

Once You Step Over the First Line, You Become Sensitized to the Next: Towards a Gateway Theory of Online Participation

Completed Research Paper

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Abstract

This article proposes a gateway theory as a promising alternative to the traditional antecedents-based view of online participation. The traditional view contends that people plan their online participation based on some rational motivations, leading to a foreseeable route. We arrived at our proposition through two entrance stories. These stories offer rich descriptions of formative experiences and consequent participation progression. Our proposition of the gateway theory consists of two parts: First, participation occurs with uncertainty, involving trial and error, unknown risks and rewards, and the availability of technology-facilitated services. Second, participation consists of sequences of activities, in which each step sensitizes the person to opportunities previously not acknowledged. Consistent with the metaphor of the gateway, the first encounter may often be the most critical step. We argue that the gateway theory offers major opportunities for future research, particularly in conceptualizing the early stages of an individual's path of online participation.

Keywords: Gateway theory, online participation, antecedents, Wikipedia, FLOSS

Introduction

The first impression is crucial in many kinds of encounters, as it provides a formative experience that could guide future action. It also bears importance in the use of web technologies for cooperation and collaboration. Such technologies are part of our work and leisure, and have become a central focus of study within numerous disciplines, including Information Systems (IS) research. These technologies have allowed new forms of collaboration to emerge, facilitating the connection of people around the globe to work on joint matters. Researchers have examined these new technology-facilitated forms of collaboration with terms such as online participation, open collaboration, and peer production.

Explaining the progression of online participation bears a clear resemblance to explaining why people accept and use innovations, which has been one of the major topics of study in IS research during its existence (Straub and del Giudice 2012). One of the remaining key questions under this topic is, which comes first, need for a new technology or awareness that the technology exists? IS theory paints a mixed picture: For the most part, early IS theories suggested that needs precede technology. For instance, early IS development models, such as the waterfall model (Benington 1983), offered requirements analysis as the first step of the IS design process. Later theories and models seem to tell otherwise. For example, prototyping (Brooks 1987) and the spiral model (Boehm 1988) suggest that people may not have such a good idea about what they want the new system to do; therefore, it is necessary to involve the end users in the design process and show them intermediate steps of the system. On the other hand, when looking at the Information Technology (IT) adoption models, the dominant ones such as TAM (Davis 1989), TAM2 (Venkatesh and Davis 2000), UTAUT (Venkatesh et al. 2003), UTAUT2 (Venkatesh et al. 2012), and DTPB (Taylor and Todd 1995) all either tacitly assume that needs come first or they shun the entire question. Intriguingly, empirical tests of these models often find that measured predispositions toward accepting or using IT often fail to determine actual behavior (Davis and Venkatesh 2004; Kuo and Young 2008; Venkatesh et al. 2000; Wu and Du 2012).

IS literature on systems development, IT use, and online participation are by no means alone in being ambiguous about the order in which need for and awareness of a technology come about. This is one of the remaining key questions in innovation research that remains unanswered (e.g. Rogers 2003, p. 171). Solving the needs-first vs. awareness/knowledge-first problem is of importance for academics and practitioners alike. The “awareness/knowledge-first” view suggests that the individual is a passive spectator when first being exposed to awareness/knowledge about an innovation (Coleman et al. 1966). In contrast, the needs-first view suggests that the individual actively exposes herself to messages about an innovation (Hassinger 1959). In terms of new product development, the needs-first view suggests that product developers should query people for their existing, unfulfilled needs. The “awareness of an innovation first” view, in turn, suggests that new product development cannot be based on identifying unfulfilled needs because those needs come into existence only after people encounter new technologies, which create the need.

It is evident that much of the existing research into online participation has followed the lead of the dominant IT adoption models and focused on the antecedents of the behavior (Bagozzi and Dholakia 2006; Benbya and Belbaly 2010; Fang and Chiu 2010; Hsu and Lin 2008; Roberts et al. 2006; Wu et al. 2007). In turn, another stream of such research has explained the evolving process of online participation through concepts such as legitimate peripheral participation (LPP) in communities of practice (Lave and Wenger 1991). These concepts have been used to make sense of newcomers’ progression from a newbie to a full member of various online communities (e.g. Antin and Cheshire 2010; Bryant et al. 2005; von Krogh et al. 2003; Ye and Kishida 2003). Overall, we acknowledge that there is a wealth of studies that explore people’s engagement in online communities and rely e.g. on theories of identity or commitment development (e.g. Bateman et al. 2011; Lampe et al. 2010; Ren et al. 2012; Schultze 2014; Valentine and Holloway 2002). We find research on online participation, however, as limited concerning the initial phases of online participation. None of these streams of research touches on the precedence of needs and awareness/knowledge.

Hence, in this paper we focus on the precedence of needs and awareness/knowledge in the context of the initial phases of online participation. We develop an alternative explanation to the traditional antecedents-based view on how individuals progress in their online participation. We label our conceptualization as the “gateway theory to online participation”, being inspired by the famous albeit also widely criticized gateway theory to drug use (Kenkel et al. 2001). We are telling a scholarly story at two levels. On the level of online participation, we seek to answer the following research question: How does online participation progress over time, particularly during the very early stages? On the level of technology diffusion, we seek to answer the related perennial question: Which comes first, needs or awareness of an innovation? Hence, in this research paper we seek to contribute to research in both online participation and diffusion of innovations through considering the factors intertwined with people’s online participation choices that are perceived as dynamic, emergent processes.

The paper is structured as follows: In section two, we first review related research on the antecedents to online participation, after which we construct our theoretical framework based on the gateway theory. Section 4 introduces the research design employed in our empirical studies in two online community contexts. The fifth section, building on a “confessional” narrative style of writing (Van Maanen 2011), introduces two distinct entrance stories that paint a picture of the process of entering and eventually becoming members of two online communities. The sixth section discusses the implications of the results, while the last section summarizes them and their implications for IS research and practice, and identifies the limitations of the study and interesting paths for future work.

