Design and Synthesis of Personalities

Special track along with 14th International Conference on Advances in Human-oriented and Personalized Mechanisms, Technologies, and Services, CENTRIC 2021, October 3 – 7, 2021 in Barcelona, Spain, and Online

Jeff Stanley
The MITRE Corporation
McLean, VA, USA
e-mail: jstanley@mitre.org

***Abstract*—This paper summarizes six presentations, including two paper submissions, in the special track "Design and Synthesis of Personalities". This special track has shed light on different ways MITRE has incorporated elements of personality into human-machine interaction research, and it has showcased perspectives from other organizations as well. The paper explores major open questions for personality synthesis – such as how to decide on the "right" personality, how to express that personality, and what guidance is needed for personality development – as approached by these six presenters.**

Keywords-personality computing; personality synthesis; chatbots; conversational user interfaces; digital assistants; virtual humans; serious games; human-machine interaction; human machine teaming.

I. INTRODUCTION

Personality can be thought of as patterns in behavior that are somewhat consistent within an individual and distinctive from other individuals [1][2]. By this definition, personality is an important design consideration for machines, because it affords human users a way to recognize them and anticipate their behavior.

In their survey of personality computing, Vinciarelli and Mohammadi [3] defined personality synthesis as the generation of artificial cues by a machine such that a human will attribute particular personality characteristics to it. A machine's voice and facial appearance, for example, are artificial cues that help to synthesize personality. Even non-anthropomorphic attributes such as amount of exposed hardware affect perceived personality [4]. These cues trigger human mental models to lead users to expect certain sorts of behavior.

When synthesizing personality for a use case, two questions are especially relevant: What is the best personality for the use case, and what are the appropriate cues to convey the personality?

Synthetic personality cues impact not only human expectations but also human attitudes and behavior. A large body of research indicates that humans instinctively react to these cues as they would to other humans, a paradigm known as Computers Are Social Actors [5]. Computers that fail to observe human norms of politeness cause offense [6], and computers that speak with empathy improve human mood [7]. There is a currently a gap in guidance to ensure positive emotional and psychological impact and minimize risk.

Applications that incorporate personality into their language, behavior, and appearance are nothing new [8]. However, recent developments highlight the need for research and guidance on personality synthesis, such as the growing popularity of chatbots and voice assistants [9], increasing investment in telehealth technology [10], deployment of robot helpers and companions for an aging population [11], and demand for effective human-machine interfaces in autonomous vehicles [12]. As a not-for-profit organization operating several federally funded research and development centers for the United States Government, MITRE has the opportunity to approach this cross-domain need from multiple angles.

II. SUBMISSIONS

The first presenter comes from outside MITRE. "AI Digital Workforce: Principles for Successful Adoption and Scalability" by Rinker [13] provides an industry perspective on the demand signal and trends for personality synthesis in the commercial space, broadening our discourse beyond MITRE's government and research-oriented work program. The PRSONAS product line consists of digital personalities that serve as receptionists, guides, brand ambassadors, and product specialists. Digital employees ideally free up humans for more creative and interesting tasks. This presentation introduces a key insight: Synthetic personalities need not (and should not) mimic humans; rather, they should focus on communicating information and social cues appropriate to their purpose.

The second presentation is of a paper by Strickland and Stanley [14]. Written from the perspective of accessibility and inclusive design, this paper illuminates novel challenges that must be overcome for synthetic personalities to offer good experiences to all people. Current digital accessibility guidelines focus on making interfaces easy to understand and navigate for people with various physiological, cognitive, and situational impairments. Applications with personality add a layer of complexity, as not all personalities are

agreeable to all people. Designers must take into account the likely range of expectations, dispositions, moods, and cultural affiliations of their users. Conducting studies with representative users and allowing user choice and customization are critical to achieving this goal.

Third is a presentation of a paper by Friedman et al. [15] closely examining six social cues and how they can be used to reveal or implicitly communicate the internal state of an artificial agent. For instance, a fast speech tempo is associated with urgency and can indicate that the agent perceives time pressure. Meanwhile, a slow speech tempo conveys low confidence in what is being said. This paper demonstrates that, in addition to social engagement, personality-related cues can have an informational purpose. When applied appropriately they convey important information seamlessly.

The presentation by Miller [16] continues the discussion of how to select and implement personality cues, diving deeply into language and speech. Dialoguing with themes from previous presentations, this presentation considers various aspects of voice and language style, including gender, culture, regional style, prosody, and degree of humanness. Computers can take advantage of conversational dynamics to express and negotiate their relationship to conversational partners, just as humans do. These speech characteristics are a product of underlying models, which means that personality design is not just for content developers; it affects technical requirements.

The first of two applied use cases, Elson's presentation [17] describes Now We're Talking, a serious game by which active service members and veterans can practice conversation skills to maintain healthy relationships. Based on established theory and research, the game supports one-on-one conversations with an artificial partner. The partner simulates varying levels of emotional intelligence – awareness of and control over emotions. In turn, the user must exercise emotional intelligence to keep the conversation on the right track. The partner's attitude is conveyed by wording of content, facial expression, and "stage directions" accompanying the text.

The final presentation by Horinek and McDermott [18] describes the ACQ-SYNC | JumpStart App for acquisitions professionals and its digital assistant PEG (Policy Education and Guidance). Traits and guiding principles such as "classy" and "not antagonize" lend a consistent style to PEG's content and imagery. At the same time, the app offers three different PEGs with different priorities – Speedy PEG, Innovative PEG, and Avoid Replanning PEG – that may make different and conflicting recommendations. Because it illustrates multiple versions of a digital assistant, this presentation especially encourages critical thinking about what makes a synthetic personality consistent and distinctive.

