

Beyond the digital divide: An ecological approach to gameplay

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ABSTRACT

This paper outlines a framework for understanding gameplay from the perspective of ecological psychology. According to this perspective, gameplay can be described in terms of *perceiving*, *acting on* and *transforming* the affordances that are related to a game system or to other players in a game. Challenges in games have an emphasis on *perceiving suitable actions* and/or *performing suitable actions*, often with emphasis on one aspect. For example, in many board games, strategy games and puzzle games, the challenge is to *perceive* appropriate affordances while in many sports, multiplayer shooter games, racing games, etc. the challenge is to *use* appropriate affordances. From this follows that the ecological approach to gameplay overrides the division of games as being digital and non-digital games.

Keywords

Gameplay, ecological psychology, affordances, digital games, non-digital games.

INTRODUCTION

Digital games seem to be elusive artifacts to grasp intellectually. A great deal of effort has been invested in trying to define digital games and to position them historically in relation to text, media, play, literature, drama, etc. Are we to understand games as related to other screen-based media and place them in the same media ecology as movies? Are they thus historically related to theatre and drama? Can we see digital games as a form of interactive television? Does it make more sense to place digital games in a broader framework of studies on play? Are digital games related to sports and, if so, in what way? The field of studying games sometimes also describes its own historical roots in terms of the so-called ludology–narratology debate. This discussion regarded the status of stories in games and if rules or fiction was the appropriate unit of analysis for understanding digital games (cf. Eskelinen 1999; Frasca 2003; Pearce 2005; Murray 2005).

How a scholar chooses to position digital games has consequences on what can be seen as relevant research questions, appropriate methods and whether results are a contribution or not. For example framing video games as “media” will make the game a vessel for some “content,” and emphasis will be on how the game mediates a certain theme. A game like *The Sims* (Maxis, 2000) would in such a framework be comparable to soap TV-series and could be discussed in relation to how other media and commercials have an impact on socialization. Such a framework would also position the user of the game as a consumer/observer. Framing video games as toys, i.e., material for play, will make *The*

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Sims become comparable to a “doll house” and place game studies in a long tradition of studies on play. The user will in such a framework be positioned as a player. Framing *The Sims* as a design tool will emphasize creative aspects and depict the user as an author/designer. It is thus crucial to question how the academic community frames games. To use Wittgenstein’s terminology (1953, § 65-71) we need to pay attention to what kind of “family resemblances” we ascribe different games. Some frameworks will highlight specific features of games but hide or trivialize others.

For instance the division of games into the categories *digital* and *non-digital games* makes us think in specific way about games. For example the literature about games, learning and education can be seen as being divided into two traditions. Whereas the *International Simulation and Gaming Association* (ISAGA) has a long history of seeing gaming as an instructional approach that can be done with or without digital technology (for examples see: Booth Sweeney & Meadows 1995; Thiagarajan 2003), the more recent discussions about *serious games* and *gaming literacies* are associated to the field of educational technology (Gredler 1996; Shaffer 2007; Gee 2003; 2005; 2007). Ideas about games and learning then become associated with ideas about using technology in schools, and the educational value of games is seen in relation to features like multimodality, visual realism and interactivity. Other aspects like what it means to interact with *rules* are here easily overlooked.

The distinction between digital and non-digital games is in many ways institutionalized. The multidisciplinary game research community, *Digital Games Research Association* (DiGRA), has for instance the distinction built into its title. Yet the community as such embraces the study of any form of games, which is stressed by using *non-digital games* as specific tracks on conferences. While the distinction digital/non-digital from a historical and technical perspective certainly is useful, it can be argued that the recent trend with pervasive digital technology makes it out-of-date to frame the study of games and learning on the basis of the technology that is used. Is it relevant for the game experience if a game contains some form of digital technology? Consider for instance toolkits for board games and tabletop role-playing games. These toolkits are in the form of applications for tablet computers or smart phones and are supposed to help players manage the complexity of some games. For example the board game *Arkham Horror* (Lauinius & Wilson 2005), which is a rather complex game with many cards in different categories and several sub-mechanisms, has a toolkit that among other things replaces some of the drawing decks in the game. Might it not be that digital and non-digital are rather blunt instruments for discussing games? With pervasive digital technology around us, will it make sense to single out games on the basis of the technology they employ?

