

AIS Electronic Library (AISEL) (<https://aisel.aisnet.org>)

[AMCIS 2014 PROCEEDINGS \(HTTPS://AISEL.AISNET.ORG/AMCIS2014\)](https://aisel.aisnet.org/amcis2014/)

Follow (<https://network.bepress.com/api/follow/subscribe?publication=MDQ0NWVIZDZlY2MyOTYwMw%3D%3D&format=html>)

AMCIS 2014 ISBN Number: 978-0-692-25320-5

Browse the contents of AMCIS 2014 Proceedings:

[Accounting Information Systems \(https://aisel.aisnet.org/amcis2014/AccountingIS\)](https://aisel.aisnet.org/amcis2014/AccountingIS)
[Adoption and Diffusion of Information Technology \(https://aisel.aisnet.org/amcis2014/AdoptionofIT\)](https://aisel.aisnet.org/amcis2014/AdoptionofIT)
[Business Intelligence and Knowledge Management \(https://aisel.aisnet.org/amcis2014/BusinessIntelligence\)](https://aisel.aisnet.org/amcis2014/BusinessIntelligence)
[Data Quality and Information Quality \(https://aisel.aisnet.org/amcis2014/DataQuality\)](https://aisel.aisnet.org/amcis2014/DataQuality)
[e-Business \(https://aisel.aisnet.org/amcis2014/e-Business\)](https://aisel.aisnet.org/amcis2014/e-Business)
[eGovernment \(https://aisel.aisnet.org/amcis2014/eGovernment\)](https://aisel.aisnet.org/amcis2014/eGovernment)
[EndUserIS \(https://aisel.aisnet.org/amcis2014/EndUserIS\)](https://aisel.aisnet.org/amcis2014/EndUserIS)
[Enterprise Systems \(https://aisel.aisnet.org/amcis2014/EnterpriseSystems\)](https://aisel.aisnet.org/amcis2014/EnterpriseSystems)
[Global, International, and Cross Cultural Issues in Information Systems \(https://aisel.aisnet.org/amcis2014/GlobalIssues\)](https://aisel.aisnet.org/amcis2014/GlobalIssues)
[Green IS and Sustainability \(https://aisel.aisnet.org/amcis2014/GreenIS\)](https://aisel.aisnet.org/amcis2014/GreenIS)
[Healthcare Information Systems and Technology \(https://aisel.aisnet.org/amcis2014/HealthIS\)](https://aisel.aisnet.org/amcis2014/HealthIS)
[Human Capital in Information Systems \(https://aisel.aisnet.org/amcis2014/HumanCapitalIS\)](https://aisel.aisnet.org/amcis2014/HumanCapitalIS)
[Human Computer Interaction \(https://aisel.aisnet.org/amcis2014/HumanComputerInteraction\)](https://aisel.aisnet.org/amcis2014/HumanComputerInteraction)
[ICTs in Global Development \(https://aisel.aisnet.org/amcis2014/ICTGlobal\)](https://aisel.aisnet.org/amcis2014/ICTGlobal)
[Intelligence and Intelligent Systems \(https://aisel.aisnet.org/amcis2014/IntelligentSystems\)](https://aisel.aisnet.org/amcis2014/IntelligentSystems)
[IS in Education, IS Curriculum, Education and Teaching Cases \(https://aisel.aisnet.org/amcis2014/ISEducation\)](https://aisel.aisnet.org/amcis2014/ISEducation)
[Examining IS History \(https://aisel.aisnet.org/amcis2014/ISHistory\)](https://aisel.aisnet.org/amcis2014/ISHistory)
[IS Philosophy \(https://aisel.aisnet.org/amcis2014/ISPhilosophy\)](https://aisel.aisnet.org/amcis2014/ISPhilosophy)
[Information Systems Security, Assurance, and Privacy \(https://aisel.aisnet.org/amcis2014/ISSecurity\)](https://aisel.aisnet.org/amcis2014/ISSecurity)
[IT Enabled Organizational Agility \(https://aisel.aisnet.org/amcis2014/ITOrganizationalAgility\)](https://aisel.aisnet.org/amcis2014/ITOrganizationalAgility)
[IT Project Management \(https://aisel.aisnet.org/amcis2014/ITProjectManagement\)](https://aisel.aisnet.org/amcis2014/ITProjectManagement)
[Mobile Computing \(https://aisel.aisnet.org/amcis2014/MobileComputing\)](https://aisel.aisnet.org/amcis2014/MobileComputing)
[Panels \(https://aisel.aisnet.org/amcis2014/Panels\)](https://aisel.aisnet.org/amcis2014/Panels)
[Posters \(https://aisel.aisnet.org/amcis2014/Posters\)](https://aisel.aisnet.org/amcis2014/Posters)
[Research Methods \(https://aisel.aisnet.org/amcis2014/ResearchMethods\)](https://aisel.aisnet.org/amcis2014/ResearchMethods)
[Service Systems \(https://aisel.aisnet.org/amcis2014/ServiceSystems\)](https://aisel.aisnet.org/amcis2014/ServiceSystems)
[Social Computing \(https://aisel.aisnet.org/amcis2014/SocialComputing\)](https://aisel.aisnet.org/amcis2014/SocialComputing)
[Socio-Technical Issues and Social Inclusion \(https://aisel.aisnet.org/amcis2014/SocioTechnicalIssues\)](https://aisel.aisnet.org/amcis2014/SocioTechnicalIssues)
[Spanish & Portuguese Language \(https://aisel.aisnet.org/amcis2014/SpanishLanguage\)](https://aisel.aisnet.org/amcis2014/SpanishLanguage)
[Strategic and Competitive Use of Information Technology \(https://aisel.aisnet.org/amcis2014/StrategicUse\)](https://aisel.aisnet.org/amcis2014/StrategicUse)
[Systems Analysis & Design \(https://aisel.aisnet.org/amcis2014/SystemsAnalysis\)](https://aisel.aisnet.org/amcis2014/SystemsAnalysis)
[Virtual Communities and Virtual Worlds \(https://aisel.aisnet.org/amcis2014/VirtualCommunities\)](https://aisel.aisnet.org/amcis2014/VirtualCommunities)