Background and Theoretical Lens

This section introduces existing research on antecedents to online participation, participation progression, and the original gateway theory. The section concludes with our own formulation of the gateway theory, which we have adjusted for the contemporary context of online participation.

Antecedents to Online Participation

Various disciplines, including IS research, have already produced a huge amount of literature on online participation. Many of these studies can be labelled as “antecedent research” – essentially variance-theoretical accounts focusing on conditions that predict participation. In the context of Wikipedia, for example, such studies represent an established stream of research (Okoli et al. 2012). In these types of studies, independent variables such as intrinsic motivation, extrinsic motivation, external self-concept and internal self-concept (Yang and Lai 2010), reputation, reciprocity, self-development, altruism, enjoyment, ideology and sense of belonging (Xu and Li 2015) or attitude, subjective norm, descriptive norm, perceived behavioral control, and ego involvement (Park et al. 2015) have been used to predict knowledge-sharing behavior (Yang and Lai 2010), content contribution, and community participation (Xu and Li 2015), or intention to upload content (Park et al. 2015).

The similar trend can be found in studies examining other kinds of online communities. In open-source software (OSS) development communities, studies have revealed cognitive (attitudes, perceived behavioral control, identification with the open source movement), affective (positive and negative anticipated emotions), and social (social identity) determinants of participation and their consequences (Bagozzi and Dholakia 2006). Research also has shown that helping behavior, economic incentives, and adequate motivators influenced OSS developers’ feelings of satisfaction and their intentions to continue with OSS development (Wu et al. 2007). Moreover, ease of use, enjoyment, and knowledge sharing (altruism and reputation) were positively related to the attitude toward blogging. Other elements include social factors (community identification) and attitude toward blogging, which significantly influenced a blogger’s intention to continue to blog (Hsu and Lin 2008). In addition, justice and trust are important antecedents to the intention to continue knowledge sharing in virtual communities of practice (Fang and Chiu 2010).

Online Participation Progression from the Periphery to the Center

In addition to the antecedent-orientation, another relevant stream of research focuses on participation progression. In this stream, the focus is on the complexities of an evolving process of online participation from the community’s far periphery towards its core. For example, the concept of *legitimate peripheral*

participation (LPP) in communities of practice (Lave and Wenger 1991) has been utilized in various kinds of online community contexts to make sense of how a member progresses from a newbie to a full member of an online community (e.g. Antin and Cheshire 2010; Bryant et al. 2005; von Krogh et al. 2003; Ye and Kishida 2003). Scholars have conceptualized online-community-specific frameworks. For example, Preece and Shneiderman (2009) introduced the Reader-to-Leader Framework, in which a user transitions from a reader, to a contributor, to a collaborator, and finally to a leader.

In contrast to models that offer predestined paths, however, we emphasize situated actions that sensitize the individual to opportunities that she did not acknowledge beforehand. We focus on the initial encounters with particular online communities, and develop an alternative explanation to the traditional antecedents-based view of online participation. We acknowledge that theories such as LPP are well equipped to explain the evolving process of people becoming acknowledged or full members of online communities (e.g. Antin and Cheshire 2010; Bryant et al. 2005; von Krogh et al. 2003; Ye and Kishida 2003), but claim that these theories neglect the initial stages related to adoption or choice. Earlier antecedent-based IS research, on the other hand, has thoroughly examined the motives or other factors that affect the intention to join an online community, but our theory postulates that it is not meaningful to focus on the a priori intentions or attitudes. We label the explanation as “the gateway theory to online participation”, being inspired by the famous albeit widely criticized the gateway theory to drug use (Kenkel et al. 2001). Before presenting our formulation of the theory, we introduce the original gateway theory in its indigenous context of drug use.

The Original Gateway Theory

The origin of the gateway theory (also gateway hypothesis, or gateway effect) comes from the context of drug use. Denise Kandel is often credited for coining the concept in 1975 in her article in *Science* (Kandel 1975). The idea existed earlier as the “stepping stone theory”, and is rooted in conventional wisdom (Bell and Keane 2014, p. 46). Robert DuPont Jr. introduced the idea to the wider population in early 1980s (DuPont 1984). DuPont’s suggestion to “get tough on gateway drugs” became a central anti-drug policy guideline in the United States (Kleinig 2015), and was widely popularized in Nancy Reagan’s “Just Say No” campaign (Mackey-Kallis and Hahn 1991). Bell & Keane (2014, p. 45) label the gateway theory as “one of the most influential models of drug use of the twentieth century”.

Kandel (1975) studied the sequential pattern of drug use initiation through longitudinal data and found four stages in drug use where marijuana was the first gateway on the path to other drugs. Later, however, Kandel and colleagues (Kandel et al. 1992) emphasized that entry into one stage does not inevitably lead to entry into the next stage. Pudney (2003) identified three possible mechanisms for a causal gateway effect in drug use; any one of these mechanisms or any combination of them may cause entry through the gateway into the next stage of drug use. The three mechanisms are as follows:

- 1) The consumption of soft drugs may create a psychological or physiological need for getting further and stronger experiences of the same type;
- 2) The act of obtaining soft drugs may bring the user into contact with the users and suppliers of harder drugs whom they would not had met otherwise; and
- 3) The personal experience of the use of soft drugs with no obvious ill effects may contradict and undermine the strong negative publicity that is directed against drug use in general, therefore making the public campaigns against hard drugs less persuasive.

Bretteville-Jensen et al. (2008) also identified the consumption of a drug for the first time as a threshold-crossing experience and that action could make it less costly to proceed through the gateway into subsequent stages of drug use. They identified alcohol being the gateway drug for cannabis, cannabis being the gateway drug for amphetamine, and amphetamine being the gateway drug for cocaine. Recently, the emergence of e-cigarettes has re-energized the gateway theory to describe the transition from recreational nicotine use to nicotine addiction (Bell and Keane 2014).

