IDENTIFICATION OF DIFFERENT AFFORDANCES OF INFORMATION TECHNOLOGY SYSTEMS: AN EMPIRICAL STUDY

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Complete Research

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Abstract

The concept of affordances has been suggested as a way to understand the effects of information technology (IT) on human behavior and the factors that affect individual IT use. However research has discussed affordances mostly on a conceptual or theoretical level. We empirically investigate different characteristics of affordances to understand the factors that influence users’ understanding of and intention to use IT. To closer observe the formation and roles of different affordances, we conducted in-depth interviews with 18 informants who use different types of airline check-in processes. We examine how individuals use IT and demonstrate that every user of an IT system has indeed different affordances. As a result, we show that as soon as the participants perceive a function and understand its use, there is a positive effect on symbolic expressions attached to the technical object. In this regard, we also demonstrate that the individuals’ interaction with IT system depends on age, background, and the general experience with IT. In doing so, we contribute to the growing field of research on the role of affordance in technology by examining the specific features of IT and factors contributing to the understanding and interpretation of the IT system by the user.

Keywords: Affordances, Features, Intention to Use, IT Use.

1 Introduction

Information systems (IS) research has researched for years the effects of the use of information technology (IT) on user behavior on an individual level (Venkatesh, 2006; Venkatesh and Davis, 2000). During the past decades, a number of seminal studies have investigated the factors that motivate individuals to use IT. Specifically, how and why individuals adopt new information technologies, IT systems, or applications has long been investigated (Venkatesh et al., 2003). Many of these findings build on the technology acceptance model (Davis, 1989) or the unified theory of acceptance and use of technology (Venkatesh et al., 2003), both having developed theoretical frameworks using or combining constructs from diffusion of innovation theory (Rogers, 2003), theory of reasoned action (Fishbein and Ajzen, 1975), or the theory of planned behavior (Ajzen, 1991), to study user adoption and acceptance of IT.

Mostly, existing literature and studies focus on the use of an IT system, application, or IT artifact as a whole. In contrast, only few studies so far have tried to investigate the use and effects of specific parts or features of an IT system, or have tried to uncover the effects of different functions that influence
individuals in their use of different features of IT systems (Cenfetelli et al., 2008; Sun and Zhang, 2008). However, a growing number of findings show that the same IT system is used differently by different users, even when using the exact same technology (Leonardi, 2013). In consequence, the factors that lead an individual user to use specific features of an IT system has become a focal point of interest (Jasperson et al., 2005).

The concept of “affordance” has been suggested by various researchers for specifying the possibilities and limits for action that different features of an IT artifact as a material object offer to an individual user (Leonardi, 2013; Markus and Silver, 2008; Robey et al., 2013), allowing to account for the fact that selected IT features can be used and others ignored or worked around by individual users with their own goals in mind (Robey et al., 2013, p. 387). Affordances permit researchers to theoretically frame “that one technology can support multiple affordances, and, consequently, that each member of the same social group can enact a different affordance or set of affordances when using the same technology” (Leonardi, 2013, p. 751). So far, however, existing IS research has discussed the concept of affordances on an abstract, mostly theoretical level (Markus and Silver, 2008). Even though some empirical studies suggest that affordances are indeed a salient and useful concept (Leonardi, 2013), in-depth empirical studies of the working mechanisms and processes leading to different kind of affordances for different users are missing so far (Borghi et al., 2012). This leads to our central research question in this paper: “How do different characteristics of affordances provided by an IT system affect the behavior of users?”

In order to address this question, we use the concept of affordances to empirically investigate the effects of IT on human behavior and users’ changed activity during the usage of different features of technology. Following from this conceptualization, the effect of IT use depends on the design of the IT system, the features that an individual user perceives to be afforded, and the interpretation of the IT system by the individual user. We analyzed this human-technology interaction, with the concept of affordance as the fulcrum, using the case of airline check-in processes with different options such as counter check-in, self-service machine, online check-in, or mobile check-in. 18 check-in users were interviewed in-depth, with the purpose of identifying differences in their affordances and reasons for and causes of why the preferred option for check-in was chosen and used by the interviewee.