Affordance Theory in the IS Discipline: a Review and Synthesis of the Literature

Completed Research Paper

Giulia Pozzi

LIUC – Università Cattaneo
TEM – Telecom Ecole de Management
gpozzi@liuc.it

Federico Pigni

Grenoble Ecole de Management
federico.pigni@grenoble-em.com

Claudio Vitari

Grenoble Ecole de Management
claudio.vitari@grenoble-em.com

Abstract

The growing interest of IS researchers in using the theory of Affordances for studying the uses and consequences of the IT artefact calls for an integrative view on the subject. The originating literature is dispersed and the definition of the concept of affordance varies in these studies.

With this paper we offer a framework for organizing the existing interdisciplinary literature modeling affordances' manifestation as effects of actions. Using a structured methodology, we reviewed the titles and abstracts of 126 articles from IS, Organization Studies, and Management literatures and examine a subset of 25 articles.

Our work makes three main contributions. First it formalizes the concept of affordance as instanced in the IS domain. Second, it organizes IS affordance studies around four main areas: affordance existence, affordance perception, affordance actualization, and affordance effect. Finally, it discusses the current limitations of Affordance studies and offers the basis for future research.

Keywords

Affordances, Affordance's Theory, Literature Review.

Introduction

The theory of Affordances (Gibson 1977, 1986) has received a renewed attention in Information System (IS) literature (Leonardi 2013; Majchrzak and Markus 2012; Markus and Silver 2008; Seidel et al. 2013; Volkoff and Strong 2013; Yoo et al. 2012; Zammuto et al. 2007). The reasons are enthralling. Its application promises to provide new insights in explaining the consequence of IT artefact uses in organizations (Majchrzak and Markus 2012; Markus and Silver 2008) and the related organizational changes (Zammuto et al. 2007; Leonardi 2013; Volkoff and Strong 2013).

The increasing relevance of the theory of Affordances in IS research and the growing interest of scholars in using its principles call for an integrative view on the subject, as the originating literature is dispersed among different disciplines and the definition of the concept of affordance seems to vary among IS studies.

With this paper, we provide a comprehensive review and summary of existent literature examining the role of affordance's theory in IS.

To achieve this goal, we organize previous works in this area through an integrative framework that represents the current state of art of the affordance's theory, identifying past and current contributions, and research gaps in each part of the framework, mainly trying to address the research question: "*Why Affordance's Theory is useful in IS research?*".

In the next section, we formalize the concept of Affordances. Subsequently, we outline the theoretical framework that we adapted from Bernhard et al. (2013) work. The framework organizes the literature review and our findings. The paper concludes with a discussion of the findings and the implications for future research and practice.

Defining Affordances

The concept of affordance as it has been used in the more recent papers, (Zammuto et al. 2007; Markus and Silver 2008; Yoo et al. 2012; Majchrzak and Markus 2012; Volkoff and Strong 2013; Leonardi 2013; Seidel et al. 2013) originated with Gibson (1986) in ecological psychology as the interaction between an actor with the environment, defined as the surroundings of the actor itself. According to Gibson, actors are organisms perceiving and behaving in the environment. The conditions that enable this interaction include both the properties of the actor and of the environment (Gibson 1986). Affordances are preconditions for an activity, but do not imply that the specific activity will occur (Greeno 1994).

Gibson (1977, 1986) intended an affordance to mean an action possibility available in the environment to an actor. An affordance is independent to the actor ability to perceive the possibility (Greeno 1994; Hartson 2003; McGrenere and Ho 2000).

Hutchby (2001) is the first author to apply the original concept of affordance moving from the environment to technologies, understood as IT artefacts. He considered the functional and relational aspects of affordance as possibilities for action and acknowledged the potential of this approach for studying the complex relationship between technologies and the actors.

Affordance exists as a relationship between an actor and an artefact, it is relative to the action capabilities of the actor, and reflects possible actions on the artefact itself (Hutchby 2001; Majchrzak and Markus 2012; Volkoff and Strong 2013; Zammuto et al. 2007). Affordance are objective in that their existence do not depend on value meaning or interpretation, but also subjective in that an actor is needed as a frame of reference. In this sense, Gibson's affordances introduce the idea of actor-environment mutuality, as the actor and the artefact are inseparable pair (McGrenere and Ho 2000).

Recent IS literature has described affordances as possibilities for goal-oriented action, emerging from the relation between IT artefact, considered in terms of IT features, and organizational systems (Zammuto et al. 2007), and afforded to specified groups of actors by technical objects (Markus and Silver 2008).

As affordances are just potentials for action, several studies recognize that affordances need to be triggered (Volkoff and Strong 2013) or actualized (Strong et al. 2014) by a goal-oriented actor to achieve an outcome.