Instead it might be fruitful to explore other forms of family resemblances among games that do not take into account the specific technology used in the games. Projects with an academic interest in game mechanics have approached games in this way. In the *Gameplay Design Pattern Project* (Björk & Holopainen 2005a; 2005b; Holopainen & Björk 2008) as well as the *Game Ontology Project* (Zagal et al 2005; Zagal 2008), game mechanics are discussed without giving any special account to the kind of technology employed in the games. The emergence of journals like *International Journal of Role-Playing* (<http://journalofroleplaying.org/>) also points toward classifications of games that override the digital/non-digital distinction (cf. Hitchens & Drachen 2008). This paper concurs with these ways of approaching games.

Aim of this paper

This paper has three interrelated aims. The primary purpose of this paper is to outline a framework for understanding gameplay from the perspective of ecological psychology (Gibson & Pick 2000; Gibson 1977; 1986; Reed 1987; 1996). This framework describes gameplay in terms of perceiving and acting in accordance to affordances in games. This account can be used as a thinking tool for a number of different questions related to the academic study of games and gaming.

The second purpose of the paper is to show how the ecological approach to gameplay provides a new way to look at challenges in games. The approach makes it possible to see new family resemblances among games, based on whether a game challenges the player's ability to perceive affordances or the player's ability to use affordances.

Finally, the framework is used to discuss the issue of digital versus non-digital games. The ecological approach to gameplay makes a cross section through any attempt to classify games based on the kind of technology they employ. The purpose of this paper is to open up a discussion where games are classified on the basis of their gameplay. This means that such odd entities as sports, puzzles games, board games and video games can be discussed with the same framework.

METHODOLOGICAL CONSIDERATIONS

This paper is a strictly conceptual contribution with no other empirical sources than the author's own game experience. It might seem a bit at odds to talk about methodology with such an approach. Yet, since the field of game studies has been rather occupied with defining games and gameplay (Juul 2003; Salen & Zimmerman 2004) and this is another account in this tradition of theoretical papers, I would like to point out some epistemological concerns.

The academic confusion surrounding digital games is not in any sense unique. There are many phenomena that are studied in different disciplines with different knowledge interests, and it is part of being a scholar to argue about definitions, theories and methodological approaches. But what is noteworthy in some of the attempts to give digital games an appropriate definition, theory and history is that the attempts build on a so-called *things-ontology* (Säljö 2009). Scholars in the game studies field are trying to define the "true" nature of games (cf. Juul 2003 pp. 19–51; Salen & Zimmerman 2004 pp. 70–91, for examples of game definitions).

This paper offers yet another framework for approaching games but attempts at doing so without an essentialist epistemology. I do not see the value of theory in its relationship to an objective world of "things," but in how a theory can illuminate and describe something in a powerful way (Säljö 2009 p. 204). The claims made in this paper rest on the ecological approach to perception, action and learning and are supposed to be read from this point of view. Whatever discussions there are between ecological psychology and other approaches, for example cognitive psychology, this is not the place to account for them.

AN ECOLOGICAL APPROACH TO GAMEPLAY

The affordance concept

The theory of ecological psychology is mainly known from James Gibson's writings and the affordance concept that he coined (1986 p. 127). The affordance concept was picked up by traditions like *human-computer interaction* and *interaction design* where it came to take on a somewhat different meaning than it had originally (see Norman 1998; 1999).