In general, the gateway theory offers “a degree of seductiveness to the idea that exposure to a single substance will lead people inexorably down a path of vice they would not otherwise have succumbed to” (Bell and Keane 2014, p. 49). But Kleinig (2015, p. 5) recently summarized that there is no one gateway theory. Instead, there is a “cluster of theories about successive stages in drug use, from less serious

(“softer”) to more serious (“harder”). Similarly, Bell and Keane (2014, p. 50) argued that instead of a single theory, it is “a hybrid of popular, academic, and media accounts”, and what the “theory is and what it *means* is neither fixed nor stable”.

Formulating the Gateway Theory of Online Participation

“Give a small boy a hammer, and he will find that everything he encounters needs pounding.”
(Abraham Kaplan 1964, p. 28)

The law of the instrument by Abraham Kaplan (1964, p. 28) succinctly captures the essence of our gateway theory of online participation. In this section, we explain how past encounters could guide one’s future encounters; here with complex sociotechnical ensembles we call online communities. The central ideas of our gateway theory are that 1) first encounters are largely incidental and situated-in-action, and 2) encounters sensitize the person to new opportunities through positive outcomes operating as formative experiences.

In more everyday language, people learn to see opportunities for using technology with which they have had positive encounters, and fail to see opportunities to use technologies that they have not used before. The same can be applied for more complex sociotechnical ensembles such as online communities. All this implies that encountering a technology or an online community does not necessitate a will or motivation, but it can be highly incidental and situational. Here, the mere availability of a technology can be more important innovation attribute than its relative advantage (Rogers 2003) in determining the rate of adoption and use. Positive initial experiences are essential in this theory. Formative experiences are those experiences that make a major impact on the person, resulting in learning (e.g. Janson 2008), in which experience is at the center. Past positive experiences guide our behavior; rewarded or successful behaviors also reinforce similar behavior in the future and the sense of success leads to the strengthening of self-efficacy in associated activities or areas (Janson 2008, p. e.g.). Hence, the gateway theory suggests that we acquire rather than inherit our behaviors. Additionally, the theory emphasizes the influence of first-hand experiences rather than a priori motivation as determinants.

Another important aspect in the theory is that practically all purposive behaviors need some outside stimulus to start them. All along, social psychology has acknowledged this: “Attitude and, as ordinarily used, disposition suggest something latent, potential, something which requires a positive stimulus outside themselves to become active.” (Dewey 1922, pp. 40-41) Social psychologists have downplayed the need for activation because motivation seemed to be, for a while, a sufficient determinant of purposive behaviors. As a result, a host of motivational theories sprang out explaining behavior with expectancies about one’s ability to reach the desired outcome and with the task value. These expectancy-value theories have been moderately successful in explaining solitary behaviors but unable to account for those properties of recurrent behavior, such as rate of technology adoption or frequency and amount of technology use. While motivation to use technology may develop through evaluation of technology characteristics, as suggested for example by the diffusion of innovations theory (Rogers 2003, p. 175), goal activation does not. The redoubtable John Dewey already noted that activation of behaviors develops through first-hand experience with action: “The essence of habit¹ is an acquired predisposition to ways or modes of response, not to particular acts except as, under special conditions, these express a way of behaving. Habit means special sensitiveness or accessibility to certain classes of stimuli, standing predilections and aversions, rather than bare recurrence of specific acts. It means will.” (Dewey 1922, pp. 41-42) In the gateway theory to online participation, we maintain that initial experiences with online participation, if positive, sensitize the individual to the stimuli and may initiate in the individual even a need for getting further and stronger experiences of the same type.

To summarize, the gateway theory to online participation maintains that participation occurs under uncertainty and involves trial and error, unknown risks and rewards, and the mere availability of technology-facilitated services. Participation almost necessarily consists of sequences of activities in which each step sensitizes the person to opportunities previously not acknowledged. Consistent with the

¹ Dewey used the term habit in a very different meaning than the one given to it in current information systems research. In fact, Dewey clearly opposes the current practice of conceptualizing habit as automatic repetition of rule-based action.

metaphor of the gateway, the first encounter may often be the most critical step. Next, we present our empirical examples that offer support for the gateway theory to online participation and a description of the research design involved with gaining such empirical data.

Methodology

Our arguments about the initial stages of online participation are based on our qualitative inquiries (Denzin and Lincoln 2000). One research stream has focused on the Finnish language edition of Wikipedia, and the other has concerned free/libre open source software (FLOSS) development projects. While our two research programs have been separate projects, both can be labelled under the banner of *open collaboration* (Forte and Lampe 2013; Levine and Prietula 2014).

“Qualitative research is a situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that make the world visible. These practices transform the world. They turn the world into a series of representations, including field notes, interviews, conversations, photographs, recordings, and memos to the self. At this level, qualitative research involves an interpretive, naturalistic approach to world. This means that qualitative researchers study things in their natural setting, attempting to make sense of, or to interpret, phenomena in terms of the meanings people bring to them.” (Denzin and Lincoln 2000, p. 3)

Our studies into Wikipedia and FLOSS development projects are qualitative, albeit with definite differences. In qualitative, interpretive research, Walsham (1995; 2006) has discussed the different roles the researchers can adopt, i.e. the “outside researcher” and the “involved researcher” (Walsham 1995). The former refers to the researcher having “no direct involvement in action in the field or in providing significant feedback to field participants”, while the latter refers to researcher acting as a participant observer or action researcher who consciously and explicitly aims at changing things in the field. In this case, the researcher participates in action, not only accesses opinions on the matter of interest. The research subjects may have a positive view of a researcher who “tries to make a valid contribution to the field”, not only to academic literature. On the other hand, there are numerous risks and challenges involved with this type of research, such as its demands on resources. Another risk may occur when the researcher “goes native” to the extent that she loses the critical distance to the field and to the intervention outcomes. (Walsham 2006)