We noticed a usage of the terms actor, user, person, individual, and agent (Majchrzak and Markus 2012; Markus and Silver 2008; Zammuto et al. 2007) as synonymous to indicate the human volition to take advantage of an affordance. In this paper, we decided to use the word *actor* to emphasize the human active role in the relation to the IT artefact.

Theoretical Framework

The literature review is organized around an integrative framework that explicitly models affordances' manifestation as effects of action. Our integrative framework (Figure 1) is adapted from the model presented by Bernhard et al. (2013). Our adaptations emphasize mainly the specifications of the intertwining of objects and actor. We explicitly consider that affordance existence derives relationally from the interaction of an IT artefact characterized by its features, and an organization with expertise and goals. Our choice for IT artefact is consistent with the development of the affordance theme, at the intersection of IS and technology (Leonardi 2013; Savoli and Barki 2013; Volkoff and Strong 2013). IT artefact may comprise numerous technical objects, their component parts, the interface through which the actor interacts with it, and the outputs of the IS (Markus and Silver 2008). Our choice for the organization is also consistent with IS recent studies (Leonardi 2013; Strong et al. 2014) where a group of actors is considered to be those involved in the relation to the technology, as they perceive affordances and perform actions exploiting its potentials.

Differently from Bernhard et al. (2013), we assert that factors, other than external information and actualization effort, influence affordances' perception and actualization.

According to other authors (Greeno 1994; Hutchby 2001; Leonardi 2013), we also emphasize affordance existence and perception as two distinct processes of cognition and recognition respectively. Furthermore, we consider that affordance actualization substantiate organization's behaviours to achieve the desired goal. The effects are then the result of the goal-driven affordance actualization.

At the end, we propose a four-step framework. Firstly, this framework recognizes affordance existence as a cognitive process, the product of the interaction between IT artefact and organization. Secondly, affordance needs to be perceived or recognized by the organization. Thirdly, the affordance is actualized as the behaviour that the organizations adopt acting on the perceived opportunity for action. Fourthly and finally, this behaviour will produce effects.

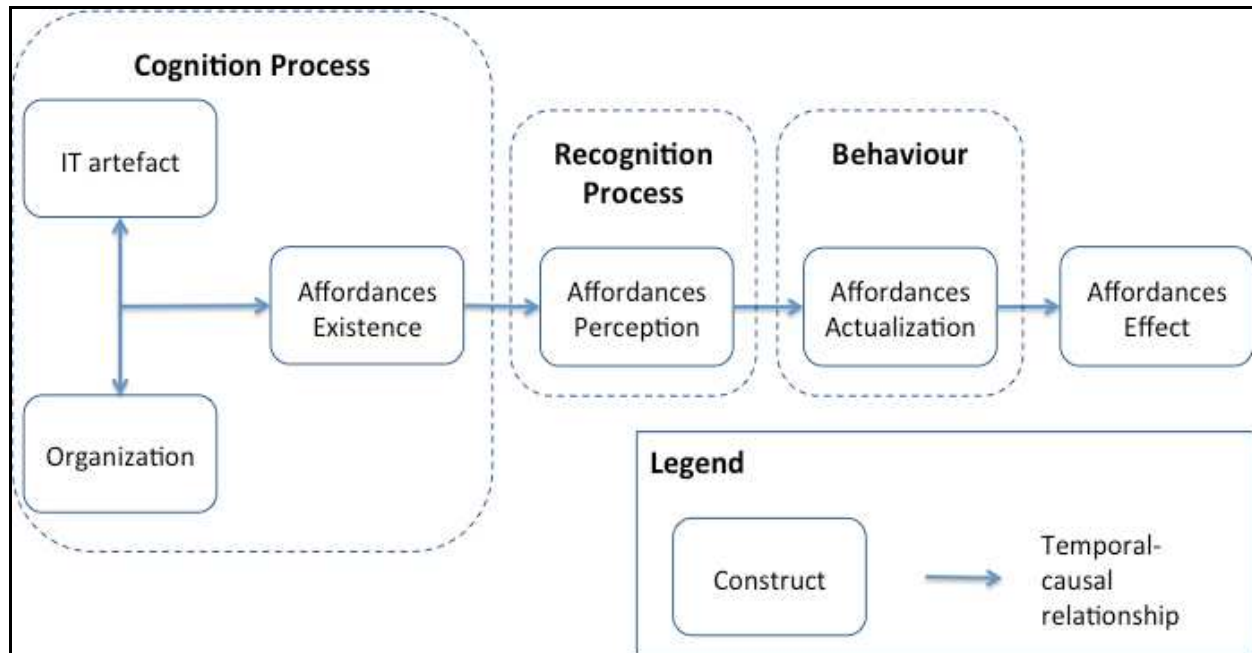


Figure 1 Affordances Theoretical Framework

In the proposed model, full-line boxes represent the constructs, dotted-line boxes represent the step in which the construct belong, and the arrows indicate the temporal-causal logic relating constructs to one another. We propose our affordance theoretical framework as a process, defined as a time-dependent sequence of events, governed by a process framework (Mackenzie 2000). The affordance theoretical framework involves entities (organization and IT artefact) committed in performing the process, constructs that describe the stages in the process, and causal-relationships between every pair of these constructs. Entities, constructs and relationships define the process framework (Mackenzie 2000).