The main idea with the affordance concept, as it originally was developed, was to address the reciprocal relation between humans (as well as other animals, both humans and animals are regarded as perceiving and acting organisms in this theory) and the environment. The environment contains everything from buildings and plants to different objects as well as other humans and animals. These things exist in relation to each other in a layout, a structure of the environment. This layout is constantly changing when events occur, things and people move, change, disappear, etc. At the same time animals and humans are active organisms interacting with the environment. The environment *offers* the individual different ways of acting. These offers are called affordances and an important part of the original formulation of the concept is that affordances are relative to an organism (relative between species as well as between individuals). For instance, a stone can afford being thrown for someone with a hand and an arm of certain strength. This affordance is thus relative to the physical constitution as well as the capabilities of the organism. Many humans and some apes could use a stone as a projectile, but this affordance is not an affordance for an infant or someone with a disability in their arms or hands.

An affordance is thus always relative to an agent; it is not an objective property of the environment. I find that the most illustrative metaphor for illustrating the original meaning of an affordance is that of an empty space between two fitting jigsaw pieces. The environment must have certain properties in relation to the acting organism, its bodily constitution and its capabilities.

Although many basic affordances are of such nature that they can be acted upon by a majority of the animals in a species, there are individual differences. As Gibson and Pick (2000) point out, for humans affordances are often an outcome of training. Experts in a certain domain have learned to utilize affordances that are not available to non-experts:

Humans, at least, must learn to use affordances. Some affordances may be easily learned: others may require much exploration, practice, and time. [...] Further development of expertise may involve learning to realize affordances unavailable to non-experts. A three-inch-wide beam affords performing back flips for a gymnast, but the affordance is not realizable by others; rock climbers learn to use certain terrains for support that do not appear to others to provide a surface of support. (2000, pp. 16-17)

Some affordances are thus only realizable (can be utilized) by experts in a domain, even if they are recognizable (can be seen) by others, who lack the skill of acting upon them. I can see that waves on a windy day afford surfing, even if I cannot stand on a surfboard. It is important to notice though, that being knowledgeable in a domain also means having the ability of perceiving more affordances than a novice. While I can see that the waves afford surfing, I cannot identify properties of the waves for doing certain tricks or judge if

the conditions are safe. Expertise is both about recognizing affordances and being able to realize them.

To discover affordances

The ecological approach rests on strong anti-cognitivist assumptions. It rejects the existence of mental schemata and the computer metaphor of an information-processing mind. Instead an assumption in this theory is that learning and perception is a process of *differentiating* and making distinctions. It rejects the idea of perception as a process of *enriching*. We do not add mental schemata to stimuli in order to make sense of the world; we make sense of the world by becoming attuned to our environment, being able to make finer distinctions (Gibson & Pick 2000). The fundamental function of perception is to pick up information about possible ways of acting in the environment. In other words, we look for affordances.

Just as we must learn to utilize some affordances, we also must learn to discover affordances by cultivating our perception. Experts in different domains are able to perceive things in their surroundings that remain invisible to novices. A trained soccer player can see opportunities that someone who is not familiar with the rules of soccer would not see. For example, only a skilled player who is attuned to making the necessary distinctions can see the possibility of luring the opposing team into an offside trap. Gaining the ability to discover specific affordances is called *perceptual learning* in the ecological approach (Gibson & Pick 2000).

Perception and action

The theory presumes that perception and action are closely related. We take actions to perceive what our world around us can afford and we act upon these affordances, sometimes in ways so that new possibilities open up for us (Gibson & Pick 2000; Gibson 1977; 1986). It should also be made clear that according to this theory perception is a kind of action. We actively look, listen, smell, hear and touch. We turn our heads and adjust our bodies in order to gather information. We reach out and touch objects. We focus in order to hear better and listen. A point in this theory is to separate between two different aspects of actions. Actions have both exploratory/information-gathering aspects as well as performatory/executive aspects.

