

The Smiling Chatbot:

Investigating Emotional Contagion in Human-Chatbot Interactions

Abstract

Submitted by

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Abstract

Recent advances in modern computing technologies substantially improved the power and versatility of artificial intelligence (AI) applications. As a consequence, AI is increasingly used in business operations and is taking over many tasks that previously have been handled by human employees. In this respect, the service sector is no exception. Here, AI is most-frequently employed in the form of chatbots that are used to communicate with customers. The increasing relevance becomes obvious by taking a look at the number of chatbots being used on Facebook Messenger. The number grew from 34,000 in 2017 (Schneider, 2017) to more than 300,000 one year later in 2018 (Boiteux, 2019). With this development the way service tasks are being performed is to change tremendously (Huang and Rust, 2018).

Although AI is becoming increasingly capable in understanding and communicating with humans, the question arises whether it can equivalently replace human employees in all aspects of service encounters. Particularly, it is frequently argued that AI (due to its lack of being able to experience emotions as a biological reaction) is not capable of meeting emotional aspects of service encounters (Huang and Rust, 2018). Research has shown that positive displayed emotions by employees can affect the emotional state of customers (e.g., Pugh, 2001, Tsai and Huang, 2002, Hennig-Thurau et al., 2006). This process builds on the employees' expressed facial and vocal expression as well as postures that are being mimicked by the customer (Hatfield et al., 1992). In business encounters the most occurring form is primitive emotional contagion where mimicking and synchronization happens "[...] relatively automatic, unintentional, uncontrollable, and largely unconscious" (Hatfield et al., 1992, p. 153). Influencing customers' affective state is of relevance because numerous studies could link employees' displayed emotions in combination with customers' emotions to service

encounter performance evaluations and thus aspects like future loyalty intentions and positive word-of-mouth (e.g., Pugh, 2001, Barger and Grandey, 2006, Hennig-Thurau et al., 2006).

These studies highlight the relevance of emotions for the success of service encounters. With the advancing use of new technologies, such as chatbots, the question raises, if this causes the emotional components of service encounters being lost.

This thesis is aimed to close the outlined research gap. In more detail, the thesis follows three objectives. First of all, the central questions concerns the process of emotional contagion between a chatbot that displays positive emotions and a human customer. Second, this thesis aims to shed light not only on the contagion process itself but also on its outcomes in the context of human-to-chatbots interactions, such as encounter satisfaction. Lastly, it seeks to investigate if human-to-chatbot interactions indeed are just purely functional interactions but also follow social rules and mechanisms known from human-to-human interactions. With this, the thesis provides essential contributions not only to extant scientific research on emotional contagion and services. It furthermore does provide useful implications for chatbot designers and practitioners.

To answer these research objectives, this thesis builds on a series of five consecutive experiments. Starting with a laboratory experiment to generally shed light on the process of emotional contagion. Recording participants' facial reactions to the positive emotions the chatbot displayed, the results showed that the participants unconsciously mimicked those positive emotions. In order to overcome the restrictions associated with laboratory experiments in terms of the number of subjects and the associated model complexity, the following experiments were conducted web-based with standardized video stimuli. This procedure opened the possibility to investigate the respective question in a controlled environment (Pascual-Leone et al., 2016).

The bottom line is that the results clearly show that a chatbot is capable of triggering a change in the affective state of the customer. The work is thus in line with previous works that were able to demonstrate the existence of the CASA paradigm in the context of chatbots (e.g., Ho et al., 2018). In the context of a service encounter, the results also show that a change in the affective state, meaning emotional contagion, also positively influences the evaluation of the service provided by the chatbot in the further course. This clearly highlights that a pure focus on the functional attributes of chatbots falls short of exploiting their full potential in service encounters. It becomes clear that human-to-chatbot interaction in service encounters follows typical principles known from human-to-human interactions. For designers, this means they should not solely focus on functional aspects such their independence from time restrictions (Schneider, 2017, Wunderlich and Paluch, 2017). Instead, they have to mind much more complex mechanisms when implementing chatbots so that they can also meet the expectations of human-to-human interactions.

References

- Barger, P. B. & Grandey, A. A. 2006. Service with a Smile and Encounter Satisfaction: Emotional Contagion and Appraisal Mechanisms. *Academy of management journal*, 49, 1229-1238.
- Boiteux, M. 2019. *Messenger at F8 2018* [Online]. Messenger Developer Blog. Available: <https://blog.messengerdevelopers.com/messenger-at-f8-2018-44010dc9d2ea> [Accessed 14.05.2019].
- Hatfield, E., Cacioppo, J. T. & Rapson, R. L. 1992. Primitive Emotional Contagion. In: CLARK, M. S. (ed.) *Emotion and Social Behavior*. Newbury Park: SAGE Publications.
- Hennig-Thurau, T., Groth, M., Paul, M. & Gremler, D. D. 2006. Are All Smiles Created Equal? How Emotional Contagion and Emotional Labor Affect Service Relationships. *Journal of Marketing*, 70, 58-73.
- Ho, A., Hancock, J. & Miner, A. S. 2018. Psychological, Relational, and Emotional Effects of Self-Disclosure after Conversations with a Chatbot. *Journal of Communication*, 68, 712-733.
- Huang, M.-H. & Rust, R. T. 2018. Artificial Intelligence in Service. *Journal of Service Research*, 21, 155-172.
- Pascual-Leone, A., Herpertz, S. C. & Kramer, U. 2016. Experimental Designs and the 'Emotion Stimulus Critique': Hidden Problems and Potential Solutions in the Study of Emotion. *Psychopathology*, 49, 60-68.
- Pugh, S. D. 2001. Service with a Smile: Emotional Contagion in the Service Encounter. *Academy of Management Journal*, 44, 1018-1027.
- Schneider, C. 2017. *10 Reasons Why Ai-Powered, Automated Customer Service Is the Future* [Online]. Available: <https://www.ibm.com/blogs/watson/2017/10/10-reasons-ai-powered-automated-customer-service-future/> [Accessed 27.11.2018].
- Tsai, W.-C. & Huang, Y.-M. 2002. Mechanisms Linking Employee Affective Delivery and Customer Behavioral Intentions. *Journal of Applied Psychology*, 87, 1001-1008.
- Wunderlich, N. V. & Paluch, S. A Nice and Friendly Chat with a Bot: User Perceptions of Ai-Based Service Agents. 2017/12// 2017 Seoul.