Methodology

The literature on affordances is interdisciplinary. Originated from Ecological Psychology, it has found application in numerous fields. To scope the literature review, therefore, we followed the methodology proposed by Webster and Watson (2002), and we performed a search spanning Information Systems, Organization Studies, and Management disciplines. The following databases were used: ProQuest, Science Direct, JSTOR archive, ABI Inform, and EBSCO. As a first step, we examined selected journals in these cited fields and we completed fully-test electronic searches on keywords including “affordance theory”, “affordances and technology” or “affordances and IS” or “affordances and IT”. These searches identified a total of 124 articles (see Table 1). The titles and abstracts of each article were examined to evaluate whether inclusion was warranted (i.e., the article appeared to be concerned with, or relevant to, the

importance of affordance theory in Information Systems). This process provided 13 articles for in-depth review.

In an effort to broaden the search beyond the original set of journals, we added the potentially interesting works published in conferences proceedings, and other journals cited by the authors of the first basket of 13 articles (Webster and Watson 2002). A further set of 12 articles was collected, read in full, and reviewed.

In an effort to develop a comprehensive model on the usefulness of affordance theory in IS research, we exclude from our analysis papers that only refer to Norman (1988) and develop his view of affordances. According to Norman (1988), affordance term refers to the perceived and actual properties of the object; primarily those fundamental properties that determine just how the artefact could be possibly used. Norman (1988) suggests that affordances are intrinsic and “designed-in” properties of the artefact. According to Norman (1988) the actor does not play any role in creating the affordance. In this formulation, Norman’s argument differs from Gibson’s in that he claims that affordances are not unique to the particular way in which the actor perceive it, and therefore affordances do not change among different contexts of use or different actor’s goals; rather that are always there to be perceived. We also limited the interaction with human computer interaction (HCI) literature, where Norman imported the term and the concept became popular (Hartson 2003; McGrenere and Ho 2000).

We also exclude from our analysis papers that do not give an explicit explanation of the meaning and the usage of the term affordance or use it as synonymous of a physical function, a characteristic, and a design feature of the artefact.

Although we followed a systematic, structured and replicable approach to determine the source material for the literature review (Webster and Watson 2002), we recognize that the chosen criteria for the literature choice are subjective and therefore some articles might not be accounted.

Our categorization of the literature is concept-driven (Webster and Watson 2002) and organized around the theoretical framework presented above. For each article, we noted: what affordances the author(s) had identified, how affordances were explained, and on what part of the theoretical framework they focused. The results are organized consistently with our integrative framework and concept matrices (Webster and Watson 2002) (see Table 2 and Table 3).

Journals and Conferences Analysed		
Journals	Abstract	Of Interest
MIS Quarterly	12	4
European Journal of Information Systems	22	0
Information Systems Research	8	0
Journal of Management Information Systems	14	0
Journal of the Association for Information Systems	25	5
Administrative Science Quarterly	5	0
Organization	1	0
Organization Science	22	2
Academy of Management Review	1	1
Management Science	1	1
Other Journals	8	5
Conference Proceedings	7	7
Total	126	25

Table 1 Journals and Conference Proceedings Analysed

Synthesis of the Literature Review

No.	Reference	Methodology	Affordance Existence	Affordance Perception	Affordance Actualization	Affordance Effect
1	Gaver (1991)	Theoretical	X	X		
2	Greeno (1994)	Theoretical	X	X		
3	McGrenere and Ho (2000)	Theoretical	X	X		
4	Hutchby (2001)	Revisited case study	X			
5	Hartson (2003)	Theoretical	X	X		
6	Conole and Dyke (2004)	Theoretical	X			
7	Zammuto et al. (2007)	Theoretical	X			
8	Markus and Silver (2008)	Theoretical	X			
9	Jung et al. (2010)	Case studies	X			
10	Leonardi and Barleys (2010)	Theoretical	X			
11	Van Osch and Mendelson (2011)	Case study	X	X		
12	Leonardi (2011)	Case study	X			
13	Yoo et al. (2012)	Theoretical	X			X
14	Majchrak and Markus (2012)	Theoretical	X			
15	Sebastian and Bui (2012)	Case study	X			
16	Davern et al. (2012a)	Theoretical	X			
17	Davern et al. (2012b)	Theoretical	X			
18	Volkoff and Strong (2013)	Published case studies examination	X		X	
19	Leonardi (2013)	Case study	X	X	X	X
20	Vitari and Pigni (2013)	Theoretical	X			
21	Savoli and Barki (2013)	Case study	X	X		
22	Seidel et al. (2013)	Case study	X			
23	Robey et al. (2013)	Theoretical	X			
24	Bernhard et al. (2013)	Theoretical	X	X	X	X
25	Strong et al. (2014)	Case study	X		X	X

Table 2 Concept Matrix: Summary of the Selected Publication

The following paragraphs details in turn the four steps in the model:

1. Affordance existence;
2. Affordance perception;
3. Affordance actualization;
4. Affordance effect.

Affordance Existence

The main contribution of scholars in affordance theory literature concerns the first construct of our scheme. Affordances existence appears to be studied mostly theoretically, presenting the definition of affordance and highlighting the concept's characteristics.

Affordances are preconditions for activity. They are properties of whatever the actor interacts with an object in such a way that an activity can be supported (Greeno 1994).

Affordances, as cognitive processes (Davern et al. 2012a, 2012b) where actors perceive objects in terms of their potential for actions, are analysed as relations between actors and others systems (Greeno 1994).

