

# Crafting Conversational Agents' Personality in a User-centric Context \* \*\*

Catia M. Ferreira<sup>1,2</sup> and Sviatlana Hoehn<sup>1,3</sup>

<sup>1</sup> University of Luxembourg, Esch-sur-Alzette, Luxembourg

<sup>2</sup> [catiamano1@gmail.com](mailto:catiamano1@gmail.com)

<sup>3</sup> [sviatlana.hoehn@uni.lu](mailto:sviatlana.hoehn@uni.lu)

**Abstract.** This research proposes a novel framework for Conversational Agents' personality design having the user as the driving force. The framework uses Social Sciences, Conversation Analysis and Computational Psychology to build a robust methodology for Conversational Agents' personality design. We build the model from three sources of data using qualitative and quantitative methods. The model consists of two personas: the user's persona and the agent's persona. The model is based on real-life customer communication channel data. We discuss the results and the potential for improvement.

## 1 Introduction

Conversational Agents, Dialogue Systems, Chatbots and Conversational Interfaces have been subject of intensive research in the last 60 years [1]. In this work, we use the term Conversational Agent (CA) as a common name for all types of Chatbots, Dialogue Systems and Conversational Interfaces. Recent advances in Machine Learning enable companies to use CAs for tasks such as customer communication and recruiting. The importance of having CAs with distinctive personalities is linked to the need to improve user experience [2]. For applications in which CAs represent the voice of a specific business or brand, additional efforts are invested in making the CA represent the company's identity.

Oxford English Dictionary defines personality as "the combination of characteristics or qualities that form an individual's distinctive character." Computational models of personality attempt to mirror and to simulate these distinctive characteristics [3]. In practice, the same person interacts differently with different persons, and interacts differently with the same persons in different circumstances. Conversation Analysis analyses these differences and explains how speakers design their language for a *particular* person. This process is called *recipient design* [4].

**Objectives:** While a lot of scientific attention has been put on modelling CAs individual characteristics [3], there is a lack of methodology in how their individual qualities form interaction with other agents. We close this gap by creating a framework for CA personality design that is grounded in both Computational Psychology and Conversation Analysis. In addition, our approach is practical and ready for industrial applications relating to Conversational Interfaces.

**Data and Method:** This research has been conducted in close collaboration with an insurance company, which provided the data and the CA's infrastructure. We use the persona methodology to create a representation for a typical CA user from three data sources: (1) vocabulary and training data for language understanding in three languages: English, French and Dutch provided by the Customer Services' team, (2) users' demographic data, and (3) unstructured interviews with the Sales team of the company. The CA's persona is then designed using the same data and taking the user persona into account, ensuring that the CA's utterances are designed for this particular persona, which is our generalisation of the *recipient design*.

\* Supported by University of Luxembourg

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## 2 Modelling, Implementation and Results

For the **user persona**, we map data units from the two qualitative sources (1) and (3) to the OCEAN personality traits' model (openness, conscientiousness, extraversion, agreeableness, and neuroticism) [5]. We combine them with demographic data (source 2) and represent the resulting persona as a radar chart. For the **CA's persona**, we map data units from sources (1) and (3), and the user's persona in order to design the CA's responses for its *particular* audience. Figure 2 shows the resulting representations. In the final step, the identified CA's personality traits are made visible in all CA's replies:

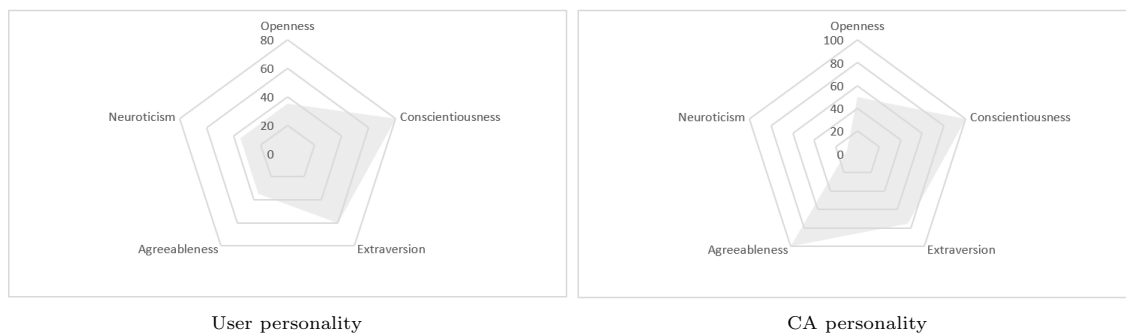


Fig. 2: User and CA personality dimensions

**Implementation:** The CA was deployed in a life system with real customers using a Chatbot creation platform. We trained the language understanding module to recognise intents from data source (1).

**Evaluation:** To validate the models, all user interactions are assessed and classified according to their alignment with the created personas' traits, or as not reflective of personality. User satisfaction with the CA is measured by rating replies and providing explicit feedback. The analysis of explicit feedback was limited by the low number user feedback messages.

Nonetheless, the results show that for the most requested queries the CA's replies are in line with the created personas. The major benefit will come from a readjustment of the intents that constitute the small-talk skill. The most activated CA reply relating to small-talk relates to the intent on whether the CA is human or bot. The CA's implemented answer, although appropriate can still be given more variations, where more of the CA's persona traits should be put forward.

## References

1. MacTear, M., Callejas, Z., Griol, D.: The Conversational Interface: Talking to Smart Devices. Springer (2016)
2. Danielescu, A., Christian, G.: A Bot is Not a Polyglot: Designing Personalities for Multi-Lingual Conversational Agents. Extended Abstracts of the 2018 CHI Conference on Human Factors in Computing Systems, CS01. ACM (2018)
3. Sun, R.: The Cambridge handbook of computational psychology. Cambridge University Press (2008)
4. Fischer, K.: Designing Speech for a Recipient: The roles of partner modeling, alignment and feedback in so-called 'simplified registers'. Vol. 270. John Benjamins Publishing (2016)
5. Costa, P., McCrae, R.: Neo PI-R professional manual. Psychological Assessment Resources **396** (1992)