The *exploratory* aspect of actions is to yield knowledge about the affordances of the specific situation. The *performatory* aspect of action is about realizing affordances that are already discovered. (Gibson & Pick 2000 p. 21)

Perceiving and acting go on in a cycle, each leading to the other. Perception occurs over time and is active. Action participates in perception. Active adjustments in the sensory system are essential. But action itself may be informative, too. /.../ Actions have consequences that turn up new information about the environment. /.../ All actions have this property; but it is useful to distinguish *executive* action from action that is *information-gathering*. (Gibson, 1991, p. 601)

Thus, in a sense action always reveals information about affordances, but it is useful to make some distinctions. As Gibson (above) points out, it is important to recognize that some actions are made with the purpose of gathering information. Another important feature of action is that some actions change the affordances of a situation, i.e., we must consider affordances for changing affordances. For example, most adult humans are able

to carry a ladder. To carry a ladder to a certain place is to use one affordance the ladder has for an adult, its property of being movable. The goal of the activity is not carrying the ladder as such but to place the ladder in order to then climb it and reach a certain spot. Thus, carrying is here an action made to change the affordances of the environment, making a specific elevated place reachable. We use some affordances in a situation in order for other affordances to emerge. Thus, the environment can be said to have affordances for gaining other affordances. We do not only adapt the environment, we also reveal information about affordances through action:

Executive actions, such as reaching, grasping, and locomotion, have their own role in perceptual and cognitive development because they change the affordances of things and places providing new occasions for information-gathering. (Gibson 1991 p. 601)

One way of gaining new affordances in a situation is to use tools. By using a tool some animals can extend their capabilities and realize new affordances (cf. Linderoth 2010). Humans are superior to other species as tool users, and the whole history of technological development can be seen as a way of changing what the environment affords us.

Gameplay and affordances

The ecological approach can, being a general theory about perception, action and learning, be used in order to understand gameplay. This theoretical framework provides concepts that can reveal interesting aspects of gameplay. The affordance concept has already been used when discussing games and gameplay (Linderoth 2010; Linderoth & Bennerstedt 2007; Rambusch 2010; Gee 2003; 2007). This paper ties into this discussion and attempts to point out that the difference between *discovering* and *using* affordances can be a fruitful distinction to use when approaching gameplay.

Gameplay and the exploratory aspect of action

As stated, actions have an information-gathering aspect, since they can reveal new affordances. Gibson and Pick (2001) point out that it is relevant to recognize actions that has as its goal to discover affordances, what they label as *exploratory* actions. Exploratory actions can be observed in numerous different instances of gameplay. Consider some examples.

A *pool* player walking around the pool table before making the shot, calculating angles, trying to predict how the balls will bounce, considering angles, etc. can be described as making exploratory actions. S/he is trying to find appropriate affordances in the situation.

A player of a third person video game moving the in-game camera around when looking for enemies, power ups, paths to take, etc. A rather similar example would be a player of a side-scrolling game like *Little Big Planet* (Media Molecule, 2008) or some of the games in the *Lego series* which moves the game character with the purpose of having the screen to scroll and reveal new parts of the game world (cf. Linderoth 2010 for an example of how side scrolling in *Lego Indiana Jones 2* (Traveller's Tales, 2009) can be seen as an exploratory action).

A *soccer* or *hockey* player holding the ball or puck for a moment while looking over the playing field is searching for opportunities to make a pass.

A player of a board game, like *chess*, who leans over the table, is trying to get an overview of the game state in order to find different opportunities for the next move.

A player of an adventure game like *Escape from Monkey Island* (LucasArts, 2000) who scrolls the mouse pointer over the screen in order to see if parts of the screen are highlighted, i.e., offers some form of interaction.

These are just some examples of gameplay instances where the player is active in finding information about affordances of the situation. In some fast-paced games like multiplayer shooters or tennis, it might be harder to observe specific actions as being *exploratory*. Yet as Gibson and Pick (2001) point out, all actions have the aspect of revealing information about affordances even if they are not produced explicitly for this purpose. Moving in a multiplayer shooter in order to capture a flag or a spawn point will reveal obstacles on the way, and the player will discover affordances while moving. Expert gamers and professional athletes have learned to differentiate among all the available information in a situation so that they perceive the affordances that are relevant in relation to the game they play and the specific game state.