Affordances exist whether the actor cares about them or not, whether they are perceived or not, and even whether there is perceptual information for them exists or not. For example, a door affords an actor to go into another room.

As indicated by the bi-directional arrow in our Theoretical Framework, affordances are relational (Hutchby 2001; Zammuto et al. 2007; Majchrzak and Markus 2012). They are not properties of either the organization or the IT artefact alone, but rather relations and dynamic interactions (Majchrzak and Markus 2012) between the two. In these terms, affordances are technology and actor specific (Strong et al. 2014). For example, the affordance provided by the door is a function of its width and the ability of an actor to move through the aperture, and depends on the actor's width and ability to walk.

Affordances are functional in the sense that they are enabling, but also constraining, factors in a given organism or organization's attempt to engage in some activity (Hutchby 2001; Leonardi 2013). This first definition of functional affordances is extended to an higher level of analysis by Markus and Silver (2008) that take into account the concept of the actor's intention to perform an action and define affordances as the possibilities for goal-oriented action afforded to specified actors' groups by technical object. For example, the actor that walks through the door wants to go in the other room.

An affordance is often seen as an enabler, a positive potential to perform an action (Leonardi 2011; Majchrzak and Markus 2012; Zammuto et al. 2007). However, affordance can also constrain actors to perform an action. Indeed, affordances arise from object features and actor's characteristics and capabilities. In this sense, depending on the actor's characteristics, these potentials can be opportunities and constraints for action. The same door of the example above, while affording the possibility to walk through for an actor whose width is smaller than the one of the aperture, also represents a constraint for an actor whose width is greater than the door size. Only a few scholars tend to consider affordances with this double nature, as simultaneously enabling and constraining the possibility to act (Volkoff and Strong 2013).

Adopting affordance theory in the IS domain produced two main consequences. First, researchers and practitioners no longer deal with just individuals as actors engaged in the relationship, but also with organizations presented as groups of people, teams and business units and consider the actors originating, perceiving, and enacting affordances with the intention to support organizational goals. In this term, the potential for coordinated action by a group of actors can be thought as an organizational affordance (Strong et al. 2014; Volkoff and Strong 2013; Zammuto et al. 2007). Second, affordances, which maintain all the characteristics indicated above, are considered, and often called, technology

affordances, as action potentials that an organization with a particular purpose can do with a technology or Information System (Markus and Silver 2008; Savoli and Barki 2013; Seidel et al. 2013).

Among all the characteristics indicated above, we emphasize the concept of affordance in the IS domain: affordances are action potentials arising from the capabilities and goals of the organization and the features of the IT artefact in a unique way where both are and equally needed.

Affordance Perception

Affordances need to be perceived by the actor to exploit their potential. Affordance perception is a process of recognition (Greeno 1994) of the affordance existence influenced by (1) the objects' features, (2) actor capabilities, (3) actor's goal, and (4) external information. The range of affordances of any object is not fully and immediately available to perception (Hutchby 2001). It is the actor, that goal-oriented, with his/her own characteristics, perceives the affordance as a potential, an opportunity to perform an action. In this sense, the process of recognition of affordance is analysed as the relationship between a specific actor and a specific system. Considering the example of the door mentioned above, while the actor recognizes the intention to move in the other room, also considers his/her width in relation to the door's aperture. In other terms, the actor might ask to himself/herself: "Am I able to pass through that door? Does the door afford me the possibility to pass or is it an obstacle to my movement? Do I have to side to pass through the door?"

Volkoff and Strong (2013) are the first to argue against affordance perception. They state that affordances, as real and generative mechanisms associated with technical artefacts for use in organizations, do not need to be perceived. In other terms, by taking into account the functional aspect of affordances, as defined by Markus and Silver (2008), they state that affordance exists only in relation to the actor's goal or intent. According to their point of view, they focus on the phenomena observed as actualized affordances, going back to the underlying affordances from the finished action.

Affordance Actualization

Actualization is defined as the action taken by actors as they take advantage of one or more perceived affordances through their use of technology to achieve outcomes in support of organizational goals (Strong et al. 2014). Actualization is a goal-oriented and iterative process (Leonardi 2011, 2013; Strong et al. 2014).

Recently, the interest in the actualization process has grown (Bernhard et al. 2013; Leonardi 2013; Strong et al. 2014; Volkoff and Strong 2013). Ecological psychologists (Gibson 1977, 1986; Greeno 1994) and scholars that first brought the affordance concept into IS (Hutchby 2001; Zammuto et al. 2007) did not emphasize on realizing potential through goal-directed behaviour or on outcome achievement per se, assuming that actors were capable of easily actualizing the affordance.

Actualization, with few empirical examples, is presented as an individual journey, as an individual-level process, experienced differently by each actor taking goal-oriented actions (Leonardi 2013; Strong et al. 2014; Volkoff and Strong 2013). Only Strong et al. 2013, based on the collective constructs literature, theoretically introduce the concept of actualization at an organizational level, seen as the aggregation of the many actors' actualization processes at an individual-level. In other terms, actualization as an organizational journey emerges as the sum of the many actor level journeys. To actuate affordances at an organizational level, Leonardi (2013) introduces the concept of shared affordance, that is, an affordance shared by all members of a group in which all actors manifest similar use of technology features. In essence, Leonardi (2013) says that only when actors agree on the usage of a similar sequence of technology features, the affordance created by the interaction with a specific technology can be actuated at an organizational level.