Our studies discussed here represent both of Walsham’s study types. In the first case, Wikipedia, the first author (Lanamäki) has conducted a set of content analyses and contributor interviews in Finland as a part of his doctoral thesis work (Lanamäki 2013). This project was initiated in 2007, with the main data collection taking place in 2010. The first contact with Finnish Wikipedia contributors was through a ranking list of the “top 100 list of Finnish Wikipedians by number of edits”. The assumption was that users with a high number of edits had the most in-depth knowledge, thus being capable of providing useful “insider” insights. Fourteen interviews were conducted in early 2010. The interviews lasted from 1.5 hours to 3 hours each. Every interview followed the same interview guide. The purpose was to let the interviewee speak openly about their career in Wikipedia, what roles they have, and what they do. The goal was to let the person’s own voice come through without the interviewer pushing any kind of an agenda. This was achieved by starting with general-level introductory questions and continuing with follow-up and probing questions. In the later part of the interviews, more direct and structured questions were asked (Kvale and Brinkmann 2009, pp. 135-136). The interviews were tape-recorded and transcribed. After each transcription, a short summary of the interview was written that contained information that could not be read in the transcription, how the transcriber had experienced the transcription process, and the general perception of the content and validity of the interview. In total, the transcriptions consisted of about 300 pages of text. Additional complementary interviews were conducted in 2014 and 2015.

The second case was part of a larger research program run by the second author (Rajanan) and his students. The program has included intensive working with a number of FLOSS development projects during an 8-year timespan for the overall purpose of improving the usability of FLOSS. The research program has included 16 subprojects within which junior researchers, under the guidance of more experienced human-computer interaction (HCI) researchers, have introduced usability activities into FLOSS development projects as part of their university studies. All the junior researchers have a usability background from at least two previous courses about usability evaluation methods (e.g. heuristic

evaluation and usability testing), user-centered design, and user interface design in both theory and practice. Each of the subprojects consisted of three to five junior researchers working between 200 and 300 hours each in planning the usability activities, carrying out these usability activities in the selected project, communicating with the project, summarizing the impact of these usability activities, collecting the empirical data, and writing project reports. The senior HCI researchers guided the junior researchers during the entire process, including during the selection of the project and the selection of suitable entrance strategies and usability methods to use. Altogether, the researchers' role was that of the involved researcher (Walsham 1995), who consciously and explicitly tried to change things in the field and make a valid contribution.

The 8-year FLOSS research program and 16 different subprojects organized various strategies and experimented with various methods. These have resulted in differing outcomes in involved projects with different domains, communities, organizational structures, and cultures. In this paper, part of the empirical data that we analyze concerns one of these usability projects. The FLOSS project in question developed a game targeted at non-technical end-users who had no interest or skills in programming. The project first began in 1995 and the team of core developers has changed many times since then. This project had 20 listed active core developers who had commit rights to the code repository. The user community, including bug reporters and non-technical users, was active on a forum with over 1,000 active users and 50,000 posts in total. Access to this case was gained through four student usability teams. Each student usability team consisted of four to six students working between 200 to 300 hours each in planning the usability activities, carrying out these planned usability activities, contributing to the development through code patches based on the results from the usability activities, communicating with the FLOSS project about these results, summarizing the impact of usability activities, collecting data, and writing a project report. Significantly, one of the developers of this particular FLOSS project was a member of the first student usability team. This student acted as an insider informant for all of the student teams and as a usability champion within the FLOSS project community, marketing the results of the usability teams and trying to generate interest in usability and in the suggested changes. Additionally, another member of the first student usability team managed to gain the status of a core developer during the usability intervention. Furthermore, two other members of different student usability teams working with other FLOSS projects gained developer status. In all of these four FLOSS entrance stories, an innocent opportunity emerged to contribute to a FLOSS project, and over time, these members of usability teams became increasingly engaged with their FLOSS project through series of unplanned contributions.

The empirical data concerning this case was collected from the online material of the involved FLOSS development project, such as websites, discussion forum posts, IRC discussion logs, etc. In addition, the student usability team produced numerous kinds of reports of their work, contributions to the FLOSS project, and pertinent information about the selected case project during their interventions. All this is included as research material. The most important research data for this study, however, is the interview of the FLOSS project developer, who as a student acted as a usability team member in the first intervention. Later on, he acted as an insider informant for other student usability teams and as a usability champion in the FLOSS project. The interview addressed his path to core developer status and the paths of other core developers in the FLOSS project. For the purposes of this paper, we inductively identified the events and steps leading to joining the FLOSS project in question, identifying an informant-constructed narrative of entering the community that we label as an "entrance story".

The initial spark for this article came from wondering why the Wikipedia contributors' entrance stories did not resemble the message provided in antecedent studies. In other words, not one contributor had provided a well-formulated intention for their participation in the first place. Then, after a discussion between the first and second author, it seemed so that the situation was also similar in the context of FLOSS. After examining the empirical material separately as regards the Wikipedia and FLOSS development project cases, we combined the findings. We further analyzed those from the viewpoint of the initial encounter during which these individuals entered into the online community and their subsequent career path. We identified clear similarities between the two stories and coherence with the gateway metaphor.

The data was analyzed iteratively by all four authors. In both entrance stories, we focused on the initial encounter with the online community and if this encounter was planned or due to chance. We identified

from the entrance stories that the informants encountered the online community without any prior planning. Both the Wikipedian and the OSS game developer started with small, unplanned contributions and gained positive experiences through these contributions. We identified how both of the entrance stories fit within the logic of the gateway theory. Neither of the informants had decided to become involved in any way, but they did when an innocent opportunity emerged, and slowly, through sequences of activity transitions, they became deeply engaged.

