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# AI in the Workplace: Exploring Chatbot Use and Users' Emotions

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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 the workplace. Chatbots differ from traditional organisational ICTs in many aspects including machine learning and exhibiting social presence. These characteristics motivate us to explore the role of emotions on chatbot use in the workplace. Following a case study approach and collecting rich qualitative data, the research identifies the different emotions involved in chatbot use in the workplace and their effect on employees' use behaviour. The findings surprisingly highlight that excitement, hope and playfulness in addition to empathy towards the chatbot offset the negative emotions of frustration experienced when getting wrong results and propel users to continue their use. The social presence of the chatbot and its potential to learn infuses a more tolerant forgiving user behaviour towards the chatbot. The study theoretically contributes to the understanding of chatbot adoption and use in organisations and informs research into the adoption, use and design of this new class of technology. Further research is encouraged to take the findings of this study and test them on a large sample of employees.

**Keywords:** Chatbots, Artificial Intelligence, Emotions, Emotions at Work, Digital Workplace, Technology Adoption, AI Adoption, Future of Work, Chatbot Use

## 1 Introduction

The use of AI in organisations is increasing exponentially [1, 2]. Chatbots present a class of new technology that relies on Artificial Intelligence (AI), Natural Language Processing (NLP) and Machine Learning (ML) [3, 4] to provide human-like conversational agents. The adoption of chatbots in the workplace is growing, which is motivated not only by the efficiency and cost reduction potential but also by the possibility of projecting a contemporary office that appeals more to modern workers and digital native generations while they enter the workplace [5] and to improve employee experience and satisfaction [6]. In a recent survey by Gartner, CIOs identified chatbots as the main AI-based application used in enterprises and its adoption is

expected to soar, where 70% of white-collar workers are expected to interact with conversational platforms on a daily basis by 2022 [5]. This trend has been accelerated as a result of the Covid-19 pandemic and the associated forced home office work and social distancing measures. Despite its growth and potentials, research into the integration of this new class of technology into the workplace is in its infancy. Indeed, little is understood regarding their use and impact on employees' experience.

As chatbots exhibit conversational abilities with natural language processing, "it is important to understand the emotional, relational and psychological outcomes that chatbots convey to the user through their communication" [7]. Emotions have been associated with information systems use in organisations. Research shows that the successful use of organisational systems is impacted by users' emotions [8]. Beaudry and Pinsonneault [8] argue that excitement and happiness are positively related to organisational IT use while anxiety is negatively related to it. Evidence from the fields of management, marketing and information systems finds that emotions and feelings play an important role in job satisfaction, decision-making behaviour and technology adoption and "can even have more explanatory power" on behaviour than cognition [9, 10]. Hence, understanding emotions in chatbots adoption and use is vital and can inform technology design, management and use.

Against this backdrop, this research questions: What are the types of emotions involved in chatbot use in the workplace and what role they play in its adoption and use? To answer the research questions, we conducted an in-depth qualitative study in a large organisation that implemented a chatbot for the exclusive use of its employees. Through inductive research processes and benefitting from Beaudry and Pinsonneault's framework [8] and Richins' emotions inventory [11], the findings identify the different emotions associated with chatbots' use in the workplace. They highlight that excitement, hope and playfulness, in addition to empathy towards the chatbot, offset the negative emotions of frustration experienced when getting wrong results and propel users to continue their use. The social presence of the chatbot and its potential to learn infuses a more tolerant forgiving user behaviour towards the chatbot. This research contributes to the nascent literature on AI and chatbots adoption and use in organisations. It draws the attention to the role played by emotions and their impact on chatbot adoption and use and informs research in this domain. Further research can take the findings of this study and quantitatively test them on a large sample of chatbot users in the workplace.

Following the introduction, this paper is structured as follows: Section 2 presents a brief literature review on chatbots and their emotional aspects. Section 3 introduces the theoretical framework on emotions and technology adoption, followed by the outline of the research methodology including the case description and data collection in Section 4. Section 5 presents the research findings in terms of the key emotional aspects upon which users interact with the chatbots. The paper closes with a discussion of key insights from the study (Section 6) and the conclusion (Section 7).