Affordance Effect

Affordances have the potential to cause an event. As a generative mechanism, the actuation of an affordance produces an empirical result. In other words, actor's volition to act upon a technology becomes an entity when the actor behaves to actuate the affordance.

Scholars tend to differentiate affordance actualization results in two main sets, based on actors' time perception. In the short term, the effect generated from affordance actualization is called immediate-concrete outcome (Strong et al. 2014), as a specific expected outcome from the actualization and useful for realizing an ultimate organizational goal, the so-called affordance effect in the long term. An immediate concrete outcome serves as an intermediary between actualization actions and ultimate organizational goals (Strong et al. 2014).

The actualization of an affordance may result in (1) enabling conditions for additional affordances, (2) development of additional IS features, and/or (3) enabling organizational changes.

Actualized affordances provide explanations of causality at a level that is specific to the respect of the technology and the organization (Volkoff and Strong 2013).

IT-associated organizational changes are now studied in terms of results of the affordance actualization process. Most, are focused on cross-functional communication and informal network changes (Leonardi 2013; Sebastian and Bui 2012), as well as efficient control of operations after IT implementation (Strong et al. 2014).

Conclusions

Discussion

We reviewed the abstracts of 124 articles from the Information Systems, Organization Studies and Management disciplines. We categorized 25 relevant studies based on an integrative framework that summarizes affordance actualization. The literature review tries to answer the research question concerning the understanding of the use of the affordance perspective in IS literature to help explain IT uses and consequences.

The literature review was developed on the concept of affordance existence, affordance perception, affordance actualization, and affordance effects in which literature was classified.

Our review of the literature shows primarily the novelty of the theme in the IS research. The growing number of publications on affordances and affordance theory reflects the increasing interest of scholars and recognizes the potentials of this theory to explain IT artefacts and social actor intertwining

The theoretical framework proposed identifies four areas, affordance existence, affordance perception, affordance actualization, and affordance effect, according to which the selected articles have been classified. The four areas are part of a broader picture that describes affordance translation into action.

From this review, we reach a number of conclusions. First, due to the lack of unique interpretation of the definition of affordance in IS literature, researchers tend to propose and/or reshape it to their specific needs. Second, even though psychology researchers (Gibson 1977, 1986; Greeno 1994; Hutchby 2001) have highlighted the role of actor's affordance perception before being able to act on it, IS researchers do not agree on its importance. We suggest a view consistent with psychology researchers. Third, we believe that the attention of IS researchers on affordances actualization is not in the actualization process per se, but on the factors contributing to the ease or the difficulty that organizational actors may encounter as they act to actualize an affordance (Leonardi 2013; Volkoff and Strong 2013). According to the literature, the actualization of an affordance may depend on the presence of appropriate enabling, stimulating, and releasing conditions (Volkoff and Strong 2013), such as: (1) the technology configuration and technology features, (2) the actualization of previous affordances, (3) the difficulty of the actualization itself - also called degree of effort the actor has to invest to act on it (Bernhard et al. 2013) -, (4) the actors' ability and understanding - also called cognitive load (Bernhard et al. 2013) -, (5) organizational and environmental structures and demands, (6) actors' ultimate goal, (7) the inability of the organization to perceive an affordance despite its availability, (8) the willingness to change behaviour, and (9) the organizational level of skill or knowledge. Fourth, we believe that further attention is needed in the actualization process at an organizational level, as now, affordances actualization has been considered as simply the sum of actors' actions, as affordances are considered in a first-person perspective view. Affordance literature seems silent on organizational actualization in terms of actions taken by organization seen as a whole, but, instead, as the sum of actions taken by actors or groups of actors, even if several studies (Capra and Luisi 2014) show organizations manifest properties different from those of the sum of its groups or individuals.

Fifth, the attention of IS researchers in studying affordances effects is mostly on how and why outcomes occurs (Volkoff and Strong 2013; Strong et al. 2014) and on what barriers an actor might face in trying to achieve those outcomes (Leonardi 2013), deviating from the rationale of affordance theory itself. We argue that research attention should focus on what outcomes occur and what goals are achieved due to the actualization process.

Finally, our review suggests that, with an increasing number of academic works in the last two years, the focus of affordance literature seems to have changed from affordances themselves to affordance implication in IT uses and consequences to organizations (Markus and Silver 2008; Majchrzak and Markus 2012). While previous papers (Markus and Silver 2008; Zammuto et al. 2007) are theoretical works on the organizational concept of affordance, current scholars are presenting empirical examples of it (Leonardi 2013; Strong et al. 2014). We believe that the focus of IS researchers is now in the process that is needed to capture affordance potential as organizations’ opportunities for action, deriving value, and ultimately reaching goals.

Highlighting the Difference between Gibson and Norman’s Affordance

While literature gives credits to Gibson for originating affordance concept in psychology, credits are also given to Norman for introducing the concept into HCI field, where the definition spread quickly. Considered the relevant usage of the concept of affordance in HCI field, this paragraph aims to clarifying the main differences between Gibson and Norman affordance’s definitions shedding lights on ambiguities and possible misunderstanding.

Norman (1988, 1999) instead refers to affordances as real and perceived. Real affordances are physical characteristics of a device or interface that allows its operations. Perceived affordances are characteristics in the appearance of a device that gives clues for its proper operation (Norman 1999). To Norman, a real affordance is something that help the actor doing something, and a perceived affordances suggest how the artefact should be use and therefore determine its usability. According to Norman is the designer of the artefact that is involved in characterizing the existence of an affordance, while there is no actor as a frame of reference (McGrenere and Ho 2000). When the designer takes advantage of an affordance, the actor knows what to do with the artefact just by looking at it, denying in this sense both affordance existence and affordance perception phases.