For the purposes of the present article, one respondent was chosen from each of the study contexts. We could have picked other interviewees as well, because the descriptions of their formative participation had many similarities. But we chose these two respondents because the transcripts included the most detailed and self-reflective entrance stories in comparison to all others. In the next section, we proceed to these two entrance stories.

Entrance Stories

In this segment, we present two entrance stories of online participation. The first one is from Finnish Wikipedia. The second one is from an open source game project.

A Story of a Wikipedian

This story paints a picture of a person who accidentally encountered Wikipedia when surfing the web, searching for information and trying to entertain himself. The Wikipedian encountered a piece of information that he thought was false. This became the trigger that encouraged himself to try to edit a Wikipedia page.

I started [in Wikipedia] in 2006. That was around the time I had started to do my PhD. I figured out that, goddamit, I cannot just work all the time. So my first Wikipedia experiences were related to providing a little entertainment to my day. Some others go to Facebook, some go to pony pages, and I browsed Wikipedia. So I was looking at how [Wikipedia] worked and that's how it all started. ... Actually, it all started even before that... It was maybe a traditional story [of Wikipedia participation]. Or I don't know what's traditional, but... I was Googling my home municipality. You know, I'm originally from [a small town in southwestern Finland]... This municipality has an unusual name. I glanced at its Wikipedia page, and someone had written what is the origin of the name... It was total bollocks. I got this feeling that THIS JUST CAN'T BE TRUE. I was thinking whether I should correct this information. About three days later, I decided that, why not? I could try to correct it. And that's how it started.

Hence, this person encountered Wikipedia content without any prior planning or intention to participate. Wikipedia was available there for entertainment and information search purposes, ready at hand, but also accidentally enticing the person to contribute and offering tools to do it. The person contemplated the issue of contributing for awhile, finally deciding to try it out. The next paragraph illustrates the positive experience gained through such action, which evidently acted as a formative experience for this to-become Wikipedian:

I got a bit hooked [on Wikipedia] later. [It's a great] feeling you get when you see your own text on the Internet. You can point out a piece of text and say: 'I was the one who wrote that'. However, I never decided that I'd become a regular contributor. It did not happen like that. It started like, it's impossible to work for 8 hours in a row. Some people take a coffee break, some others pick their nose. I wrote Wikipedia entries. It was harmless amusement for the time.

Here, it is pointed out that the person did not plan to become Wikipedian to begin with. Instead, he just incidentally tried it out, gained positive experiences, and eventually got hooked on it. The activity slowly started to gain more prominence in the life of this contributor:

At first, it did not matter how often I visited or how much I contributed. But then at some point I become aware of these contributor-ranking pages. I saw how much I had contributed, that I was on a ranking page of contributors with over 10,000 edits. It was like wow, just 2 more edits and I will be one spot higher! And for a period of time, that was what motivated me. But after awhile, that was not interesting any more. That list did not seem like a sign of achievement, but more like a list of losers.

This story evokes how the Wikipedia contributor became more seriously involved with the community, increasingly addicted, if you will. One may say that the individual was sensitized to the stimuli but it also seems that a need for getting further and stronger experiences of the same type was evoked. The person was gaining new responsibilities, rights, and plenty of positive experiences during the engagement:

When I become a Wikipedia administrator, then that again really inspired me. For awhile, it was a new thing to do, and I did a range of administrative tasks. I tried to keep the quality high. I corrected errors, fought vandalism, and all that, very much. That also normalized over time. ... After I had become much more active in Wikipedia [and the activity thus required many hours per each day], it become more a free-time activity, a hobby.

In a quite late stage, this Wikipedian become more involved with the Wikipedia *community*, not just Wikipedia content. This is in line with how Preece & Shneiderman (2009) characterized collaboration as a rather high-level stage in participation progression. The respondent characterized this step also as unplanned, a rather gradual shift of what emerged as a side activity to article writing:

I also moved from plain article writing to that social side of activities. That community aspect actually started quite unnoticed. I had commented something like, “here I am writing this [Wikipedia] article, while there is a scholarly article I should be writing.” And someone responded that he/she was in a similar situation. And it had occurred in local history articles as well, that I’ve got to know some people who share similar interests. Maybe they are originally from the same municipality. A discussion may have originated from article collaboration, and then continued on user talk pages. Sometimes we have had email correspondence afterwards, because those user talk pages are public, for everyone to see. And through [Wikipedia], I’ve got to know some people whom I’ve also met face-to-face. We’ve drank red wine together, and things like that.

In this case, the activity has already reached its peak, while the person was still active in Wikipedia, errors and vandalism prevention enticed the person to continue contributing:

Nowadays I’m not that active on Wikipedia. Well, I have lots of articles on my watch list. I monitor that regularly. But due to my studies, I’m forced to a quieter phase of Wikipedia participation. If I had more free time, I’d write more. Nowadays it’s more like, I just try to keep up to date with what’s happening in the community. I try to participate whenever there are current community-level discussions going on. I do have some small projects that I slowly try to develop forwards. If I see that someone has vandalized something I’ve done, or if I see some errors somewhere... There’s a little autistic part of me, or perfectionism... I just can’t tolerate errors [when I encounter them in Wikipedia]! I gotta fix it! [laughs]

A Story of an Open-Source Game Developer

Interestingly, the story of an open-source game developer paints a very similar picture of the initial encounter with an open-source game. A person accidentally came across the game when surfing the web, searching for certain kinds of games and trying to entertain himself:

First I encountered [the game] in 1997, when I was searching for and testing all Rogue-like role-playing games, I think I found it from a BBS [bulletin board system] or something, like I found the others. Back then it was not really an open-source project yet, because it was in the very beginning of the development, being developed—very slowly—by one guy, who you could only contact through his email. And there was not really any means yet to share source code. I mean there were no code repositories or anything like that yet... So I played [the game] first time back then, and it was a really early version, it was actually very crude, lousy, and unfinished back then, but somehow I recognized something in it, something that separated it from the other Rogue-like games that I had tried. There was this one other game with finished development and it was all good, but somehow I still preferred [this game]... I don’t know, something in it was so special, so I wanted to play it more, and then I got some ideas how it could be improved.

