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Social Bots as Initiators of Human Interaction in Enterprise Social Networks

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Abstract

Enterprise Social Networks (ESNs) are said to have the potential to significantly improve communication and collaboration between employees. However, utilization is still a problem in organizations, as participation is voluntary. Current research on Affordance theory in IS research suggests one reason being that users may not always recognize the opportunities for action and the potential outcome of the corresponding actualization. In our qualitative study in a medium-sized company, we investigate how experiencing offline networking with other ESN users will help to recognize online networking potentials, leading to an increased actualization of ESN affordances. In addition, we investigate the role of social bots (here: Lunch Roulette Bot), which provoke interaction by inviting users to meet other employees for lunch, therefore nudging users to experience certain actualizations like offline networking. We find that social bots can be more helpful than conventional one-to-many solicitations of the management and help increase human interaction in ESN.

Keywords enterprise social networks, affordance theory, social bots, social media

1 Introduction

The presence of technology is evermore noticeable in many aspects of human life. In particular the increasing relevance of technology in enterprise settings shapes and influences not only the way organizations do business but also the way they work and function internally (Leonardi 2013). Enterprise Social Networks (ESN) as such a technology help facilitate communication and collaboration processes between workers across different subsidiaries, departments or hierarchy levels (Riemer et al. 2017). In doing so, ESNs provide opportunities for private messaging between only two actors as well as public messaging in open communication channels. Moreover, users can maintain personal user profiles and interact with other user profiles by liking or commenting on their content. Top level management implements ESNs into organizational infrastructures to enable their workers and improve the flow of information not just across hierarchies but also among employees on the same hierarchical level (Riemer et al. 2015; Stieglitz et al. 2014). Accordingly, in the process of exchanging work-related information on ESNs, employees may also socialize and build personal relationships. This added value of introducing ESN in the work environment and thereby improving enterprise social exchange and decreasing anonymity is becoming a favorable indirect consequence of ESNs. However, research shows that some workers can show low activity in soft factors such as exchanging task-related information resources, socializing with colleagues, or both (Meske and Stieglitz 2013).

According to Affordance Theory, differences in technology adoption such as varying levels of network activity and feature usage are possible due to differences in technology perception and awareness of technology affordances (Leidner et al. 2018). “Affordances” can be understood as a general opportunity for action to individuals who interact with a particular technology (Volkoff and Strong 2013). Basic affordance assumptions and factors determining technology use thereby include individual levels of awareness (here: perception), individual preferences or contextual use, which may vary within collective groups of individuals using the same communication and collaboration tools (Volkoff and Strong 2013). Research shows that for instance, the socializing potential of ESN use in organizations is surprisingly often not perceived and consequently not actualized by ESN users, even if advertised by management (Leidner et al. 2018). Instead of disseminating information of potential use cases top-down, nudging the employees to individually experience the advantages of e.g. socialization is an alternative and promising way to encourage new ESN affordances. One facet of more individualized interaction on social media has been realized through social bots. In the process of the increased enterprise social media diffusion in organizations social bots growingly become a facet of the interaction in the work environment. For this purpose, we argue that instead of top-down management communication, social bots could be used as a resource to nudge ESN users to experience interaction with other colleagues. Namely because social bots can provide a low cost, time- and space-independent version of a key user on the ESN, who provoke interaction as they are often perceived as neutral sources of information, which communicate at eye-level with other users. Social bots are characterized as automatic or semi-automatic computer programs, which mimic human behavior while interacting with humans on the network (Wagner et al. 2012; Davis et al. 2016). Furthermore, in the particular context of organizational ESN, in order to help users understand the advantages of digital interaction potentials, it may also be beneficial to facilitate respective networking-experiences outside of the technology, which in turn can make digital social networking potentials more visible (Zhang and Venkatesh 2013). In consequence, our research question reads: *How can social bot induced offline-interaction lead to a change in perceptions of ESN affordances and actualization?*