The remainder of the paper is structured as follows. In the next section, we provide an overview of the concept of affordances. Based on this, we then propose a framework and we describe our research methodology as well as our research design. Afterwards, we present the results and discuss our findings. In the concluding section, we summarize our findings, discuss the most important outcomes, and give an outlook on further research.

2 Theoretical Background

2.1 The Concept of Affordances

Leonardi (2009) proposes that many IS researchers nowadays accept that “technologies are as much social as they are material (in the sense that material features were chosen and retained through social interaction) and [social routines] are as much material as they are social (in the sense that social interactions are enabled and constrained by material properties)” (p. 299). However, technologies and social routines are relatively easy to distinguish at the empirical level (Leonardi, 2011). Based on a recent reconceptualization of core concepts of adaptive structuration theory (DeSanctis and Poole, 1994), Markus and Silver (2008) have suggested that specifically the concept of “functional affordances” is of major importance for understanding IT effects on user behavior, and the duality of the material and social. Building on DeSanctis & Poole (1994)’s concepts and combining them with other theories, Markus and Silver (2008) propose three concepts to describe IT artifacts and their relationship with human agents: “technical objects”, “functional affordances”, and “symbolic expressions”. The concept of technical objects pertains to the IT artifacts themselves; the concepts of
functional affordances and symbolic expressions refer to relations between technical objects and users. Thus, the two last concepts are bridging concepts between IT artifacts and users, allowing to conceptualize in more detail users’ use and interpretation of IT artifacts. Specifically, the concept of functional affordances has the potential to allow researchers to describe the different effects of IT use for different users.

The concept of affordances is not a new one (Leonardi, 2013, p. 751). Following work in ecological psychology by Gibson (1986), people do not operate with an object without recognizing its meaning, and connecting certain qualities with an object, such as color, size, or form. Gibson (1986), however, states that people do not perceive these qualities, but a request to carry out a certain action. This addresses the so-called “affordance” of an object, the possibility for action it affords to people. In most cases, affordances are defined and understood as the offer of an object or an action request (Jenkins, 2008). This request directs the attention of a user on the relevant object. Every technical object acts as a usage requirement for the person and requests her or him to do something: “… what we perceive when we look at objects are their affordances, not their qualities” (Gibson, 1986, p. 134). This understanding of the concept of affordances as “perceived affordances” was popularized by Norman (2002) in human-computer interaction research. For example, software manufacturers supposedly should design user interfaces as objects in such a way as they believe they are intended to be used; thus, a user should know explicitly what s/he deals with, without having read the instructions before (Norman, 2002). Nevertheless, there is always room for interpretation, as the perception of an object and the affordances ascribed to it may be different with every individual user. Hence, affordances are the relation between the perceived surroundings and the interpretations of the users (Chemero, 2003).

Translated to IS research, technical objects are IT artifacts and their component parts (Markus and Silver, 2008, p. 620). Humans make technical objects and the objects are thus outcomes of intentional design and manufacturing processes. They are real things, material or abstract, with properties that may have causal potential. These properties may be intended or unintended; technologies “do not merely assist in everyday lives, they are also powerful forces acting to reshape human activities and their meanings” (Bijker, 2010, p. 67). However, just because technical objects have potential for certain uses does not mean that this is how they will necessarily be used. Functional affordances identify what the user may be able to do with the object, given the user’s capabilities and goals. In that they are “potentially necessary (but not necessary and sufficient) conditions for ‘appropriation moves’ (IT uses)” (Markus and Silver, 2008, p. 625). Moreover, functional affordances of a technical object for a specific user (or a user group) can be interpreted differently by other users or by designers.

Consequently, functional affordances can be defined as the possibilities for goal-oriented action that are afforded by technical objects to a specified user group; therefore functional affordances are relations between technical objects and users that identify what the user may be able to do with the object, given the user’s capabilities and goals (Markus and Silver, 2008). Researchers who adopt such a relational view suggest “a double bind of sorts in that users will appropriate certain features of a technology only when they perceive that those features offer them affordances for action, but if those features are not appropriated, their material qualities cannot afford social structural change” (Leonardi, 2013, p. 751). Central to this relational understanding is that different users can have different goals when using the same IT artifact, and if “people hold different goals, they may enact different affordances from the same technology; that is, they will use its features in ways that are distinct from how other group members use them” (Leonardi, 2013, p. 752), and with “multiple members in a group, and multiple features available for use, the possible number of affordances that may be enacted when different individuals use the technology is very large” (Leonardi, 2013, p. 752).