## 2 Literature Review

Chatbots refer to any software application that engage in a dialog with a human by using natural language [12]. They are conversational agents that typically have a natural language interface which allows users to explore data and services either via text or voice [9]. The natural language interface component is a distinct characteristic of chatbots and provides them a human-like conversational capability. In general, there are three types of chatbots, namely, chatbots without embodiment, virtually embodied avatars and physically embodied robots [13]. The ability of chatbots to interact with users through the use of natural language is a unique characteristic that distinguish this class of technology from other software [14].

As an AI-based technology, chatbots use machine learning and artificial intelligence methods to imitate human-like behaviours and provide a task-oriented framework [15]. The chatbot architecture comprises of a language model and computational algorithms [16]. Hence, chatbots consistently learn from their users and the ways they interact with them. Therefore, understanding their use is of paramount importance. The chatbot design consists of two fundamental components: the form and the function [17]. The function of a product, which is dominated by principles from engineering, refers to product specifications and standard architectures. It focuses on the utilitarian aspect through addressing the practical needs of users, such as being able to communicate with an agent in natural language, whereas the form of a product refers to the individual design components. It represents the aesthetic component and can be interpreted as a user's perception of non-utilitarian aspects. Moreover, a form feature that has attracted a lot of attention in chatbots is the anthropomorphic presentation. Apart from the human-like visual cues of chatbots, the language is a major aspect as it might be enriched by emotional semantics or expression of emotions [17].

## 3 Theory of Emotions in Technology Adoption and Use

### 3.1 Emotions and feelings

Much has been done on the cognitive side of technology adoption and use, while the affect side has received less attention despite its importance. Studies of technology adoption embracing emotions have mostly focused on the negative affect such as computer anxiety [18–20]. According to Venkatesh [21] the emotional aspect of technology usage could be captured through the construct of computer anxiety [21]. Furthermore, people establish judgments and feelings about any technology. These judgments and feelings are essential factors in the adoption of new technologies. To improve our understanding of the motivation of people to adopt and use new technologies, a fundamental step is to understand the influence of emotions and feelings [18].

Emotions and feelings have been used to measure affect. However, these two terms are distinct. Emotions have been defined as a mental state of readiness that occurs from cognitive appraisals of events or thoughts [22]. As such, emotions influence behaviours

or changes in action readiness [8]. On the other side, feelings are different in the sense that they lack the evaluative, cognitive and motivational components which are distinctive of emotions [23]. In addition, moods are low intensity mental states which have a longer duration than emotions and lack intentional capacity and action tendencies [24].

### **3.2 Triggers and Appraisals of emotions**

Laros and Steenkamp [25] distinguished between negative and positive emotions . A narrower distinction between different emotions has been introduced by Richins [11] within the consumption context, who developed the “Consumption emotions set” (CES). This set of descriptors represents the range of emotions consumers most frequently experience in consumption situations [11]. Furthermore, Beaudry & Pinsonneault [8] developed a framework that classifies emotions based on two appraisals. The primary appraisal is goal achievement which is the opportunity/threat to the personal goals [26]. The secondary appraisal is the degree of certainty users feel about the outcome [26]. Accordingly, they suggest four distinct types of emotions: achievement, challenge, loss and deterrence emotions as presented in figure 1.

Achievement emotions are triggered from the appraisal of an event with positive outcome and high degree of certainty over its consequences. This category of emotions includes happiness, satisfaction, joy and pleasure. Challenge emotions are also caused by the appraisal of an event as being an opportunity over which individuals feel they have some control. These emotions might evoke excitement, hope, anticipation, playfulness and flow. On the other side, loss emotions reflect the perception of an IT event as a threat and the perception of a lack of control over its consequences. This category of emotions includes anger, dissatisfaction and frustration. Similarly, another class of emotions that perceives IT as a threat is the deterrence emotions however, with some degree of control over its consequences. Emotions such as worry, fear and distress are included in this category [8].

Since this paper aims to understand the types of emotions involved in chatbot use in the workplace we adopt Beaudry’s & Pinsonneault’s [8] emotion framework that classifies emotions and concentrates on how they are related to the usage of a new IT system [8]. Richins [11] has provided an inventory of emotions that complements Beaudry & Pinsonneault [8]. Based on these two studies, and informed by our analysis, we introduce the framework in figure 1 as a guidance for the reader and not to represent the order of the research process.