Gameplay and the performatory aspect of action

Some of the affordances that the player discovers during gameplay will be acted upon. These performatory actions are done in order to achieve something in relation to the challenge that a game presents. Some actions will have direct effect in relation to the winning condition of the game or the personal goals that the player has set up. Shooting a puck or ball against a goal, attacking other players in multiplayer shooter games, jumping over some obstacle in a platform game, playing the highest card in a trick-taking card game, etc. are all performatory actions done directly against some goal. Many of the actions a player does during game play have a *transformative* aspect in that they can create new opportunities for other actions. The player can change things in a situation so that new affordances appear. Note that the point here is that the player takes actions to *create* new affordances, not just to discover them through exploratory actions. Examples would be:

Positioning oneself on the soccer field or hockey ring in order to afford being passable by another player. The constant movement of players in these games will present an ongoing flow of coming and going affordances, which the players try to control with their actions.

Taking cover and positioning the avatar in multiplayer shooters is also about changing what affordances the situation has for the player and the other players.

In a platform game like *Little Big Planet* (Media Module, 2008), crates can be moved in the game world and by placing them on certain spots so that the player can use them to jump on and reach new parts of the game environment.

In some board games, the units can be upgraded; for example, in *Shadows over Camelot* (Cathala & Laget, 2005) players can heal their units and get back health points by skipping a turn. In *chess*, moving a pawn to the opposite side of the game board upgrades this piece to a queen, a move that radically alters the affordances in the game.

In some video games the dynamics of changing affordances happens when the player changes avatar. In games from the Lego branch (*Lego Star Wars*, *Lego Batman*

[Traveller's Tales, 2007; 2008], etc.) only certain characters can do some things in the game environment. By changing avatar, new possibilities open up in the game.

These are some examples of performatory actions that have a transformative aspect since they change the affordances for the player.

An ecological approach to gameplay

The theory of ecological psychology gameplay can be described as follows. *Gameplay is to perceive, act on and transform the affordances that are related to a game system or other players in a game.* The player needs to handle a constant flow of coming and going opportunities for action. Players perceive affordances through exploratory actions and act on affordances with performatory actions. The performatory actions that a player executes often transforms what affordances the situation will have. Two examples from the authors gaming experience can illustrate how gameplay can be approached from the ecological perspective.

Example 1. Trine.

Trine (Frozenbyte, 2009) is a 2-D side scrolling platform videogame with both action and puzzles. The player's goal is, like in most games of this genre, to get from point A to point B in each of the game's levels. In single player mode you can switch between three different characters: a knight, a thief and a wizard. They all have different abilities. In one gameplay session I was playing as the thief and reached a chasm that I needed to pass. Examining the screen I saw a small ledge on my side of the chasm. Jumping down to the ledge made the screen scroll down and reveal that at the bottom of the chasm there was just a floor and not deadly lava or spikes like it had been in other cases. Moving across this floor revealed a number of crates that I had to jump over. On the other side of the chasm I found a steep wall. The level continued at the top of this wall. Since this wall could not be jumped I changed character to the wizard, whose special ability is to manipulate objects in the game world. I used the wizard to lift and stack the crates on top of each other so that they formed a rough flight of stairs. But before I was done the wizard's magical energy depleted and I could not finish. I started to move back in the chasm to look for other paths across it. Then the game gave the sound of enemies spawning. I immediately changed to the warrior, who is the game's only character with melee ability. Some skeleton enemies charged my warrior and I defeated them. One skeleton was shooting arrows at me from the top of the wall. I changed to the thief who has a bow for ranged attacks and defeated this skeleton as well. One skeleton had dropped a blue energy vial that I picked up. Now my wizard had some energy again and could finish building the stairs. By jumping from crate to crate I was able to get to the top of the wall and continue along the level.



