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# Chatbots at Work: A Taxonomy of the Use of Chatbots in the Workplace

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**Abstract.** The adoption of Artificial Intelligence (AI) applications in organisations is growing rapidly. In this study, we focus on chatbots as one type of AI applications in organisations. As an AI-enabled application, Chatbots learn from their use patterns. Therefore, the ways users adopt and use chatbots will have significant impact on the future evolution of this technology. This study examines the use of chatbots in the workplace. It questions how employees use chatbots in the workplace. It adopts an inductive approach to examine the use of the same chatbot in the same organisation. The findings highlight the existence of different patterns of use. Based on the inductive analysis of data, we develop a taxonomy of chatbot users. The taxonomy offers four types of users based on two prominent criteria. The study presents a key step in understanding chatbot use in the workplace that could pave the way for future research.

**Keywords:** Chatbots, Future of Work, Artificial Intelligence, AI Adoption, AI Use, Smart Organisation, Smart Technology, Technology Appropriation, Taxonomy

## 1 Introduction

The growth of Artificial Intelligence (AI) use and popularity in organisations is continuing apace. A recent report shows that 85% of the surveyed organisations are either evaluating or using AI [1]. AI technology is an umbrella term that covers Robotics, Natural Language Processing, Machine Learning among other smart capabilities [2, 3].

Chatbots are widely used by organisations to externally serve customers in many service domains and are recently used by organisations to internally serve its employees. In the customer service context, chatbots promise to create a fast, convenient, and cost-effective channel for communicating with customers [4]. In the workplace context, chatbots are implemented to enhance the productivity of the employees through assisting them in information retrieval tasks [5]. It has been also argued that chatbot use in the workplace could reduce stress and information overload and provide employees with valuable assistance [6, 7]. The increasing use of chatbots

in the workplace presents a significant development in the digitalisation of the workplace [8], that has consequences for organisations and employees. However, integrating such digital innovations into the workplace has received little attention despite its importance as a key area in workplace transformation that drives efficiency [9][10].

While the use of chatbots in the workplace is increasing, limited research is available in the applications of chatbots in employee support services. As chatbots are AI-enabled applications, they consistently learn from use patterns and the ways users interact with them. Therefore, understanding how employees interact with this technology and how they use it is of particular importance. This study contributes to closing this research gap by exploring the use of chatbots in the workplace from the employees' perspective. It aims to answer the research question of: how employees use chatbots in the workplace?

To answer the research question, we conduct an inductive qualitative research to examine the use of a chatbot in a large international organisation. Data analysis shows that employees use chatbots in different ways. Accordingly, we develop an inductive taxonomy to categorise users based on their patterns of use. This research contributes to the very thin literature on chatbots and AI adoption in the workplace. By building a taxonomy of users in relation to chatbot use, it lays the foundation for further work and theory building in this domain [11, 12].

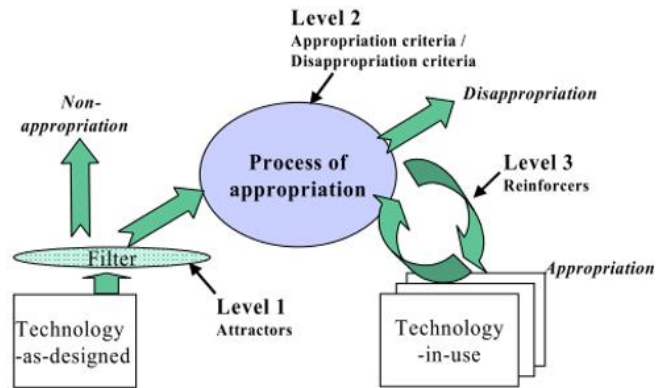
Following the introduction, the paper is organised into six sections. Section 2 presents the concept of Technology Appropriation a brief literature review on chatbots in the workplace. Section 3 provides the research methods including the case description, data collection and taxonomy development method. Section 4 presents the research findings in terms of the key themes upon which users were organised into four types. Section 5 discusses the findings while section 6 presents the conclusions, limitations and future research.