Even though Markus and Silver (2008) re-focused our attention on the relation between users and technical objects, different conceptualizations, characteristics, and categories of affordances exist in the literature. For example, Leonardi (2013) suggests distinguishing between individualized, collective, and shared affordances. We follow this conceptualization, as we agree that “some group-level affordance, as opposed to simply an individualized or ‘functional affordance’ (as Markus and Silver called it) is necessary to produce change that cascades beyond the individual or group to the
Identification of Different Affordances of IT Systems

organization level of analysis. Accordingly, if affordance is to be specified as a mechanism that links technology feature use to network change in organizations, some treatment of affordances as a group-level construct is needed” (Leonardi, 2013, p. 772). An individualized affordance is an affordance that will benefit the person who enacted it, but that affordance may not be available to everyone else in the group (Leonardi, 2013). This can be a technology’s feature, which enables the user that is able to use it to do something that others cannot. A collective affordance is an affordance that is collectively created by members of a group and that allows the group to do something collectively that it could not otherwise accomplish (Leonardi, 2013, p. 752). This can be the result of pooled individual affordances in the form of differential feature use that are necessary for completing noninterdependent tasks that pooled together achieve the groups’ goal. In contrast, a shared affordance describes an affordance that is shared by all members of a group and represents similar use of the technology’s features by all members (Leonardi, 2013).

Furthermore, regardless of the type of tasks conducted, use of the technology’s features by all members can follow either a shared or a configurational structure. A shared structure means that all members in the group use the technology’s features in roughly the same way and in the same frequency (Leonardi, 2013). Compared to this, a configurational structure means that all members in the group use the technology’s features in roughly the same frequency but different configurations (Leonardi, 2013). Leonardi (2013) hypothesized that groups with the same interest, which converge mainly upon a shared structure, are likely to enact a shared affordance, while the groups with different interest in their use of technology’s features constitute a configurational structure and are likely to enact collective affordances.

2.2 A Framework for Investigating Affordances

To sum up, the concept of affordances describes the interaction between advanced IT in the form of technical objects and human (social) actions of users. This enables us to describe and investigate the perceived features and values of technical objects that users interpret, and which consequently should guide their understanding of the features/functionality of an IT system. The concept of affordances can also be used to investigate IT effects and to understand the factors that influence user intentions to use IT. Consequently, affordances can be applied to analyze the influencing factors after the IT system has already been implemented and used for some time.

In the following, we empirically examine to what degree and how different affordances can be differentiated in real user groups with real IT artifacts, and how they influence people in their usage of different features of technical objects. In order to structure our investigation, we build on the conceptual framework of functional affordances as proposed by Markus and Silver (2008), amended by Leonardi’s (2013) distinction between individualized, collective, and shared affordances. This framework (cf. Figure 1) helps us to empirically investigate the effects of different affordances that influence people in their usage of different features of IT. In the following study, the technical objects under investigation are different applications that are used for checking in for airline flights: check-in counter, self-service machine, Internet-based online check-in, and Internet-based mobile check-in. All of these have similar or different features they offer, building on different technologies to fulfill the same purpose of allowing users to check in for their airline flight.
3 Research Design and Method

3.1 Research Site and Sampling Frame

In this study, we sought to consider a broad range of different affordances between different individual users and the different technologies’ features. We therefore decided to collect data via in-depth interviews with 18 informants who use different types of airline check-in processes. The check-in is the first thing that an airline passenger must do on reporting for her or his flight at any airport (i.e., register baggage and get the boarding pass). However, there are various forms of check-in available: (1) check-in counter, (2) self-service check-in machine (SSM), (3) online check-in, or (4) mobile check-in. Interestingly for our study, with the exception of the “manual” counter option (1), all other options basically support the same process steps and often build on the same IT platform (theoretically offering the same features), but make use of different devices.