To investigate according assumptions, we will survey one specific case in a medium-sized enterprise marketing agency, which uses a social bot to randomly bring ESN users into offline contact. In this case the social bot functions as a programmatically controlled Bot-user who interacts with other ESN users as if it was human. By randomly assigning real world lunch appointments, the potential of interaction with colleagues is made visible to workers across departments and hierarchies in order to decrease social interaction barriers, which consequently may lead to novel ESN affordances and actualizations. For this purpose, we conduct qualitative interviews with workers in the case company who have used the Lunch Roulette Bot. The research objective of this study is hence twofold. First, we investigate the potential of social bots in nudging ESN users to interact. Second, we investigate the recursive effects between experiences in the online and offline environment that affect technology affordances and actualization.

The remainder of this paper is structured as follows: First, we will begin by presenting the status quo on the current scientific discourse about the applicability of ESNs in work environments. We then review the existing literature on social bots, which is a comparatively new object of study in information systems research. Thereafter, we will introduce Affordance Theory as the theoretical foundation of the socio-technical paradigm presented in our work. We then will provide our research design. The paper ends with first findings of our qualitative study.

2 Literature Review

2.1 Enterprise Social Networks in Organisations

Scott et al. (2016) define ESNs as “platform[s] for tight integration of multiple types of Web 2.0 tools into a single private/semi-private network for businesses and organizations” (p. 2). Basically, ESNs are virtual networks within the company to help enhance work processes by offering different features such as blogs, wikis, and open or closed communication channels as well as discussion boards (Schneider and Meske 2017). In their basic functionality, ESNs can be compared to Social Networks like Facebook or Twitter. Nevertheless, they differ in regard to their accessibility as ESNs are restricted to the Enterprise setting and therefore only grant access to authorized actors. Due to the restriction to enterprise settings and apart from cases in which customers or business partners are granted access (Turban et al. 2011), ESNs provide a new form of Intranet in which the links between two or more actors represent professional relationships. IS researchers have shown the ESN significance to organizations by tending to the various ESN features and their provided opportunities for interaction (Dimicco et al. 2008; Moqbel and Aftab 2015). There is a multitude of ESN features which can support actors to orchestrate their relationships such as possibilities to create customized online profiles for instance. Other features provide opportunities to connect with colleagues and track their activities. Sharing content and experiences by exchanging short messages via direct messages or blogs, or posting, commenting, editing, and linking files during the exchange with others (Leonardi 2013) are also opportunities for feature use.

However, due to the default setting character of the mentioned features in most ESNs, users are more likely to exercise a feature bias towards the technology functionalities they are familiar with or see the most potential given the context in which they use the technology (Leonardi and Vasst 2017). That way feature utilization is more dependent on individual preferences regardless of the potential features an ESN has to offer. A variety of factors may influence feature use such as organizational contexts or personal perception (Chemero, 2001). For instance, research shows that there are intrinsic altruistic motivations and extrinsic motivations that influence network participation (Wasko and Faraj 2005). Intrinsic reasons such as the desire to help others can be viewed as genuine drivers to enhance interaction. A genuine interest in network participation and interaction with colleagues may bring many benefits to the organization. In fact, more recent research focuses on the indirect added value of ESNs in organizations. Thereby key subjects to research are the access to intra organizational exchange of information and knowledge, the overall increased group performance, or the enhancement of social capital. Meanwhile, extrinsic reasons such as increased attention or visibility are short lived as they are not self-sustainable (Ke and Zhang 2010) and may influence interaction seeking only with individuals who are valued as beneficial in realizing extrinsically motivated goals. Research shows that extrinsically motivated people who view the use of an ESN as strictly work related or as something mandatory they are getting paid to do, will not perceive socializing features as valuable (Roberts et al. 2006). Instead they will predominantly utilize ESNs to exchange work related information or finish tasks and refrain from exhausting the full ESN potential. As exhausting ESN potentials to enhance intra organizational interaction remains an overall management goal and the realization of this goal is subject to research in this work, we will now assess possibilities of enhancing intra organizational interaction. Accordingly, social bots will be introduced as a means to enhance interaction in the enterprise setting.