## **2 Literature Review**

### **2.1 Technology Appropriation**

The concept of Technology Appropriation explains the transformation process of a technology as it is envisaged by its designer (technology-as-designed) into technology as it is being used (technology-in-use). It studies the cycle of the usage after the initial adoption, thus complementing existing technology adoption, use and implementation research [13]. The core focus of research adopting the Technology Appropriation concept is that users make technology their own, in a process of adaptation, by which both the technology and individuals and/or collective practices are transformed [14]. It involves the adaptations, the practices and skills that users initiate of the novel technology [14]. It is recognised that there are multiple views on appropriation: organisational, technical and personal [13]. However, following the inductive analysis, this paper embarks on classifying the different use patterns and how users appropriate chatbots in the workplace, it concentrates on the behavioural outcome of the individual users. While many existing Technology Appropriation models draw on social science

principles to consider appropriation by groups, Carroll's [15] proposed an individual-based model of Technology Appropriation that focuses on the interplay between an individual and a technology. We adopt this model of Technology Appropriation [15] that focuses on the concept of appropriation from an individual user perspective.



**Fig. 1.** The Model of Technology Appropriation Adopted from Carroll et al. [20]

Carroll et al. [16] suggest that users evaluate a technology at three levels which reflects different degrees of familiarity with the technology as shown in Figure 1:

**Level 1:** At this level, initial judgements are made with the users' first encounter with a new technology. The outcome of this encounter is the decision to non-appropriation, where users are not interested in this technology, or to the adoption, where the appropriation process begins.

**Level 2:** Through the process of appropriation users explore the technology in depth. The outcome of this process is either the appropriation, where the users take possession of its capabilities in order to satisfy their needs, or the disappropriation, where users, at some stage during the appropriation process, choose not to persist with the technology.

**Level 3:** The technology is appropriated and integrated into users' everyday practices based on the long-term use of the technology. However, changes in users' evaluation of the technology may lead to disappropriation [15].

The individual model of Technology Appropriation maintains that the use of technology is strongly influenced by users' understandings of the capabilities of the technology [17]. Users adapt by changing their practices and situations of use to fit in with the technology, in both intended and unintended ways [15]. Consequently, they might not use it in ways that were initially expected by the developers [17].

## 2.2 Chatbots' use in the workplace

The use of chatbots has been studied from a human computer interaction (HCI) perspective and in marketing from a customer service perspective. However, there is little understanding of chatbots use in the workplace and how employees use this AI-

enabled technology. From a HCI perspective, chatbots' design features could provide social cues to users. For example, human-like function/appearance, language style, personality, the degree of interactivity and assumed agency could trigger social responses and influence users' perception and behaviour [18, 19]. These 'social cues' can substantially affect users' perception and as a result impact the adoption and use of these systems [18]. Moreover, the social presence of chatbots technologies is believed to influence the development of social and emotional bonds with this intelligent system [20].

Schmitt [21] distinguished five strategic experiential modules of creating different types of customer experiences: sensory experience (Sense), affective experience (Feel), cognitive experience (Think), physical experience (Act) and experience defined by social identity (Relate). Hoyer [22] proposed that AI-enabled technology, including chatbots, create experiential value and identified three dimensions of this experiential value involving cognitive, sensory/emotional, and social. Cognitive value is the experiential value that consumers receive as a result of processing the information and decision-making and is closely tied to the analytical features of AI technologies [22]. Sensory/emotional value comprises the value consumers get from sensory stimulation and emotional attachment, which results from the sensory and affective features of the AI technologies. The sensory/emotional value of chatbots consists of making intelligence tangible, making them a true human companion. It is recognised that anthropomorphisation falls in this category and increases this type of value [22].

### **3 Research Methods**

#### **3.1 Research Site and Data Collection**

Omilia (a pseudonym) is a large international organisation that has recently developed an internal chatbot for its employees to support them in IT related issues as a virtual IT help desk. We gained access to the development team and users since December 2019 as part of a wide ongoing research project. We also had access to the different documents and internal links. We conducted 28 semi-structured interviews with users and developers in two rounds. The first round of interviews included the product owner and professionals from the development team. The focus of these interviews was on understanding the initial purpose of the creation of the chatbot and how the development cycle works. In the second round of interviews, which took place from the beginning of July until the end of September 2020, we conducted 24 interviews with users aged between mid-twenties to 50s with a University degree; they were randomly selected from different teams across the IT department, who agreed to participate in the study. These interviews broadly explored people's experiences and use of the chatbot in their daily work. The interviews lasted between 20 mins to one hour. Each participant was interviewed over a video/audio conferencing line. All interviews were recorded following participants' consent and transcribed verbatim. All the data that were collected from the interviews and the organisation's name have been anonymized for the purposes of confidentiality.