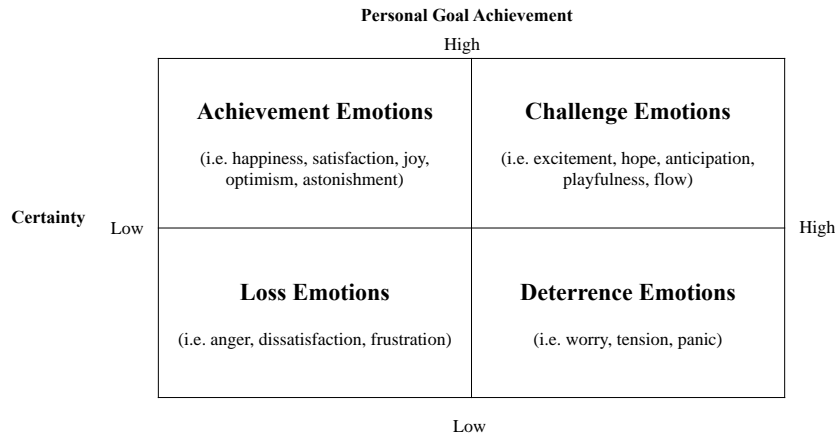


Fig. 1. Classification of emotions, adapted from Beaudry & Pinsonneault [8].

## 4 Methodology

### 4.1 Case description

Omilia (a pseudonym) is a global organisation that has developed an internal chatbot for its employees to provide IT services. The main reason for the creation of the chatbot was initially to reduce cost and later evolved to provide seamless work experience to their employees. The chatbot provides employees with a wide range of IT-related information and support of the kind typically held and done by traditional IT helpdesk. One of the objectives of implementing the chatbot was to enable the users to be self-sufficient. The chatbot was developed based on the Microsoft Bot Framework utilizing the Azure Cloud Services. The implementation of the cognitive services of the chatbot was initially challenging for the project team, however, soon, they mastered it and expanded the functionalities of the chatbot. The utilization of the cognitive services helps the chatbot to continuously learn based on users' input. Nevertheless, the team implemented supervised learning to be able to review and approve the suggestions they receive from the cognitive services.

### 4.2 Data Collection

In terms of data collection, we gained access to the development team and users in December 2019 and continued with data collection till September 2020 as part of a wider research programme investigating chatbots' use in the workplace. Data collection took place in two rounds and the third is planned. Data collection consisted of interviews and document reviews. We conducted 28 semi-structured interviews with users and developers. The first round of interviews included the product owner and professionals from the development team. The focus of these interviews was on understanding organisational objectives behind the creation of the chatbot and its

development approach and use within the organisation. 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. Participants were randomly selected from different teams, who agreed to participate in the study. The interviews addressed themes relevant to the research topic, including people's experiences and emotions on their use of the chatbot in their daily work. The interviews were semi-structured and conversational in nature, addressing participants' experience of using the chatbot in their day-to-day activities at work. Interviews lasted between 20 mins to one hour. Each participant was interviewed over a conference line, due to Covid-19 lockdown and travel restrictions. All interviews were transcribed verbatim. In addition to the interviews, data was also collected from different organisational documents and internal links. Moreover, observations of use took place and the users shared screen shots with the researcher. All the data and the organisation's name have been anonymized to maintain confidentiality.

### **4.3 Data Analysis**

This study is part of a wider research programme on chatbots' use in organisations. We performed inductive analysis in coding, followed by themes development [27]. "The primary purpose of the inductive approach is to allow the research findings to emerge from the frequent, dominant or significant themes inherent in the raw data" without the enforcement of any structured theory upfront [28]. This approach is suitable for the exploratory nature of the study and considering the novelty of chatbots adoption in the workplace [29]. The data analysis initially focused on the participants' perceptions and experiences with the chatbot. During the data analysis, emotions emerged as a key concept that influenced the adoption and use of the chatbot in the organisation. Hence, the data was coded to identify different types of emotions. In doing so, we benefited from Beaudry & Pinsonneault's [8] classification and Richins' [11] inventory of emotions. While Beaudry & Pinsonneault's [8] study focused on four emotions, namely, happiness, excitement, anger and anxiety in IT use, we complemented it with emotions of 'hope' and 'anticipation' from Richins' as they were emerging from our data [11]. Throughout the analysis, we did not force the data into categories. This allowed for the emotion of empathy to emerge from the data as a new emotion associated to chatbot use.