2.2 Social Bots

A new type of computer algorithms, known as social media robots and often referred to as social bots or bots have an increasing presence on public social media like Facebook (Wagner et al. 2012). Social bots characterize as automatic or semi-automatic computer programs (Wagner et al. 2012), which produce content (Davis et al. 2016) on social networks. They are unique in that they mimic human behavior while interacting with humans on networks (Boshmaf et al. 2012). Accordingly, social bots have perfected simulating the way humans communicate and interact online (Freitas et al. 2015). Moreover, another important characteristic of social bots is that they have the ability to perform human activities such as posting messages or requesting to connections to other actors, thereby growing their ties within the network (Boshmaf et al. 2012). Though the intentions to deploy social bots in networks are not always bad, they can also be harmful in cases where they are deployed to spread unverified or false information (Ferrara 2017). There are several examples of social bot misuse in the literature ranging from social bots functioning as spam to social bots deployed to mislead publics or slander politicians to artificially gain support and in consequence sway public opinion towards a favorable political candidate (Ferrara 2017). In such cases social bots may target social networks in general or specific online communities to either reach an influential position with the most possible impact on the collective opinion or perform some kind of online surveillance (Boshmaf et al. 2012). Despite the many examples of negative social bot influence, there are other instances where social bots have been deployed to entertain, help, disseminate

information or simply interact with human users on the network (Davis et al. 2016; Ferrara 2017). As the boundaries between human-like and bot-like behavior get harder to decipher, research has tried to identify relevant distinctions to uncover bot networks on social media. One approach to research on social bots by Freitas et al. (2015) assessed key aspects in order to differentiate between content posted by different kinds of social bots as opposed to content posted by humans. On the basis of their findings the researchers then developed a machine learning model as a tool to enable social bot detection more easily (Freitas et al. 2015). Other research approaches are less concerned with social bot detection and rather focus on consequences of social bot interaction. Therein research has developed means to deploy machine learning to predict user's vulnerability to social bot attacks (Wagner et al. 2012).

Despite the broad research interests in both social bot detection as well as assessing the consequences of social bot activity on public social media, much less research has been applied to the role of social bots in enterprise settings. Research results by Wagner et al. (2012) indicate that users who are more susceptible to social interaction in ESNs are also more susceptible to interacting with social bots. Though as social bots mimic social behavior and provoke interaction with humans, there is a potential for social bots to help exhaust the full potential of ESN feature use even in individuals less susceptible to social interaction. Before assessing the role of social bots in closing this gap, we will first assess the theoretical background in differences between ESN features and ESN Affordances to understand why ESN potentials may not be exhausted equally within the same organization.

3 Theoretical Background

An important aspect of Affordance Theory is that humans have to recognize (technology) features in order to be able to carry out a respective action (Chamero 2003). Opportunities for action are never endless and can also be constraining (Leonardi 2013). In fact, an individual's goals and abilities determine how he or she affords an object, though the object's affordance may change according to the particular context in which it is used (Faraj and Azad 2012). Meaning, that if a technology user recognizes certain features he or she may actualize features that help satisfy a particular goal and disregard features that do not serve a purpose in a given context. At the same time the option to "like" content in an ESN may be afforded to express applause in one context and to give consent or approval for project agendas in another context. As Chemero (2001) framed it "action is preceded by perception" (p. 115) and until affordances are actualized they remain mere potentials for action. Affordance Theory has its roots in the field of Ecological Psychology. James J. Gibson is the founding father of both, ecological psychology and Affordance Theory. He developed the research approach based on his interest in perceptual psychology and how the environment affords humans a variety of possible actions (Gibson 1966). Further, he stated that humans' actualizations of affordances are perceptually driven and defined environmental cues as information-based accordingly. Following that, the study of perceptual psychology analyses cognition in regard to relations between (human) agents and others systems (Chemero 2003). An important aspect of affordances as opposed to other human-technology centered theories is that both technologies and humans possess agency, meaning the power to influence or modify state of affairs. In IS literature the concept of affordances is viewed from a social-technical paradigm applying the concept of affordances to the relationship between humans and technologies (Chemero 2003; Volkoff and Strong 2013). Thereby, an affordance emerges as an opportunity for action to individuals who interact with a particular technology (Hutchby 2001).