### 3.2 Taxonomy Development

We adopted an inductive approach to data analysis [23, 24]. Our analysis highlighted the existence of different patterns of use among users. We therefore embarked in the categorization of these patterns in a taxonomy. There is a variety of ways to present taxonomies and the literature does not recommend how a taxonomy should be presented [25]. However, once we observed in the data the existence of different pattern of use, we adopted Nickerson's et al. [11] recommendation on developing taxonomy through empirical inductive approach –which is strongly rooted on Bailey's [26]. This involves inductive analysis to extract patterns, dimensions and characteristics upon which a taxonomy is constructed. The characteristics of a useful taxonomy include being concise, robust, comprehensive, extendible and explanatory [11]. The analysis proceeded in three steps. In the first step, an inductive coding was performed on the raw data [24]. The second step, two broad themes were users differed were identified. The two themes that emerged were: Interaction and Perception which served as the basis of the classification. In the third step, data was re-analysed based on these two themes which led to the emergence and identification of four types of users as shown in Figure 2:

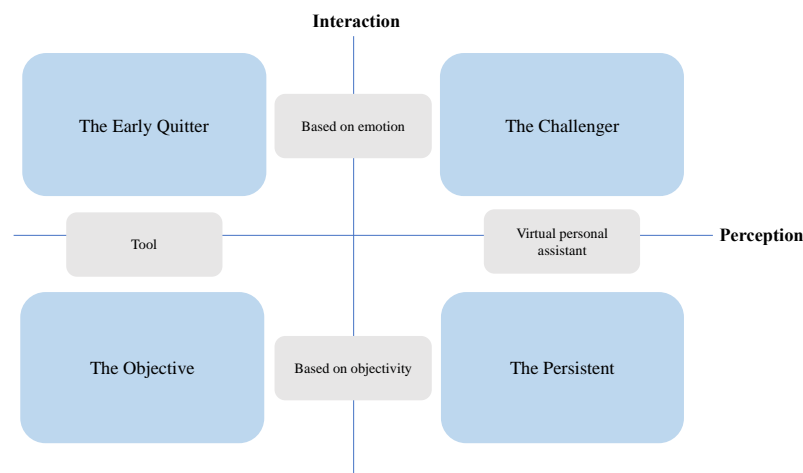


Fig. 2. User classification based on the two themes: Interaction and Perception

## 4 Research Findings

### 4.1 Key Themes

Through data analysis, two main themes related to users' appropriation of chatbots were identified using an iterative process and later used to create the taxonomy. The first theme that emerged from the analysis of data is the employees' perception towards the chatbot. The perception ranges from considering the chatbot just as other applications for information retrieval to considering it as a human-like assistant and a colleague.

The second theme that arose from data is related to the interaction with the chatbot. The interaction ranges from emotional to functional based. The following section presents how these two themes provided the base for further analysis that resulted in the taxonomy building.

## 4.2 A Taxonomy of Chatbot Users

Based on the two identified themes mentioned above, four distinct types of chatbot users in an organisation were identified. Each type comprises a unique combination of dimensions related to the above-mentioned themes [11, 26]. The four types of chatbot users are: 'The Early Quitter', 'The Challenger', 'The Objective' and 'The Persistent' as explained in the following sections.

**The Early Quitter.** The Early Quitter represents the category of users who perceive the chatbot as a machine, as another additional tool to support their daily work and interact based on emotions. The following quote encapsulates this view.

*"If you ask me right now, I see it simply as a search engine."  
Interviewee 22*

In terms of interaction, this type of user tends to act based on emotion as they have a biased opinion about the chatbot which is based on their previous encounter with such an application in a different setting. Furthermore, this type of user gets easily frustrated in cases where the chatbot is not responding as they would assume, and they assign the dysfunctionality to the chatbot without thinking of the possibility to change their language pattern. This view was succinctly summarised as follows:

*"Because in your daily life you are also confronted with these bots, right? So, if you go on an internet page and then you see some kind of smart robot on a certain web page 'can I help you?', you know it's just a robot, you never get anything out of it. But I typed some questions and what I could recall is that it never really gave me the answer I was looking for." Interviewee 11*

**The Challenger.** This type of users finds the chatbot to be an assistant and interact based on emotions. They embrace the chatbot and experiment with its use. They try to find different ways to use the chatbot so that it could assist them in daily activities. This type of users is interested in the technology and tries to experiment with the chatbot, to test it, evaluate it and find its limits.