## **5 Research Findings**

The findings show that users experience different emotions in their chatbot use. These emotions are not discrete, and one user could experience a mixture of emotions. The following sections present the emotions experienced by chatbot users in their workplace.



## 5.1 Achievement Emotions

Achievement emotions result from the appraisal of an upcoming event that generates primarily from users' perception that new ICT offers them opportunities to achieve their personal goals. It includes emotions such as happiness, satisfaction, joy, and pleasure [8]. For example, the interviewees expressed their view of the chatbot as useful. This perspective is illustrated below:

*"I just wrote 'software' and then it gave me the **options**, like 'do you want to request a software', 'do you want to review an order' and all that. So, it was **quite handy**, very useful. For all these cases I just went to the chatbot because it's quite handy, especially for ticket creation. [...] it gives you all the possible options **quite nicely**." Interviewee 5*

Achievement emotion was also expressed even when the chatbot did not provide the required information, but it offered to assist in generating a request to the helpdesk from where the user can get support. This reference to the helpdesk was perceived as useful in assisting with the process and influenced positive emotions towards the chatbot use.

A user eloquently expresses this view in the following quote:

*"It didn't give me the information I wanted, but what I did **like** when it got to the end and **it couldn't help me, it said 'do you want to open a ticket?'** that aspect was very useful because that is really what I wanted to do in the first place." Interviewee 12*

## 5.2 Challenge Emotions

Emotions from this class are triggered by the appraisal of an event as being an opportunity likely to result in positive consequences and over which users feel they have some control. This category includes the feelings of excitement, hope, anticipation and playfulness [8]. Challenge emotions were evident in the data. In this regard, we found that users were excited to use the chatbot due to its novelty and their curiosity to try it. The following quote expresses this view:

*"I just knew that it was kind of AI and because it was an AI, **I just wanted to try it out**, because we didn't have anything like that before and that was what actually drove me to just use the chatbot." Interviewee 5*

Users find the chatbot as a potential opportunity that is likely to result in positive consequences now or in the future. The characteristic of chatbots as learning agents brings about users' anticipation that it will improve based on their continuous use. This is despite delayed or mistaken results of the chatbot. The following quote shows this anticipation and hope from users which is driving their continuous use:

*"Well, I think it's fine. I mean, it's I think it's just a matter of time before it gets **smarter and better**. I mean **the more training it has it would definitely get better**." Interviewee 10*

Users are also hopeful that the chatbot with their learning capability will improve based on acquiring more users. Hence, as good citizens, users find their continuous use to be

a contribution to the chatbot future improvement. The following quote presents an example of this view:

*“If less people are using it, I don’t see how the robot can learn.”*  
Interviewee 6

### 5.3 Loss Emotions

Loss emotions are negative emotions such as anger, dissatisfaction and frustration. According to Beaudry and Pinsonneault [8], these emotions are stemmed from user perception of lack of control. However, in the case of chatbot, while users exhibit frustration of its use, they surprisingly find different excuses for its faulty results. The following is a representative quote that shows that users experience lack of goal achievement and less control over results. However, they continue to use the chatbot, despite their frustration, annoyance and the fact that they find excuses for it, based on its characteristic as an “intelligent agent”, that is here to help. The following quote encapsulates this view:

*“Not upset, maybe just a little **bit frustrated** ..., **it tries to help you so it’s not its fault**, but yeah. It’s not upsetting, it’s just a little **bit annoying** sometimes.”* Interviewee 5

While users get frustrated from the use of the chatbot, they sometimes blame the complexity of the task as a satisfying reason for its confused results. In this case, they revert to a human to help them with their queries. It is intriguing that users refer to their colleagues, in this case, as “humans” and not as “colleagues”, nor they mention their names or use their job title. This is illustrated in the following quote:

*“So, that way it is good and the only problem for me it’s that you know, sometimes, it doesn’t understand you and then it becomes **frustrating**. [...] Yes, when it’s a complicated issue maybe it’s better, because the chatbot doesn’t solve every issue so it’s good to have the **human** aspect as well.”* Interviewee 9