We believe that Norman concept of affordance also emphasizes the socio-materiality (Jung et al. 2010; Leonardi and Barley 2010; Robey et al. 2013) of the object focusing on its practical and immediate usability. The relational nature of the affordance and the opportunity for action created by the intertwining between the actor and the object are then disregarded.

Although we limited our literature review to papers that refers to Gibson’s concept of affordance, we notice that only few of the selected papers also refer to Norman’s works (see Table 3). With X, we indicate the authors that have further developed the concept of affordance referring to Gibson or both Gibson and Norman. With (X), we indicate the authors that, although following Gibson point of view, have cited and taken into consideration Norman’s concept of affordance. With (x), we indicate the authors that have cited Norman’s work but not developed the concept further.

No	Reference	Gibson (1977, 1986)	Norman (1988)
1	Gaver (1991)	X	(X)
2	Greeno (1994)	X	
3	McGrenere and Ho (2000)	X	X
4	Hutchby (2001)	X	(X)
5	Hartson	X	X
6	Conole and Dyke (2004)	X	
7	Zammuto et al. (2007)	X	
8	Markus and Silver (2008)	X	

9	Jung et al. (2010)	X	X
10	Leonardi and Barleys (2010)	X	
11	Van Osch and Mendelson (2011)	X	(x)
12	Leonardi (2011)	X	(X)
13	Yoo et al. (2012)	X	
14	Majchrak and Markus (2012)	X	
15	Sebastian and Bui (2012)	X	
16	Davern et al. (2012a)	X	X
17	Davern et al. (2012b)	X	X
18	Volkoff and Strong (2013)	X	
19	Leonardi (2013)	X	(x)
20	Vitari and Pigni (2013)	X	
21	Savoli and Barki (2013)	X	(X)
22	Seidel et al. (2013)	X	
23	Robey et al. (2013)	X	X
24	Bernhard et al. (2013)	X	
25	Strong et al. (2014)	X	

Table 3 Concept matrix: Selected Literature Reference to Gibson and Norman

Implications For Future Research And Practice

Because of the renewed interest of affordance theory in the IS domain, our literature review, and more broadly the affordance perspective itself, provide significant value to researchers and practitioners, as discussed below.

The concept of affordances offers a rich approach to study the effect of the implementation and usage of the Information Systems, as it facilitates conceptualization of different perceptions and use patterns of IS based on how Information Systems features relate to the goals and properties of specific actor and/or groups of actors (Markus and Silver 2008; Sebastian and Bui 2012). Affordance theory overcomes the contingency theory debate on technological imperative against organizational imperative (Zammuto et al. 2007). Affordance theory also surmounts, to one side, the limitations of theories that emphasize only on psychological or social behaviour, therefore ignoring the features and functionalities of IT, and, on the other, the limitations of the theories that make simplistic and deterministic assumptions about the effects of IT on human behaviours and organizational outcomes. In other terms, affordance accounts for the possibility that organizations can achieve outcomes that would not occur without the use of technology. Furthermore, it explicitly includes the unintended and the undiscovered use of technology (Majchrzak and Markus 2012). Under the affordance lens, technology is no more an outsider, as an external force generative of change and possibility for innovation, but as an organizational factor.

In terms of methodology, application of quantitative methods seems to lack in affordance research. This is because of the very nature of the affordance concept. As a cognitive and generative mechanism it leads to qualitative investigation aiming at exploring the mechanisms of affordance emergence and actualization (Bernhard et al. 2013). From our literature review, we recognize the main contribution of researchers in affordance existence, with 15 theoretical papers and 10 case studies, and affordance perception, with 5 theoretical papers and 3 case studies. We recognize the lack of contribution on affordance actualization and effect, where findings and studies are mainly form case studies. We hope that this finding could

address further researchers in exploring other kind of analysis and therefore enrich the affordance research avenue.

While the interest in affordance actualization process and actualization effect is increasing, literature seems silent on affordance potential to capture and create value because of affordance actualization. If affordances are seen as value drivers (Piccoli and Pigni 2013; Vitari and Pigni 2013), how can firms and organization take advantage of these drivers to extract value? Can entrepreneurs strategize on affordances potential? Can managers predict affordances impact on value creation from the intertwining of their organizational capabilities and IT features?

Scholars seem to identify more frequently technology-specific affordances (Conole and Dyke 2004; Van Osch and Mendelson 2011; Vitari and Pigni 2013). The understanding of the affordances of a specific technology in a selected field can help better predict how technology will affect people's way of doing activities and actions and their relationships (Van Osch and Mendelson 2011). While we agree on the usefulness of defining technology-specific affordances, we are also forced to consider the risk that this could imply. A restricted focus on the technological artefact could result in the loss of the affordances relational nature, therefore, transforming affordances into technology characteristics.