Again, the informant came across the game without any prior planning or intention to participate. The game was there for entertainment purposes, ready at hand, but accidentally also including potential targets for improvement and possibilities for small contributions. Similar to the Wikipedian’s story, this person contemplated on the issue of contributing for awhile and finally decided to try to share his ideas

with the developer. The next paragraph illustrates the positive experiences gained through such contribution that in this case also evidently acted as a formative experience for this to-become open-source game developer:

So I emailed the developer and told him my idea how to make the user interface better... I mean, back then you had to press three buttons to do one simple task, and I had the idea that why should I press three buttons, why is one button not enough? I told this idea and some other small user interface ideas to the developer and then in the next release—after quite a long time—I noticed that he had made the changes I suggested to the user interface and I saw that he put my name into the list where he thanked people who had helped him to develop this game. It was so positive an experience; I got in a very happy mood then, getting my name into that list just by giving ideas. I did not really understand game design or coding back then. I felt like the game had progressed and improved thanks to my little contributions, and then it was also easier for me too to play [the game]. So I had a good motivation to do suggestions how to improve the game interface and usability, how to reduce some of the tedium in the game.

In this case also, the person points out that he never thought that he would be allowed to act as a game developer in this community or never planned to become one. Instead, things slowly progressed, one small contribution after another, the person becoming more seriously involved with the community, becoming increasingly addicted, making bigger contributions, gaining new responsibilities and rights, and plenty of positive experiences:

In 2006, another development team forked the game and then I decided to try it again and also to see if I could still make some improvement suggestions. I tried it and found that the user interface was greatly improved, also the game design was really improved. They had removed some unnecessary tedium from the game, really improving it. So then I saw that the development was going to the right direction, and I wanted to do more to the development than just give suggestions... I found out some bugs in the game, so I submitted some bug reports... then I studied and learned the source code of the game... and I made some bug fixes... and then some ideas for the content of the game. One motivating factor when I started collaborating with this development team was that they were so open in communication and [the] development process. There were guides about how the source code could be and ought to be modified, and now the source code was in [a] code repository with version tracking... So I learned how to use this type of code repository and the version tracking, and I then really got motivated to learn how to code... my motivation for all that was that I wanted to go and change and by myself go improve the contents of the game: the character classes, spells, monsters etc... I really wanted to contribute to the game development so that I could get exactly the game that I want to play, but I also wanted to make a great game for everybody else to play too. Then when I really started developing for [the game], I submitted code batches, I did level design and some small side dungeons. Then we had this idea of a portal area, where you had access to these small side dungeons... it was easy to develop a separate small dungeon and then to attach it to the main dungeon. I developed the first two side dungeons, because I really wanted to have dungeons that were themed as ice dungeon and sewer dungeon, really [laughs]... Then I did quite a lot of batches where I just fixed the game text, typos and such, and to improve the text. It was invisible work, but I felt that somebody had to do it, so I did it. Then I fixed some obvious problems in the game, bugs and such, and changed some monsters from boring and generic to more innovative and interesting.

The person had become involved with the community by being a user himself, spotting issues that could be improved. The narrative shows how one thing lead to another, how taking a step sensitized the developer to further or even stronger experiences of the same type. Over time, the person was able to identify solutions that would not just provide quick gains, but could offer longer-term benefits to the development and to the community. He had eventually acquired a significant position in the community:

I also started documenting the process for the future developers, so that it would be easier for them to start to develop... Of course this kind of administrative work does not show directly in the game in any way, but it is important meta-development, that makes the game development possible. I see it this way... this kind of invisible work is good for the community as a whole, and it will be fruitful even though it is not visible in the game itself, by doing this kind of invisible administrative development I try to make the playing and development of the game easier... it is

because I like the game, and I still play it myself... and I always want a better and better game. All these things, suggestions, bug fixes, level designs, game designs, administrative work... they all were the reason why I was invited in 2009 to become part of the development team... it was [an] absolutely great day... really... I really did not imagine back in 1997 that I would someday become a member of the development team myself... But it was not really a surprise in 2009, because I had gradually become an assisting developer, step by step, I was contributing many things and I was in the right time in the right place doing [the] right things.

Similar to the Wikipedian's story, the open-source developer's activity had already reached its peak in this stage. Regardless, the person is still active in the game community, following up the new ideas and versions of game and enjoying the gameplay:

I was very active those two first years; I was a development team member... I tried to make at least one code commit to every little new version of the game, even if it did not have any influence in the game design. So [during] 2009–2011 I was very active as a developer. Nowadays I still read version tracker, commit messages, and email lists. And I try to evaluate the game design suggestions and graphical designs from the community contributors. There have also been lots of new developers... with new ideas, so the development has gone forward, really... there have been even very radical changes, some changes to the game design that I previously thought were impossible to do... So I see now that the game design and development is now in good hands... So now I mostly play the game and enjoy it... I never have even thought about retiring from the development team. I am still part of the development team, but I am not anymore so active.

Summary

These two entrance stories on online participation share very similar characteristics. In both stories, the initial encounter with the online community was due to chance when trying to entertain oneself and the encounter started without any prior planning. Both the Wikipedia entry and the OSS game offered possibilities to contribute, and both the Wikipedian and the OSS game developer started with small, unplanned contributions. As a result, both of them gained positive experiences through these contributions acting as formative experiences. Both persons pointed out that they never thought to become engaged in these online communities. The process was slow, unplanned, and they both became more seriously involved with the community through gradual steps, one contribution after another, becoming increasingly involved, gaining new responsibilities and rights, and plenty of additional positive experiences.