In terms of perception, the Challenger considers the chatbot not only as a mere tool, but also as a personal virtual assistant. For example, Interviewee 19 mentions:

*"I really try to imagine the chatbot as my personal virtual assistant."  
Interviewee 19*

In addition, in terms of interaction, these users express, and act based on emotions, due to the enthusiasm towards technology they emanate. Interviewee 6 shares this notion:



*"The chatbot also needs to learn. I guess it asks me at the end 'was this helpful or how did I find it', and when I tell him no, I feel bad for the bot." Interviewee 6*

**The Objective.** The Objective represents the category of users who perceive the chatbot as a machine, as another additional tool to support their daily work and also hold a functional view of the chatbot. For example, Interviewee 9 refers to the functionality of the chatbot as a machine that needs to be trained and compares its performance to human interaction:

*"If the bot can be trained in a way that it's giving better results, more efficient results, then it's fine otherwise it's better to talk to a person." Interviewee 9*

In terms of interaction, this type of user tends to act based on their logical analysis of chatbot functions and capability. For example, Interviewee 23 gives a rationale behind the interaction with the chatbot in terms of its capability:

*"So, to be able to trust the chatbot, I would personally also like to understand and see what information sources it covers. So how much can I really trust, how deep does the chatbot go into the different pages. So, I would need to first understand how detailed its searches are and how widespread it is looking to be able to trust it." Interviewee 23*

The Objective type of users will continue to use the chatbot for as long as it is functioning to their expectations. They will discontinue its use once its usability weakens.

**The Persistent.** This type of users sees the chatbot as a personal assistant and interact with it based on its functions and capabilities. The element that differentiates the Persistent from the Objective type, is the former's perception of the chatbot as an assistant, having a human cue as well as their continued use of the chatbot by rephrasing their question. As below, Interviewee 16 expresses their perception of the chatbot as communicating with a person:

*"I always chat as if I am chatting to a person, it's not like I am searching for anything." Interviewee 16*

In terms of interaction, they act based on objective and functional understanding that is driven by emotions. Interviewee 5 provides a justification behind the chatbot interaction:

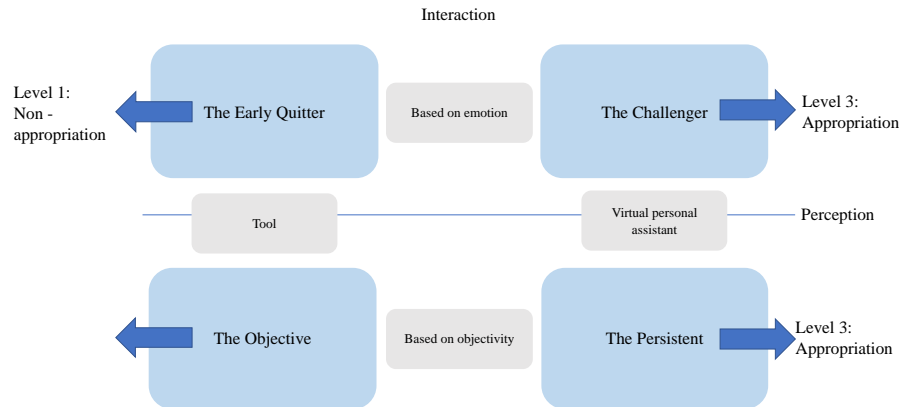
*"So, that's better than the human interaction because it is actually giving you the links and pages and everything that you need. So that way, it is more helpful when you really want information about something." Interviewee 5*

## 5 Discussion

The use of AI in organisations is growing. This study focuses on the use of chatbots as one type of AI. It aims to answer the research question of: how employees use chatbots in the workplace? To do so, it adopted an inductive qualitative approach to examine a chatbot use in an organisation. The findings show that employees vary in their appropriation of the chatbot at work and the way they perceive it. In this study, we categorised the differences under two themes namely: perception of the chatbot (tool or assistant), and basis of interaction (based on emotion or objective and function). Accordingly, four types of users were identified.