This differentiated view of perception, use, features, action, and outcomes offers a first approach to distinguish the various aspects of affordances which according to research has not yet been given enough attention (Leidner et al. 2018). Every interaction between humans and technologies begins with the technology use and consequently affords the user of the technology certain possibilities for action. As features posit the potential for action, users may continue to actualize some features which they perceive has useful and disregard others. Depending on the feature actualization every technology affordance ends in a particular outcome of the affordance generated by using the technology in the first place (Leonardi, 2011). Accordingly, ESNs are not afforded to provoke social interaction in cases where such affordances are for whatever reason not perceived. This is where research has yet to provide possible solutions as to how such beneficial technology affordance can be nudged. Therefore, we aim to close this gap by assessing the potential role of social bots in driving social interaction. In the following we will now layout our research design and preliminary findings for both, the role of social bots in exhausting ESN potentials as well as the change in ESN affordance after a social bot induced offline interaction.

4 Research Design

We adopted the critical realist perspective as fitting to conduct our research within an open, in terms of non-restrictive with unpredicted outcomes (Carlsson 2011), but at the same time enterprise specific and regulated (social) system. Critical realism generally describes an epistemology where micro- and macro level dynamics in the real world are actualized in specific contexts, connecting them to the empirical domain (Bhaskar 2008; Mingers 2010). We found the critical realist notion fitting in explaining potentially new empirical outcomes. Considering social bots in the enterprise context and further assessing their role as human interaction enhancing is rather novel, we set out with a single case study. Thereby, we aim to utilize described potentials of single case studies such as for instance the discovery of unique insights (Seidel et al. 2013), in the attempt to make a valuable contribution to the empirical domain. Moreover, we realize that said potentials also satisfy the reasons for appropriate use of case studies according to Yin (1989): First, most small-and medium sized enterprises (SME) are aware of ESNs and make efforts to implement such technologies in their organization. Nevertheless, much less prominent is assessing the technology efficacy in terms of its individual user actualization in SMEs. This is where our case fits the premise of uniqueness because introducing social bots as a way to increase ESN feature actualization has not been suggested in research. The SME in our case has about 100 employees and is in the consulting business. The ESN “Slack” was introduced in January of 2016 to support networking across hierarchies and departments. In the process of affording Slack there are a variety of different features such as for instance open and closed communication channels or posting pictures provided to the users. A user who has the goal to communicate more with his or her colleagues on ESNs may afford the technology to interact with peers. There are said features like open or closed channels which the user can actualize in pursuit of his or her goals. We will interview about 10-15 employees from the entry-, mid-, and senior-level of authority at the SME to explore the distribution of contextual use and individual goals for ESN affordance. On their ESN, the SME integrated a social bot function, called Lunch Roulette. The Lunch Roulette bot is an algorithm which randomly matches roulette participants who sign up for lunch dates. The social bot then moderates the interaction by informing participants of their assigned dates in a one-to-one message. The SME uses this particular bot function since the beginning of their Slack implementation because it atomizes the matching processes and initiates interaction between anonym participants. What makes Lunch Roulette a typical bot service is its human-like participant interaction. According to the case company, the bot proactively approaches ESN users who are more active as well as nondescript, task-oriented participant users who are more socially withdrawn. Thereby, the bot takes on a neutral role and makes it less socially awkward for people to get in touch.