Both of the entrance stories fit within the logic of the gateway theory. Neither of the protagonists of our entrance stories had decided to become heavily involved at the onset, but they did. An innocent opportunity emerged, and slowly, through sequences of activity transitions, they became deeply engaged. Similarly, a person does not decide to become a heavy drug addict during the first encounters with a "gateway drug".

Discussion

This section relates our findings to the existing IS literature. First, the main empirical findings are summarized, after which they are connected with the traditional antecedents-based view of online participation and with studies that have examined the progression of online participation. Finally, some considerations related to the application of the gateway theory to explain IS phenomena are presented.

To recap, our proposition of the gateway theory consists of two parts: First, participation occurs under uncertainty and involves trial and error, unknown risks and rewards, and the mere availability of technology-facilitated services. Second, participation almost necessarily consists of sequences of activities, in which each step sensitizes the person to opportunities previously not acknowledged. Hence, an important point here is to become sensitized to the stimuli. Consistent with the gateway metaphor, the first encounter may be the most critical step. Thus, we claim that neither a priori knowledge nor motivations predict engagement in these activity transitions.

When applied to online participation, the gateway theory suggests that progression in participation is often unintended and hinges on almost accidental events. Our entrance stories show that people do not plan their participation in any degree. They approach their participation blindly, but at the right moment.

First encounters are often accidental: People are not driven by their existing needs to search for online communities that can serve the needs. Rather, awareness seems to precede felt needs by some margin. Encounters that lead to escalation of online participation are not planned for, either. In the typical formative encounter, some aspect draws the user's attention, and the individual drifts towards some initial form of participation. Successful, rewarding trials will sensitize the individual to spot future opportunities to participate; yet each step in the escalation process is a reaction to some event rather than planned action to escalate online participation.

The strength of the gateway theory lies in its ability to explain behaviors that are difficult to explain in terms of purposive behavior. For example, theories that only acknowledge motivation as a mechanism that drives behavior end up suggesting that people are motivated to, plan for, and intend to develop bad habits or even addictions. A suggestion that someone is motivated to develop gaming or social media use to a point of addiction is, of course, intuitively difficult to accept and lacks empirical support. Addiction, compulsive engagement with rewarding stimuli, develops through repeated exposure to intrinsically rewarding behavior that reinforces the behavior. The gateway theory is capable of explaining even how behaviors with harmful outcomes, such as addictions, can develop. Relatively innocuous formative experiences can lead through sensitization and reinforcement to behaviors with harmful consequences.

The two offered entrance stories have provided richly detailed descriptions of how participation first occurred and then progressed. In both of these stories, the person had not planned their participation, especially not for the long-term. This is in stark contrast to the traditional antecedents-based view of online participation (e.g. Park et al. 2015; Xu and Li 2015; Yang and Lai 2010). A common weakness with such traditional antecedent studies is that they "tell us very little about how and why *specific classes of IT tools and technologies* are adopted and used, or how an *IT tool* being adopted *might reflect back on the individual's intentions*" (Grover and Lyytinen 2015, p. 276). Our proposed gateway theory can better account for the mutuality between technology and participation. Technology needs to be available to commit a timely activity. The committed activity will then support the sensitization for subsequent possibilities for action.

The way we view participation is that it is a complex phenomenon, and not just a single construct. Participation is a sequence of interconnected but distinct activities, as is demonstrated in our entrance stories. Once one has entered the gateway, activities evolve sequentially, step by step, contribution by contribution. After taking the first step, the person becomes sensitized to the opportunities for next steps. For the Wikipedian, it made perfect sense to become inspired by a contributor-ranking list to boost his own ranking through article contributions within a particular moment in time. For the game developer, working to improve documentation made sense in a particular moment in time. These people did not foresee a need for these activities beforehand and therefore they did not form a plan in advance to make these contributions.

Moreover, formative experiences are crucial to online participation. This is demonstrated in the context of Wikipedia by the decline in user retention after the introduction of algorithmic quality control mechanisms in 2007 (Halfaker et al. 2013). Wikipedia has undertaken several technical and social arrangements to improve the newcomer experience (Halfaker et al. 2014; Morgan et al. 2013). This is in line with our argument. Negative formative experiences will not sensitize the person for further engagement.

We can also further speculate as to whether the elements of the theory could be extended to explain in more depth the steps leading to serious use, participation if not even addiction, in an online community or IT adoption context. Naturally, the importance of the first step in online participation is highlighted similarly to sequential pattern of drug use initiation stages (c.f. Kandel 1975). Similarly to Bretteville-Jensen et al. (2008), we also identify the first time online participation as being a threshold-crossing experience and that action making it less costly to proceed through the gateway into another stage of online participation. Furthermore, similarly to the drug-use context (c.f. Kandel et al. 1992), it seems that the entry into one stage of online participation does not inevitably lead into the next stage. Our entrance stories do not show evidence of this, but the existing research results reveal, e.g., that the majority of Wikipedia participants stay as readers (Antin and Cheshire 2010) and that FLOSS participants stay as users without becoming involved in the development at all (Ye and Kishida 2003).

Overall, this research has made evident the gateway theory's relevance to the online participation context. We acknowledge, however, that for understanding long-term participation and engagement with particular online communities, there are other theories well-equipped for the purpose, such as theories on identity or commitment development (utilized e.g., in Bateman et al. 2011; Lampe et al. 2010; Ren et al. 2012; Schultze 2014; Valentine and Holloway 2002). When acting as a leader or a core member in a particular online community (e.g. Preece and Shneiderman 2009; Ye and Kishida 2003), such theories provide highly appropriate tools to explore and explain participation. The issue of identity, in particular, is certainly a significant issue in explaining people's online participation and its progression. Plenty of studies (e.g. Ren et al. 2012; Schultze 2014; Valentine and Holloway 2002) offer convincing evidence of how identities are constructed, shared, negotiated, played with, and performed in online communities. In respect to this stream of research, we emphasize the value of the gateway theory in explaining the initial encounters with online communities.