Regarding perceptions, the study finds that users either perceive the chatbot as a mere tool or as an assistant. Both 'The Early Quitter' and 'The Objective' types of users perceive it as a machine that supports their daily activities, while 'The Challenger' and 'The Persistent' perceive it as an intelligent tool or a person (Figure 3). Consequently, the latter type recognises it as a personal virtual assistant and a viable replacement of a colleague. Hence, they continue with its use and act as chatbot trainers due to their tendency to experiment. Figure 3 provides a review of the identified types in light of Carrol's et al. [20] appropriation framework. It shows that the perception of the chatbot as an assistant that is integrated into the users' practices reinforces its appropriation.

In terms of interaction, the study finds two types of interaction namely logical and emotional. The 'Objective' and the 'Persistent' interact with the chatbot based on logic while the 'Early Quitter' and the 'Challenger' interact with it based on emotions. However, the logic in the interaction does not translate into persistent use unless the user also perceives the chatbot as an assistant. Hence, the 'Persistent' type of user rarely quits and tries to use the chatbot until some answer is found. They interact based on logic and do not express any emotion towards the chatbot. In contrast, as the findings demonstrate, the 'Early Quitter', who is interacting based on emotion, considers the chatbot as a tool and has a limited view about the chatbot's capabilities. When faced with an irrelevant answer, the 'Early Quitter' exhibits negative emotions and becomes more frustrated. As a result, this dissatisfaction leads to the non-appropriation of the chatbot during the initial encounter with the technology, which is represented by the Level 1 in the appropriation process (Figure 3). However, the Objectives also consider the chatbot as a tool, but they are based on logic. Additionally, they continue to appropriate the chatbot for as long as it is functioning to their expectations, explore the chatbot in depth and disappropriate it once its usability weakens, which is represented by the Level 2 in the appropriation process (Figure 3).



**Fig. 3.** Users' taxonomy and appropriation levels

The study contributes to the emerging literature on chatbot use through providing a case study of their use in an organisational setting. In highlighting the different types of chatbot use, the study draws the attention that AI-based technology might not bring about homogeneous use. Accordingly, training AI and chatbots in organisational settings might be impacted by the different patterns of use. In building a taxonomy of users, this study provides a vital base to research on chatbot use and training. In evaluating the proposed taxonomy, we found that it meets both the criteria of mutual exclusion and exhaustion [27]. As none of the types of users has two different characteristics in a dimension, the developed taxonomy provides mutual exclusive classification. As each user type has one of the characteristics in a dimension, the taxonomy also provides collective exhaustive classification. As a consequence, each user type has exactly one of the characteristics in each dimension, interaction based on emotion with shared responsibility or logic with non-shared responsibility, perception as a tool or virtual personal assistant, as shown in Figure 3.

## 6 Conclusions, Limitations and Further Research

In short, this study focuses on employees' perspectives on using chatbots at work and contributes to the existing literature of AI adoption and use in organisations by proposing a taxonomy of chatbot users. The taxonomy presented here facilitates a more deeply nuanced understanding of the use of chatbots by the employees in a process of appropriation in an organisational setting. Ultimately, the findings show that specific types of users are more enamoured of appropriating the chatbot than others and the characteristics of these types of users have been presented based on the two themes identified: Perception: tool/virtual personal assistant, Interaction: based on emotion/logic, shared/non-shared responsibility. Therefore, the 'Challenger' and the 'Persistent' user type can have a greater influence on the advancement and training of AI applications by use.

The taxonomy developed by this study is based on the examination of chatbots, future research could extend it to other AI applications. Understanding the use of AI applications in practice is particularly important in this new type of technology since it plays a substantial role in the learning and advancement of such applications [28, 29]. The taxonomy reveals heterogeneity in the employees' characteristics on how they use AI applications and what they expect from them. Ultimately, the findings show that specific types of users can have a greater impact on the learning of AI applications, thus helping designers and researchers in the advancement of such applications while creating value and efficiency for the organisation. The results of this study could be further strengthened by examining the use of chatbots in multiple organizations. Moreover, additional interviews would allow to evaluate if participants demographic data such as gender and experience could further explain the criteria of this classification. The results of this study emerged from the qualitative data inductively, to create the different chatbot user types and did not originate from the theory. Future studies could test the user types and further validate them to a population with sampling techniques.

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