The oldest option for check-in is the traditional check-in counter in the airport building. The flight ticket is sent to each customer before the trip and the clerks at the counter check this ticket and require a valid identity card or passport and maybe a visa, depending on the destination. The passenger gets her or his boarding pass and can check-in her or his luggage. With this option, no active action of the passenger or interaction with technology is expected, and passengers execute actions merely based on the instructions of the clerks, without interacting with any technology themselves.

The use of a SSM requires an active action from the passenger and interaction with IT. Nowadays, this is the standard option at many larger airports. Passengers can check-in themselves using the check-in machine and any other persons travelling with them. The passengers can select their seats via the seat plan and obtain their boarding passes.

Using the online check-in option, passengers have the possibility to check-in via the Internet. A seat can be selected and the boarding pass printed out directly at home. This option is supposedly advantageous (which airlines also advertise) because the passengers save time at the airport and they can already reserve a seat about 23 hours before departure (sometimes even days, depending on destination, ticket class/premium price paid, or airline). Usually, the passenger is only required to enter her or his name and certificate number (ticket number or PNR code) and to select the departure city on airlines’ official websites.
The mobile check-in option is similar to the online check-in. The difference exists merely in the use of the device. With online check-in, a PC or laptop is usually applied. With mobile check-in, a mobile phone capable of Internet access is used. The check-in starts with the personal identification. A seat change is also allowed. After input of the required data, the boarding pass is sent by SMS, MMS, or e-mail to the mobile phone and the passenger does not even need to print it, being able to use the digital boarding pass on her or his mobile device at many airports.

We chose the airline check-in process because it offers many different IT-based options and the participation in check-in processes is basically open to all types of customers as users. This makes check-in a particularly interesting context for the current study. The interview questions were divided into three parts. In the first section, demographic data and data about participants’ overall airline and check-in experience were gathered. In the second section, questions pertaining to their perceived process characteristics concerning the check-in process were collected. The third section contained questions pertaining to the users’ most recent experience of carrying out check-in.

We interviewed 18 users from different age and social groups like banking, private sector or academics as well as students who use different type of check-in options. We conducted theoretical sampling and we expected different results depending on the interviewees’ characteristics. The interviewees were divided into the following three groups: students between the age of 19 to 29 years, employees between the age of 20 to 35 years, and employees between the age of 35 to 60 years, with three female and sixteen male check-in process users. Table 1 provides information about the interviewees and their experiences with IT as well as the list of check-in options that the interviewees have used so far. All of the interviewees have used at least once a check-in option. In addition, the focus of the data collection was to understand how the participants experienced their use of check-in processes. We collected data about check-in characteristics, experience with process use, and how the participants experienced different check-in options and technical challenges.

3.2 Data Collection

Interviewing as a data collection technique is very suitable for this kind of research because it is being targeted (the focus is directly on our topic) and insightful (providing causal inferences as perceived by interviewees). We used semi-structured interviews for exploring the core elements of user affordances and for taking the context of the interviewees into account (Kaplan and Duchon, 1988; Miles and Huberman, 1994). This allows the interviewees’ own interpretation of the questions, in connection with their personal experiences. All interviews were conducted between January and March 2013, and most interviews lasted about 60 minutes. Two researchers participated in all the interviews that were conducted in-person with one respondent at a time. The interview roles were decided in advance so that one researcher functioned as the main interviewer while the other supplemented when the interview came upon topics that were worth pursuing. At the beginning of the interviews, the interviewees were briefly informed about the subject of the research. All interviews were audio-recorded, transcribed, and anonymized. Although we used a guiding interview protocol1 based on the related work (cf. Section 2.2), the course of the interview was basically open, allowing for probing questions and time to think about the questions.

<table>
<thead>
<tr>
<th>Informant</th>
<th>Age</th>
<th>Sex</th>
<th>Internet Use (per Day)</th>
<th>Usual Flight Distance</th>
<th># of Flights (per Year)</th>
<th>Used Check-in Options</th>
<th>Occupation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>26</td>
<td>Male</td>
<td>10 hours</td>
<td>Medium &amp; long haul</td>
<td>2 to 3</td>
<td>Counters &amp; machines</td>
<td>PhD Student</td>
</tr>
<tr>
<td>B</td>
<td>23</td>
<td>Male</td>
<td>4 to 5 hours</td>
<td>Short &amp; medium haul</td>
<td>4 to 5</td>
<td>Online &amp; mobile</td>
<td>Undergraduate Student</td>
</tr>
<tr>
<td>C</td>
<td>19</td>
<td>Female</td>
<td>10 hours</td>
<td>Medium haul</td>
<td>1</td>
<td>Counters</td>
<td>Undergraduate Student</td>
</tr>
</tbody>
</table>