Another issue worth noting is that we do not claim that people's background knowledge or skills do not play any role in online participation. Definitely, some basic computer skills, e.g., were needed for our informants to even surf the Internet and encounter the content in question, but we do not see this knowledge or skill as the essential factor explaining online participation. Moreover, in the activity transitions of the gateway, the person's previous knowledge and skills do play a role. In the Deweyan view, habit is "special sensitiveness or accessibility to certain classes of stimuli". In this way, habit is that *status quo* of embodied knowledge and skills that make you see some cues in your environment while disregarding others. But once you step over the first line, you become sensitized to the next.

As the original gateway theory concerned preconditions to drug addiction, it needs to be pointed out here that we do not claim that technology use or online participation, at large, would qualify as addiction. The desire to use media has been found, however, to be in the category of behaviors with the highest probability of causing self-control failure (Hofmann et al. 2012). This indicates that it is not far-fetched to utilize a theory originally developed for explaining the escalation of drug use. For example, conflicts in Wikipedia have been described "as addictive as cocaine" (Reagle 2010, p. 161). Nevertheless, the original theory was developed to explain how the use of "innocent" drugs could lead to the use of drugs that are more dangerous, or into a life of crime. We acknowledge that the original gateway theory is a controversial one, and we definitely cannot *directly* apply it in our context.

We note that the gateway theory of IT adoption and use has a superficial resemblance with other theories, and particularly with the idea of trialability of innovations as found in the diffusion of innovations theory. The likeness is, however, superficial. Diffusion of innovations theory lists trialability in the perceived innovation characteristics, which are touted to determine the rate at which an innovation is adopted (Rogers 2003, p. 219). Trialability, which is defined as "the degree to which an innovation may be experimented with on a limited basis," (Rogers 2003, p. 258), is seen as a "way to cope with the inherent uncertainty about an innovation's consequences." (Rogers 2003, p. 177) Gateway theory, in contrast, proposes that formative experiences with the technology increases the rate of IT adoption and use because it sensitizes the individual to cues for further technology use.

As several commentators have stated, the original gateway theory is not a single theory. Instead, it is "a hybrid of popular, academic and media accounts" (Bell and Keane 2014, p. 50), or a "cluster of theories about successive stages in drug use" (Kleinig 2015, p. 5). One common criticism is that the gateway discourse covers "quite different and specific processes (biological, legal, social and cultural)" (Bell and Keane 2014, p. 50) under one umbrella term. As our empirical analysis shows, however, the theory bears clear relevance in our context. As a last note, we, in line with Pudney (2003), who has attempted to identify the actual gateway mechanisms, speculate on the possible mechanisms for the causal gateway effect. These propositions naturally are initial and speculative in nature. However, here are some possible mechanisms that may cause entry through the gateway into the next stage in a sequence of activities. In our case, this sequence implies a transition to a more serious online participation.

- 1) Any form of online participation may create a psychological or physiological need for getting further and stronger experiences of the same type. Our entrance stories indeed paint a picture of very positive initial experiences that can be associated with these people eventually becoming very serious with their engagement, gaining numerous rights and responsibilities in the communities.

- 2) The act of online participation brings the user into contact with other online participants on different stages of online participation whom they would not had met otherwise, and this may increase their online participation in itself. Sociability and socialization were also emphasized in the entrance stories.
- 3) The personal experience of online participation with no obvious ill effects may contradict and cancel out the doubts and negative feelings that are directed against online participation in general, therefore making it easier to enter through the gateway into the next stage of online participation. Albeit there is no such discourse on the dangers of online participation as being similar to the dangers of drug use, there is a prominent discourse warning about too-extensive IT use, and especially about addictive Internet and social media use. We do not think, however, that this plays a prominent role in the decision concerning whether to join in and contribute to an online community or not.

Conclusion

In this paper, we have contributed to IT adoption research and more particularly to online participation research by introducing the gateway theory. We developed the theory in the online participation context, but see it as relevant for IT adoption research more generally. Its strength lies especially in explaining the initial phases of online participation. The theory builds on the gateway theory derived from the drug use context, but it has been modified to fit our context and empirically examined. We offer the gateway theory as a novel approach to explain how people start to participate in online communities or to use particular kinds of IT solutions, and how their participation or usage escalates, with time, unplanned, to embrace a wider set of services offered by the technology.

The needs-awareness problem remains current in IS research, and we claim that better understanding of the pre-adoption/choice information processing would have major impact on IT development and marketing. The needs-first position would suggest that new product and service ideas should be harvested from the market and that people seek actively for product or service information once they feel the need. The awareness/knowledge-first position, in turn, contends that customers should not be trusted as a source of new product or service ideas and that considerable marketing effort should be committed to making the customers aware that a novel technology or service exists. The gateway theory suggests that the mere availability of a product or service may be critical; people need opportunities to encounter them and become sensitized to the stimuli. Naturally, positive experiences of the initial encounters are also critical here. As formative experiences, they should lead to the more serious engagement with the product or service in question.

Regarding the needs vs. awareness/knowledge-first problem, our findings suggest that it is more correct to say that awareness/knowledge about a technology precedes needs. People appear to passively absorb information about innovations, such as online technologies, rather than actively search for such information in an effort to fulfill some felt needs. This finding questions the current theorizing on IT acceptance and use, which suggests that felt needs and predisposition precede IT use and are indicative of actual future behavior. In line with this, related fields of research, such as diffusion of innovations, has already suggested a paradigm shift from measuring mental antecedents of adoption to studying the actual behavioral process (Rogers 2003, pp. 196-7). From a practical point of view, our theorizing and findings question the current wisdom of instructing practitioners to measure peoples' technology-related predispositions when seeking to identify viable gaps in the market.

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