III. Conclusions

The presentations in this track offer helpful examples and contribute to our understanding of key questions regarding the design and synthesis of personalities.

These presentations explore a wide range of cues for expressing personalities, including voice, text, language style, gesture, imagery, and more. These cues have not only a social purpose but an informational purpose as well, impacting human-machine interaction performance in multiple ways.

As for choosing a personality, the use cases in this track illustrate methodologies and guiding principles. Empathy, emotional intelligence, and trustworthiness seem to be broadly desirable synthetic personality traits. At the same time, personalities are made for a purpose, and low emotional intelligence can make sense in the right context, such as a challenging training environment.

These presentations also remind us to look not just at the use case but at the user, as different users have different expectations, preferences, and sensitivities. Technology that fails its use case is simply a lesson learned; technology that has negative impacts on its users is an ethical dilemma.

Personality synthesis continues to grow in popularity. Future research will need to earnestly examine how to produce personalities that are effective, engaging, and safe for consumers.

Acknowledgment

I would like to thank the authors and presenters for taking the time to develop and share the materials for this track, the paper reviewers for their thoughtful comments that improved the content, and the conference organizers for their encouragement, flexibility, appreciation, and patience. To everyone believing in this topic and track, putting in the hard work to make it a reality, I thank you.

References

[1] J. M. Doris, "Character and Consistency," in Lack of Character: Personality and Moral Behavior, J. M. Doris, Ed. Cambridge: Cambridge University Press, pp. 15–27, 2002, doi: 10.1017/CBO9781139878364.003.

[2] O. John, L. P. Naumann, and C. Soto, "Paradigm shift to the integrative Big Five trait taxonomy: History, measurement, and conceptual issues.," in Handbook of personality: Theory and research, O. P. John, R. W. Robins, and L. A. Pervin, Eds. New York: Guilford Press, pp. 114-158, 2008.

[3] A. Vinciarelli and G. Mohammadi, "A Survey of Personality Computing," IEEE Transactions on Affective Computing, vol. 5, no. 3, pp. 273–291, Jul. 2014, doi: 10.1109/TAFFC.2014.2330816.

[4] S. Kiesler and J. Goetz, "Mental models of robotic assistants," in CHI '02 Extended Abstracts on Human Factors in Computing Systems, New York: ACM, pp. 576–577, Apr. 2002, doi: 10.1145/506443.506491.

[5] C. Nass, J. Steuer, and E. R. Tauber, "Computers Are Social Actors," Proc. ACM Special Interest Group on Computer-

Human Interaction Conference on Human Factors in Computing Systems (SIGCHI '94), New York: ACM, 1994, pp. 72–78, doi: 10.1145/191666.191703.

[6] B. Reeves and C. Nass, The Media Equation, Chicago: University of Chicago Press, p. 29, 1996.

[7] M. de Gennaro, E. G. Krumhuber, and G. Lucas, "Effectiveness of an Empathic Chatbot in Combating Adverse Effects of Social Exclusion on Mood," Front Psychol, vol. 10, p. 3061, Jan. 2020, doi: 10.3389/fpsyg.2019.03061.

[8] J. Weizenbaum, "ELIZA -- a computer program for the study of natural language communication between man and machine," Commun. ACM, vol. 9, no. 1, pp. 36–45, Jan. 1966, doi: 10.1145/365153.365168.

[9] D. Zaboj, "Key Chatbot Statistics You Should Follow in 2021," ChatBot, May 06, 2020. https://www.chatbot.com/blog/chatbot-statistics/ (accessed Oct. 01, 2021).

[10] Fact Sheet: VA Telehealth Services, Washington, D.C.: Department of Veterans Affairs Office of Public Affairs Media Relations, March 10, 2017. https://www.va.gov/communitycare/docs/news/VA_telehealth_services.pdf (accessed Oct. 01, 2021).

[11] M. Foster, "Aging Japan: Robots may have role in future of elder care," Reuters, Mar. 28, 2018. Accessed: Mar. 09, 2021. [Online]. Available: https://www.reuters.com/article/us-japan-ageing-robots-widerimage-idUSKBN1H33AB.

[12] A. Waytz, J. Heafner, and N. Epley, "The mind in the machine: Anthropomorphism increases trust in an autonomous vehicle," Journal of Experimental Social Psychology, vol. 52, pp. 113–117, May 2014, doi: 10.1016/j.jesp.2014.01.005.

[13] C. Rinker, "AI Digital Workforce: Principles for Successful Adoption and Scalability", in Special Track: Design and Synthesis of Personalities, along with CENTRIC 2021, IARIA XPS Press, 2021.

[14] J. Strickland and J. Stanley, "Inclusive Personalities for Conversational User Interfaces", in Special Track: Design and Synthesis of Personalities, along with CENTRIC 2021, IARIA XPS Press, 2021.

[15] N. Friedman, P. L. McDermott, and J. Stanley, "Supporting Observability through Social Cues", in Special Track: Design and Synthesis of Personalities, along with CENTRIC 2021, IARIA XPS Press, 2021.

[16] C. Miller, "Linguistic and Speech Technological Ramifications of Personality", in Special Track: Design and Synthesis of Personalities, along with CENTRIC 2021, IARIA XPS Press, 2021.

[17] S. B. Elson, "Personality Design for a Serious Game to Promote Emotional Intelligence", in Special Track: Design and Synthesis of Personalities, along with CENTRIC 2021, IARIA XPS Press, 2021.

[18] K. Horinek and P. L. McDermott, "ACQ-SYNC | JumpStart: Building A Digital Assistant You Want to Work With", in Special Track: Design and Synthesis of Personalities, along with CENTRIC 2021, IARIA XPS Press, 2021.