1 The interview guideline is available from the authors on request.
We conducted a complete transcription of all interviews for a qualitative content analysis. The transcriptions constituted approximately 186 standard pages of text that were directly used for the coding of data in the subsequent analysis phase. The resulting data was analyzed with regard to the research question and the related thematic clusters derived from the concept of affordances (Miles and Huberman, 1994).

First, the data was coded openly to identify particular functional affordances mentioned by each interviewee. Second, the affordances were then compared across interviewees and coded according to a predetermined coding scheme for distinguishing between collective, shared, and individual affordances (cf. Table 2). We used MaxQDA version 10 for the coding and the analysis of the transcriptions. Two researchers coded the data.

### 3.3 Data Coding and Analysis

**Table 1. Interviewee Demographics**

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functional affordance</td>
<td>Functional affordances are the possibilities for goal-oriented action that are afforded by technical objects to a specified user group. They refer to potential uses of IT artifacts and the concept focuses on issues related to technical functionality (Markus and Silver, 2008).</td>
</tr>
<tr>
<td>Individual affordance</td>
<td>An individualized affordance is an affordance that someone enacts when using a technology’s features, but that affordance is not common to other people. An individualized affordance will benefit the person who enacted it, but that affordance may not be available to everyone else. Consequently, the enactor of that affordance might be able to use the technology to do something that others cannot (Leonardi, 2013).</td>
</tr>
<tr>
<td>Collective affordance</td>
<td>A collective affordance is an affordance that is collectively created by members of a group, in the aggregate, which allows the group to do something that it could not otherwise accomplish. Thus it represents differential feature use that is necessary for completing non-</td>
</tr>
</tbody>
</table>
interdependent tasks that, when pooled, achieve the group-level goal. A collective affordance may be the result of pooled individualized affordances. People change their system behavior as soon as they interact in a group towards a common goal (Leonardi, 2013).

| Shared affordance | A shared affordance is an affordance that is shared by all members of a group. A shared affordance represents similar use of the technology’s features by all group members. As soon as several individuals know a function, it is a shared affordance. Several people perceive functionalities in a system and are able to complete this in the given situation (Leonardi, 2013). |

Table 2. Construct Definitions used as Coding Categories

4 Analysis and Results

4.1 Perceived Functional Affordances in General

Table 3 gives an overview of the different check-in options that are regularly used by the interviewees (i.e., used more than once and reported to be regularly used). Moreover, we asked the interviewees about the option they prefer the most (indicated in Table 3 by “*”).

<table>
<thead>
<tr>
<th>Option / Interviewee</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>M</th>
<th>N</th>
<th>O</th>
<th>P</th>
<th>Q</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Counter</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SSM</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
<td>✓</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Online</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mobile</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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</tbody>
</table>

Legend: ✓ check-in option regularly used; * preferred check-in option

Table 3. Types of Check-in Options used by Interviewees

In addition, we explicitly inquired about the single process steps of checking in that must be clear to the users. Starting with examining “functional affordances” in general, the analysis of the interviews reveals that the interviewees know and perceive many different features in the online check-in process (cf. summary overview in Table 4). For example, most users understand the order of the check-in process steps within the different IT-supported options, and recognize the intention behind them; hence, the interviewees perceive the same check-in features and can explain them, for example:

“... the first step is, one enters his name, given name and last name, one enters his number, then one is forwarded to the seat reservation, there one can select the seat, click ... then just further.” (Interview participant J)

Other personally perceived functional affordances that are often mentioned are features that support different purposes, for example, reserving a desired seat or booking a special meal:

“[I reserve a seat] because I like to have my seat a day in advance.” (Interview participant B)

“So, when I fly on private business, the reason is, you can say that, the earlier I check in, obviously I have more seats to choose from and I can freely choose where to sit.” (Interview participant N)