For our data analysis, we followed the approach by Henfridsson and Bygstad (2013), who describe the following four steps to identify mechanisms to explain new empirical outcomes: identification of the objects in the case, identification of key mechanisms, and analysis of contextual conditions as well as analysis of the outcomes of the mechanisms. In accordance with the Henfridsson and Bygstad (2013), we conduct our own analysis procedure as follows: in a first step we use a self-developed coding scheme to identify the role of social bots in facilitating social interaction among colleagues with high anonymity, and from different departments or hierarchy levels. Thereby, we mainly focus on statements revealing *the role of the Bot in provoking* interaction and the influence thereafter on the continued online interaction. In a second step we code for mentioned affordances prior to social bot interaction to draw a comparison with identified changes in ESN perception and technology use in a third step. In a fourth step we then differentiate between technology use and feature actualization to clearly distinguish new affordances and their said outcomes. Currently, we are in the process of conducting up to 15 interviews with employees from the entry, mid-level and senior level, and have completed 3 of them. In the following we will now show first findings for both, the role of social bots in exhausting ESN potentials as well as the change in ESN affordance after a social bot induced offline interaction.

5 Preliminary Results and Implications

Our first three interviews confirm the assumption that social bots influence social interaction and consequently also technology affordances. The interviews resulted in the identification of Slack bots as widely accepted, natural parts of the network structure which request users to do something, provide individualized answers and information or run employer branding measures (Interviewee 2, entry-level). The lunch bot in particular acts as a significant accelerator of social interaction across hierarchical levels and departmental structures. This is also illustrated by Interviewee 3 (senior-level) who said: “(...) *the lunch bot helped me break the ice with colleagues outside of my peer group that I would otherwise not have approached within the first week*”. In terms of consequent online interaction, we learned that a bot-mediated offline interaction in turn provokes an increased online interaction. “Yes, I would

definitely say that quickly getting to know so many different people offline made my Slack activity increase exponentially (...) for instance I remember feeling encouraged to post an interesting article in the open channel because a colleague I had met previously was super visible on there" (Interviewee 1). In turn, this suggests a new technology affordance in terms of actualizing the open channel feature, which was not perceived as useful prior to the offline interaction in the SME. Interviewee 3 also stated that she is very output oriented but interacting with new colleagues offline occasioned her to "*initiate private online groups*", which is a Slack feature she knew about but did not perceive as useful prior to meeting colleagues offline. The new Slack affordances and consequent feature actualizations demonstrate that social bot induced offline interaction may influence increased online interaction and connectedness outcomes.

Overall, our findings so far provide several contributions to research and practice. For one, our case study contributes an empirical study to the existing body of knowledge regarding affordance theory. We further introduce social bots into the research field of ESNs and therefore aim to initiate a theoretical debate focused on the future of digital work environments. Moreover, we implicate that social bots may indirectly influence technology affordances and respective actualizations. This being the case our contribution to practice is a renewed awareness of the influence and user-perception of social bots in the work environment. Top level-management and decision makers need be aware of the fact that social bots are widely accepted and welcomed in the SMA. Given this positive perception we could show that social bots can provoke increased interaction and new feature use on the ESN, which in turn leads to an improved utilization of ESN-potentials.

6 Conclusion

Our case study highlights the influence of social bots on the user-interaction among workers in an SMA. We were able to assess that the neutrality of the bot and its perceived informality of interaction on the ESN is beneficial in provoking offline interaction in the SMA. Through bot-mediated lunch dates, workers build second-base (social) relationships with their colleagues in a neutral lunch-date environment outside of the enterprise setting. Though lunch-dates did not exclusively lead to increased social ties in the SMA, workers perceived them as significantly impacting their overall socialness in the SMA, especially in terms of meeting colleagues outside of their peer group or comfort zone. Moreover, this initiated (offline) social interaction to some extent provoked an increased interaction in the ESN. According to our case study, bot-induced lunch dates influence certain features-use in the ESN such as communication style and channel use.

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