REFERENCES

- Bernhard, E., Recker, J., and Burton-Jones, A. 2013. "Understanding the Actualization of Affordances: A Study in the Process Modeling Context," *ICIS 2013 Proceedings*.
- Capra, F., and Luisi, P. L. 2014. *The systems view of life: a unifying vision*, Cambridge University Press.
- Conole, G., and Dyke, M. 2004. "What are the affordances of information and communication technologies?," *ALT-J* (12:2), pp. 113–124.
- Davern, M., Shaft, T., and Te'eni, D. 2012a. "Cognition Matters: Enduring Questions in Cognitive IS Research," *Journal of the Association for Information Systems* (13:4), pp. 273–314.
- Davern, M., Shaft, T., and Te'eni, D. 2012b. "More Enduring Questions in Cognitive IS Research: A Reply," *Journal of the Association for Information Systems* (13:12), pp. 1012–1016.
- Gibson, J. J. 1977. *The Theory of Affordances, Perceiving, acting and Knowing*, Shaw R. and Bransford J. Hillsdale, N.J.: Lawrence Erlbaum Associates.
- Gibson, J. J. 1986. *The Ecological Approach to Visual Perception*, Lawrence Erlbaum Associates.
- Greeno, J. G. 1994. "Gibson's affordances," *Psychological Review* (101:2), pp. 336–342.
- Hartson, H. R. 2003. "Cognitive, physical, sensory, and functional affordances in interaction design," *Behaviour & Information Technology* (22:5), p. 315.
- Hutchby, I. 2001. "Technologies, Texts and Affordances," *Sociology* (35:2), pp. 441–456.
- Jung, J. H., Schneider, C., and Valacich, J. 2010. "Enhancing the Motivational Affordance of Information Systems: The Effects of Real-Time Performance Feedback and Goal Setting in Group Collaboration Environments," *Management Science* (56:4), pp. 724–742.
- Leonardi, P. M. 2011. "When Flexible Routines Meet Flexible Technologies: Affordance, Constraint, and the Imbrication of Human and Material Agencies," *MIS Quarterly* (35:1), pp. 147–168.
- Leonardi, P. M. 2013. "When Does Technology Use Enable Network Change in Organizations? A Comparative Study of Feature Use and Shared Affordances," *MIS Quarterly* (37:3).
- Leonardi, P. M., and Barley, S. R. 2010. "What's Under Construction Here? Social Action, Materiality, and Power in Constructivist Studies of Technology and Organizing," *Academy of Management Annals* (4:1), pp. 1–51.
- Mackenzie, K. D. 2000. "Processes and their frameworks," *Management Science* (46:1), pp. 110–125.
- Majchrzak, A., and Markus, M. L. 2012. "Technology Affordances and Constraints in Management Information Systems (MIS)," SSRN Scholarly Paper No. ID 2192196, Rochester, NY: Social Science Research Network.
- Markus, M. L., and Silver, M. S. 2008. "A Foundation for the Study of IT Effects: A New Look at DeSanctis and Poole's Concepts of Structural Features and Spirit," *Journal of the Association for Information Systems* (9:10), pp. 609–632.
- McGreene, J., and Ho, W. 2000. "Affordances: Clarifying and Evolving a Concept," *Proceedings of Graphics Interface 2000; Montreal*.
- Norman, D. A. 1999. "Affordance, Conventions and Design," *Interactions*, pp. 38–42.

- Van Osch, W., and Mendelson, O. 2011. "A Typology of Affordances: Untangling Sociomaterial Interactions through Video Analysis," *ICIS 2011 Proceedings* .
- Piccoli, G., and Pigni, F. 2013. "Harvesting External Data: The Potential of Digital Data Streams," *MIS Quarterly Executive* (12:1), pp. 53–64.
- Robey, D., Anderson, C., and Raymond, B. 2013. "Information Technology, Materiality, and Organizational Change: A Professional Odyssey," *Journal of the Association for Information Systems* (14:7), pp. 379–398.
- Savoli, A., and Barki, H. 2013. "Functional Affordance Archetypes: a New Perspective for Examining the Impact of IT Use on Desirable Outcomes," *ICIS 2013 Proceedings* .
- Sebastian, I., and Bui, T. 2012. "The Influence of IS Affordances on Work Practices in Health Care: A Relational Coordination Approach," *ICIS 2012 Proceedings* .
- Seidel, S., Recker, J., and vom Brocke, J. 2013. "Sensemaking and Sustainable Practicing: Functional Affordances of Information Systems in Green Transformations," *MIS Quarterly* (37:4), pp. 1275–A10.
- Strong, D. M., Johnson, S. A., Tulu, B., Trudel, J., Volkoff, O., Pelletier, L. R., Bar-On, I., and Garber, L. 2014. "A Theory of Organization-EHR Affordance Actualization," *Journal of the Association for Information Systems* (15:2), pp. 53–85.
- Vitari, C., and Pigni, F. 2013. "DDGS affordances for value creation," *itAIS Proceeding* .
- Volkoff, O., and Strong, D. M. 2013. "Critical Realism and Affordances: Theorizing It-Associated Organizational Change Processes," *MIS Quarterly* (37:3), pp. 819–834.
- Webster, J., and Watson, R. T. 2002. "Analyzing the past to prepare for the future: Writing a literature review," *MIS Quarterly* (26:2), p. R13.
- Yoo, Y., Boland Jr., R. J., Lyytinen, K., and Majchrzak, A. 2012. "Organizing for Innovation in the Digitized World," *Organization Science* (23:5), pp. 1398–1408.
- Zammuto, R. F., Griffith, T. L., Majchrzak, A., Dougherty, D. J., and Faraj, S. 2007. "Information Technology and the Changing Fabric of Organization," *Organization Science* (18:5), pp. 749–762.