Table 4 summarizes our findings and codings of perceived functional affordances for all interviewees. Because it should be relevant which option of the check-in is carried out (because each option basically uses slightly different technical objects, but offers basically the same features), we do show results grouped by the used technical object (i.e., counter, SSM, online, and mobile). However, a subsequent agglomerative cluster analysis did not reveal groupings of affordances according to the used technical options, and a loglinear analysis also did not show any significant relationship between the preferred technical objects and the perceived affordances. We conclude that the choice of the used technical object does not influence perceived functional affordances for the check-in process.
| Option or User Group | Feature / Interviewee               | C | H | K | A | I | R | J | O | D | E | F | L | M | N | G | P | Q | B |
| Automated Check-in   |                                   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | ✓ |
| Check-in via SMS     |                                   | ✓ |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Check-in by Phone    |                                   |   | ✓ | ✓ | ✓ |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Enter Visa Data      |                                   | ✓ |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Switch Language      |                                   |   |   |   |   | ✓ | ✓ |   |   |   |   |   |   |   |   |   |   |   |   |
| Get Flight Information Updates |                   |   |   |   |   |   |   |   |   |   |   | ✓ | ✓ |   |   |   |   |   |   |
| Scan Passport        |                                   | ✓ | ✓ | ✓ |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Check-in Groups      |                                   |   | ✓ |   |   |   |   | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |   |   |   |   |
| Select Meal          |                                   | ✓ |   |   |   |   |   |   |   | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |   |   |   |
| Overnight Baggage Drop-off |                 |   |   |   |   |   |   |   |   |   | ✓ | ✓ | ✓ | ✓ |   |   |   |   |   |
| Book Bulky Baggage Drop-off |             |   |   |   |   |   |   |   |   |   |   | ✓ | ✓ | ✓ |   |   |   |   |   |
| Set Reminder for Flight or Check-in |           |   |   |   |   |   |   |   |   |   |   |   |   |   | ✓ |   |   |   |   |
| Select Seat          |                                   | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Insert Name and Data |                                   | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Insert Flight Number |                                   | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Print Ticket         |                                   | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Send Ticket to Smartphone |                 | ✓ |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Call Phone Hotline   |                                   | ✓ |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Rebook               |                                   | ✓ | ✓ | ✓ | ✓ |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

**Table 4. Summary Overview of Perceived Functional Affordances per Interviewee**

Some interviewees explained their reasons for the use of the online check-in in detail to us. For example, some reported that as soon as they became aware of the possibility to check-in online, they used this option (e.g., after they had received advertisement by e-mail):
“Practically, since I’ve noticed it for the very first time. So, I don’t know for how long this system exists, but once I’ve had noticed it, I’m using it now for several years.” (Interview participant E)

On the other hand, the interviews specify that many different functions are known in the process of the online check-in that determined their decision to use this option and to check-in online. Although the functionalities are kept very simple in the check-in process, the perception of the possible functions is very high:

“Because I can already see there especially my place as a graph and choose exactly where I want to sit.” (Interview participant B)

“Yes, in my opinion it’s kept normally simple. Simply sound. As said before, you can choose the seats, which is always very practical.” (Interview participant J)

With this perceived functionality, the interviewees report to achieve certain goals and utility. This is different for every individual. Moreover, as expected, we also found out by using repertory grid techniques during the interviewing that the interviewees ascribe different values to functionalities (DeSanctis and Poole, 1994). Interview partners reported such as like freedom, efficiency, simplicity, or security:

“In my opinion one could say it’s simply more efficient. I think it’s very practical.” (Interview participant O)

“More autonomous. Yes, you are more autonomous to a certain degree.” (Interview participant R)

“More secure, when I know that I have got a good seat.” (Interview participant E)

“Freedom, on the one hand, because I am giving myself the opportunity to choose a seat.” (Interview Participant G)

These values are mostly associated to positive sensations that the interviewees have experienced, being mentioned also as reasons for the usage of specific check-in options. To sum up, a high perception and evaluation of functionalities lead to a high usage of IT systems. Also there are positive feelings if they can configure the process. They feel as a part of the process:

