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Appendix: Content Summaries of Selected Best Papers for the IMIA Yearbook 2022, Section Human Factors and Organizational Issues

de Melo CM, Gratch J, Krueger F

Heuristic thinking and altruism toward machines in people impacted by COVID-19

iScience 2021 Mar 19;24(3):102228

The authors conducted a study of how human interaction with machines needs to be studied, given the advent of intelligent systems in everyday life (such as autonomous vehicles) and how COVID-19 experiences shape human altruistic responses to machines. The authors correctly claim that more study of how humans can collaborate, and their attitudes and behavior toward machines differs from social norms with humans. They make use of the 'Computers as Social Actors' theory of Reeves and Nass (1996), which was influential in human computer and robot interaction research. It argues that people heuristically treat machines like people, and that encouraging intuitive thinking, in contrast to deliberation, led to increased cooperation in non-strategic settings. The authors are the first to apply and test this with concrete cognitive studies. The dictator game is used to measure altruism; the user has options to give tokens to another user (in this case the computer or a 'human' (both delivered by computer message to obscure the source). 186 participants were used as senders, across 40 US states, and provided a diverse sample. They were administered the abbreviated Post-Traumatic Stress Disorder (PTSD) checklist (to measure COVID-19 impact), and three subjective scales to gain insight on mechanisms. These were the Cognitive Reflection test to measure if those impacted engage in reduced reflection, i.e., more intuitive thinking, the Faith in Technology scale, and the Moral Foundations Questionnaire. Results showed a reduction in the usual bias against fairness toward machines the more the user had been impacted by COVID-19. There were also sharp increases in intuitive (and incorrect) thinking and faith in technology among the most highly affected group. The authors through multiple mediation analysis showed that faith in technology and heuristic thinking mediate the offer bias. They also caution that in times of stress the disproportional impact of COVID-19 on vulnerable groups leads to the need for ethical guidelines and regulations to ensure altruism/cooperation shown to machines is well deserved. They also point out the factors such as individual stress propensity, education level, and socioeconomic status could make individuals susceptible to heuristic thinking, and other social norms such as reciprocity, trust and fairness may also shape collaboration with machines.

Osiński D, Łukowska M, Hjelme DR, Wierzchoń M

Colorophone 2.0: A wearable color sonification device generating live stereo-soundscapes-design, implementation, and usability audit

Sensors (Basel) 2021 Nov 5;21(21):7351

The authors observe that while many sensory deficits have been addressed, little has been done to mitigate the colorless world of the blind and embarked on the design of a system that gives sound to color and creates a stereophonic soundscape to convey the symphony of color that sighted people take for granted. Sonification originates from attempts to transform data to sound, much as visualization methods turn data into images.

Thayer JG, Ferro DF, Miller JM, Karavite D, Grundmeier RW, Utidjian L, Zorc JJ

Human-centered development of an electronic health record-embedded, interactive information visualization in the emergency department using fast healthcare interoperability resources

J Am Med Inform Assoc. 2021 Jul 14;28(7):1401-1410

This paper is an exemplary exposition of a project to integrate and visualize urgently needed patient information for a pediatric emergency department. The project reported here began with an observation by the lead informatics physician: the complexity of screen navigation involved in collecting all the vital information needed by a clinician to treat an acute asthma exacerbation made the process very cumbersome and time consuming. Notwithstanding the immediate team's understanding of the problem, they did the right thing and stepped back to assess whether this was—and precisely what was—a problem for the users of the system. They framed this as a problem for human-centered design, i.e., prioritization of the users' needs over other considerations. Clearly, good design, development, and implementation were paid full attention at the right time. The approach entailed observation of the emergency clinicians' workflow and inclusive semi-structured interviews with every role and grade represented. This aimed to ensure that real needs could be translated into system requirements that would fit in with, rather than force changes to, the natural process of information gathering and patient assessment. It was established that the focus had to be high- and rising-risk patients and that encapsulating the patient's history visually would be the most effective way to deal with the implied information burden. A staged development process through cognitive task analysis, design, prototype evaluation, intervention development, and post-implementation continuing feedback, ensured a smooth transition from concept to reality. Within each of these stages additional work was identified and built into the program. For example, in intervention development, the team had to take account of features yet to be delivered by the electronic health record (EHR) vendor and, concurrently, the evolving specification of Fast Healthcare Interoperability Resources (FHIR, an emerging interoperability standard), leading finally to a contribution adopted by the SMART framework. Evidence from post-implementation surveys of emergency clinicians indicates broad acceptance and adoption of the new visualization app.

Sridharan S, Peters C, Newcombe S, Jephson C, Robinson R, Mulder B, Houghton W, Visram S, Sebire NJ

The essence of healthcare records:

embedded electronic health record system microblogging functionality for patient care narrative

Future Healthc J 2021 Nov;8(3):e709-e713

This paper is a description of a "microblogging" system designed for rapid summary communication between clinicians to reduce EHR burden. Great Ormond Street Hospital for Children in London is the premier tertiary pediatric hospital in the UK. A senior team at the hospital promoted a parallel development to the EHR in the form of the "Essence" microblogging application. Based on a maximum length of 156 characters, the platform constrains the user and encourages brevity and succinct expression. These brief summaries are highly effective in conveying the essence of the patient's condition. Indeed, it is observed that a "stack' of microblogs over time or across disciplines provides an excellent picture of the patient's journey. Intriguingly, development of the microblogging app took place at the same time as the hospital's major EHR rollout—a counterintuitive concept in most settings. The development and meshing process are not described in detail, but there is ample evidence of the effectiveness of the solution. In a year, over 90,000 Essence notes were filed across 49 specialties, with cardiology and neurosurgery ahead of pediatric intensive care in volume. Nursing staff entered more and longer notes (56% of the total, with median length of 14 words vs. 12 for physicians). Physicians tend to mention diagnoses while nurses mainly note procedures—a glimpse of hospital anthropology, perhaps.