: 10.1126/scirobotics.abj5425