“Independency, flexibility, efficiency. I am able to satisfy the need for information, possibly I’ve become a part of the Airline, because I’ve become a part in the process. And I’ve done tasks for the airline, thus in principle I substitute part of the work, that I’ve taken.” (Interview participant L)

Compared with these positive values and impressions, some interviewees reported also negative values with the use of check-in systems. For instance, recklessness towards the customer was mentioned, leading to the effect that the interviewee was not contend with the online system, and avoiding its use:

“By using these badly made screens? Ruthlessness towards customers, thoughtlessness, bad ergonomics.” (Interview participant K)

“For me, that’s a thing that has to be done, as quickly as possible and then somehow there doesn’t appear any special feelings. Except I’m angry, if it’s not working.” (Interview participant A)

This also shows an interesting fact: provided that there is no affordance, the people do not think about a possible activity. The more they know, the higher is their perception. This also has effects on the usage of a system. Therefore the qualities of a technical object are indeed decisive for the perception and the action resulting from it (Gaver, 1991). So we find ample evidence for different perceived functional affordances in relation to different users and different technical objects that basically support the same underlying process of checking in.
4.2 Shared, Collective, and Individual Affordances

Based on our qualitative analysis, the identified affordances summarized in Table 4 can be further classified in different kinds of affordances, in particular in “collective affordances”, “shared affordances”, and “individual affordances”. This classification leads to some very interesting findings as regards the evolution and perception of affordances and different use behaviors.

First, some interviewees considerably change their use behavior as soon as they travel in a group:

“When I now fly together with a group and we’re at the counter, that’s something different. Then, it doesn’t matter if you’re waiting for two hours. Then you’re conjointly there, together with friends and you’re glad about the vacation or whatever it will be.” (Interview participant J)

“I discreetly conduct myself as far as private journeys are concerned and when we’re there in a group. Then we have to wait in line in this group and if that’s the group’s interest, I am certain, naturally take the initiative concerning the process. But if there’s someone else who wants to organize it, then I’m not going to take a hand in it.” (Interview participant N)

“The one who booked this said we are doing all of this at the counter because this is an issue again, well we ordered it online, the tickets, and we sent him all out data and everything what he needed to enter this, but in the end it would have been like one person would have to check in for all of us, the trust is lower then, then we rather did at the counter, directly on location instead of a third person, who knows as much as I do, enters this for me.” (Interview participant M)

Travelling in a group demands from these interviewees to adapt their usual behavior. They are not alone anymore; they depend on activities of others, or others depend on them, and some of them take or deliver responsibility quite easily. Specifically, some interviewees report to adapt themselves to the majority of the group and choose the kind of the check-in option the group has decided on. This behavior can be explained with the concept of “collective affordance”.

Second, we also found in the data that on account of this “collective affordances”, people’s attention can be drawn to a new check-in option they did not know before. This leads to new “shared affordances” as soon as several individuals know a specific function and perceive functionalities in the system in the same way and are able to use these features from now on their own. For example, the features “seat reservation” and “rebooking” belong to the most known shared functions in the process of check-in. On the one hand, the personal experience is one reason for the perception of a function. On the other hand, the passing on of information by other people is decisively for becoming aware of a function:

“So probably the people in my environment simply by the way I am talking or saying how simple things are. I also have influence with my parents, who belong to the other generation.” (Interview participant N)

“I used to say that I prefer checking in online. Therefore I can just imagine or I am sure that thereby two of my friends use the online check-in.” (Interview participant B)

Besides, some functions only are known by some individuals (e.g., automatic check-in in Table 4; this kind of the check-in was known only by one interview participant). These features are “individual affordances”:

“One can automatically be checked in with Lufthansa. There, you can store a profile on the website to check in yourself automatically whenever you’ve booked a flight, never having to worry about forgetting to check-in. Quite useful as a frequent traveller.” (Interview participant Q)

Many of the other interviewees are not aware of functions such as automatic check-in that have been named by only some of the other interviewees:
“No, that didn’t occur to me, because...if I am not affected myself I don’t care much about it...unless I am asked about it but I believe only a few people come up with this idea, this thought.” (Interview participant E)

“There are certainly any possibilities...that however...there are definitely but these are...just because I am not dependent on it, as far as I know.” (Interview participant G)

Figure 2 summarizes our findings for all constructs of affordances and shows an overview of the functions that are afforded by different options of the same underlying platform (i.e., counter, online, SSM, mobile) With the help of this overview, it becomes clear that there are some functions which are known by a large part of the interviewees – shared or collective affordances. At the same time, however, some functionalities are known only by a small group of participants or only to one person – individual affordances.