### 5.4 Deterrence Emotions

Deterrence emotions are perceived when the IT event was considered as a threat to personal goal achievement and the users feel that they have some control over the expected consequences. Emotions such as anxiety, worry, fear, and distress could be experienced in this situation [8]. Sometimes users show their panic and tension over the use of the chatbot. However, for some users, this frustration and panic, triggered by the chatbot use, deterred them from trying it again. The following quote depicts this perspective:

*“The chatbot was first saying ‘is it maybe one of these issues’? I said ‘No’. Next, ‘Is it maybe one of these issues’? ‘No’. Ok, let’s create a ticket together. And then you create a ticket and then the bot was also*

*asking additional questions and then I didn't understand anymore, I don't know, it's like, **fed up** with.” Interviewee 11*

Furthermore, users express their tension which is based on their expectations by saying that they stopped using it after their first attempt:

*“Once I realised it didn't answer my question as I expected, I **stopped using it**. Because one negative experience, I think for such cases it prevents you for using it further.” Interviewee 14*

## 5.5 Empathy Emotions

In addition to the four categories of emotions, the data analysis revealed a new category of emotions: empathy towards the chatbot. A number of users expressed sorrow towards the chatbot when it did not return correct answers. This made them more forgiving for its mistakes. The following quote from one of the users summarises this view:

*“I'm not mad at the bot, I just **feel sorry for the bot**.” Interviewee 5*

Besides, employees avoided blaming the chatbot for faulty results. They were tolerant to mistakes as they felt they are part of the interaction into which they enter the chatbot and they play an active role in the conversation. The following quote encapsulates this view:

*“I mean, I have no frustration, but I thought **maybe I was not typing the right way** that it could give the information.” Interviewee 8*

## 6 Discussion

With the proliferation of innovative technologies, the workplace of the future becomes a digitally enhanced workplace [30]. This study focuses on the use of chatbots by employees in organisational setting. It aims to answer the research question of what the emotional aspects of chatbot use are. The research provides an inductive exploratory analysis based on Beaudry and Pinsonneault's [8] classification of IT-related emotions complemented by the emotions inventory developed by Richins [11].

The findings identify a range of emotions involved in a chatbot used by employees. They highlight that chatbots trigger emotions of achievement, challenge, loss, deterrence and empathy. The conversational characteristic of the chatbot infuses a feeling of flow where users enjoy the interaction with it. Flow characterises the subjective human-computer collaboration as playful and exploratory. The concept of flow indicates the extent to which the user perceives a sense of control while gaining optimal and enjoyable experiences [31].

Our findings extend Beaudry and Pinsonneault's [8] framework to include the emotion of empathy, as a new category of emotions. We theorise that this emotional reaction could be stemmed from the social presence of the chatbot and its characteristic as a conversational agent. We also find that emotions towards the chatbot were mixed.

A user could experience more than one category of emotions, when using the same chatbot under study. Further exploration of this aspect is needed.

The study mainly contributes to the literature on technology adoption and use, by examining the actual use of technology and by exploring the emotional aspects of chatbot use in its organisational setting. In highlighting the different emotional aspects of chatbot use and identifying the emotion of empathy, the research extends the IT-related emotions framework to include the category of empathy. Multiple studies showed that humans react to artificial entities with social cues such as use of natural language, and interactivity, by showing social reactions and behaviour due to the humanlike characteristics of CAs [32].

This study contributes to the understanding of chatbots as a new class of technology based on AI. As an AI technology, Chatbots are learning agents; this characteristic triggers different emotions for the users including joy, excitement, frustration and tension. Also, as chatbots rely on Machine Learning and Natural Language Processing, they create a new class of interactive technology for corporate users beyond the typical passive corporate systems they are familiar with and used to. This new technology is different from other corporate systems in that it is not passive, but it engages users on a voluntary basis. Hence, users are curious, excited and playful in their use. They are always hopeful, expect improvement, and they want to contribute to its learning as they anticipate the future advancement of it. In addition, users feel they should be part of a critical mass of chatbot learning and contribute to its development by acting as chatbot trainers.

## 7 Conclusion

In summary, the study emphasises the collaboration between users and chatbots, by revealing how users feel about this partnership and their attempts on defining its future advancement by their use. Consideration of this individualisation of chatbots provides useful direction for managers seeking to connect these components as they manage new technologies. It provides researchers and designers with knowledge about how users adopt and engage emotionally with chatbots in their work.

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