![Diagram of affordances](attachment:affordances_diagram.png)

**Figure 2. Summary of the Analysis of Types of Affordances**

## 5 Discussion

We explored the concept of affordances and investigated different characteristics of affordances to understand the factors that influence user intentions to use IT. We used different types of affordances from the literature as the nexus of our analysis. We examined different user and user groups, different technological objects, and different resulting functional affordances for the same basic process of airline check-in. The results of our analysis show how individuals interact and use technology during the usage of different features of technology and demonstrate that every user of an IT system has indeed different affordances, which can also be grouped or collectivized.

Examples for different users and user groups in our case include, for example, ‘ordinary’ users that only fly once a year for vacation or ‘power’ users who fly frequently, leading to different functional affordances (e.g., awareness of being able to automatically check-in) of the same technical object (e.g., the online check-in system). We found that functional affordances indeed refer to the potential uses of a technical object (Markus and Silver, 2008, p. 622), thereby recognizing how the properties and the materiality of a technical object favor, shape, invite, or constrain a set of specific uses (Zammuto et al., 2007, p. 752). We also can confirm that functional affordances of a technical object for users (or a user group) can be perceived and interpreted differently by other users. Applying this interpretive flexibility allows to understand a seemingly unambiguous technical object, for example, by identifying
users different interpretations of ‘working’ or ‘nonworking’, which are not intrinsic properties of IT artifacts (Howcroft et al., 2004, p. 340). This became especially apparent for online check-in – some people just perceive it as ‘nonworking’ due to previous cases of bad experience. Therefore we agree that we need to pay attention to what a technical object “lets users do, to what it does not let them do, and to the workarounds that users develop to address the latter” (Leonardi and Barley, 2010, p. 35). Hence, examples for functional affordances such as ‘Checking in 24 hours in advance’ are a feature for the user as perceived by the designer of the online check-in system. However, in our case, since a particular user had a complicated spelling of his family name that could not be entered in the online check-in system and must be manually entered, this function is ‘nonworking’ from the point of view of this end-user. Hence, it may not be a functional affordance as perceived by the ‘ordinary’ end-users. Instead, the end-user falls back to checking in manually at the counter.

What we can also corroborate is that perceived functionalities are closely related to personal values for the interviewee; symbolic expressions such as freedom or efficiency are attached to technical objects and influence the perceived functional affordances. Moreover, as soon as the participants perceive a function and understand its use, these have positive effect on symbolic expressions attached to the technical object. In this regard, we also would like to point out that the interviewees remarked themselves that our findings may depend on the age group in which one has grown up and the general experience with IT. The people who are able to deal with IT systems in general and use the Internet perceive more functional affordances. They know exactly what the technical object stands for. However, people from an older generation can achieve less with it. Older generation users are defined by individuals who are not working anymore and do not experience the contact with computers daily. The users of virtual systems are frequently in contact with personal computers, laptops, or smartphones.

Our findings corroborate empirically the suggestions from the conceptual literature on affordances that researchers need to investigate the relation between individual humans and technical objects in much more detail because different features are indeed provided to different users, given the same technical object, depending on the characteristics of both the object and the specific user. For practitioners, our findings suggest that different users depending on their characteristics and experiences can develop negative or positive beliefs about a technical object. Designers need to be aware of these differences in user groups and affordances to constantly evolve existing technical objects. Moreover, by ensuring and by highlighting the positive values of a technical object, or by helping users to understand the technical object, practitioners may be able to actualize desired affordances.

6 Conclusion

Despite the theoretical and practical contributions, our paper has some limitations. The exploratory power of our findings is restricted to one process and using one basic IT system, or platform, and we conducted only exploratory in-depth interviews. However, we are convinced that the interviews introduce enough diversity for generalization. In order to alleviate these issues, we plan to conduct more intensive case studies and test our results, for example, using experiments or panel surveys.

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