Figure 1. Scene from the game Trine.

This example can be described using concepts from the ecological perspective. Moving down to the ledge was an information gathering, exploratory action done in order to reveal what the bottom of the chasm afforded. Moving across the floor of the chasm was a performatory action, yet it revealed information about the existence of the crates and the wall. Changing to the wizard was a way of gaining the affordance to stack the crates, which was an action done in order to gain the affordance of making the wall passable. Running out of energy was an event that transformed the affordances and the wizard was no longer able to lift the crates. Moving back in the chasm was done with the purpose of finding information about other paths, i.e., other affordances for passing the chasm. Being perceptually attuned to the game, the sound of spawning enemies was enough information to perceive the affordance of threat and take the performatory action of changing to the warrior. Defeating the enemies and picking up the vial they dropped transformed the game state and the available affordances. The threat of being defeated was no longer there and once again there was an affordance for building stairs.

Example 2. Scrabble.

In a typical game of *Scrabble* (Mosher Butts, 1938), I was looking at my letter tiles and at the game board in order to find a good place to lay my tiles and form a word. I had just drawn some tricky letters and had no vowels. While waiting for my turn I discovered an opportunity to get at least two of my letters out and score approximately 20 points. Now the player before me unfortunately wrote her word on the place I could use for my word. Instead of writing something with my letter tiles, I placed them back in the tile-bag and drew some new letter tiles.

Actively looking for places to write words can here be understood as exploratory actions. It is the active search for finding affordances of writing something with the letters the player has. The performatory action of another player, placing tiles on the game board transforms the available affordances closing and opening up possible actions. Throwing the tiles back in the bag and taking up new ones is a performatory action where the player transforms her or his affordances in the game state.

These examples illustrates how gameplay can be seen as a flow of coming and going affordances that the player perceives, acts on and transforms. It is a constant interplay of reciprocal exploratory and performatory aspects of action.

EXPLORATORY AND PERFORMATORY CHALLENGES

The ecological approach is a theory about perception, action and learning that has as its primary unit of analysis the opportunities and constraints that the environment has for humans and other animals. It makes a distinction between the capability of perceiving opportunities and the ability of using them. This distinction between the exploratory aspect and the performatory aspect of action opens up for new ways of thinking about games. Games can be seen as challenging either the exploratory aspect of action or the performatory aspect of action. This is not a framework that makes a clear-cut between two distinct categories of games; games can challenge both aspects and in some cases it can be hard to see one aspect as being more challenging than the other. What I suggest is a framework where the challenges in games can be seen as having an emphasis on either *perceiving suitable actions* or *performing suitable actions*. This is not to be understood as a simple physical versus intellectual dichotomy. Perception is, according to the ecological approach, embodied action.

Exploratory challenges

Games with an emphasis on *exploratory challenges* are defined as: Games where it is a challenge for the assumed player to know what action to take but executing the action is more or less trivial.

Clear examples of games with an emphasis on *exploratory challenges* would be most board and card games like *chess* and *poker*. Under this category we can also place many digital simulation games and strategy games like *SimCity* (Maxis, 2000) and *Civilization* (Meier, 1991) as well as digital and non-digital puzzle games. In these games the challenge for the player lies in perceiving the rewarding affordances in a complex cluster of possibilities. The actions tied to these affordances, once they are perceived, are trivial to execute for the assumed player. To draw a card, roll a die, click on something in a menu, place a tile, etc. are all actions that hardly can be seen as challenging.

Backseat gaming

Since the actual challenge in these games lies within perceiving affordances, not in the execution of them, there can be cases when many persons share the position of the player. Exploratory challenges can be shared, for instance, in puzzles and simulation games. While one player might be in control over the mouse, control pad or formally have a player position in a board game, these games allow other people to take part in the challenge even though they have no agency to execute actions in the game. This kind of *backseat gaming*, i.e., someone who formally is not a player in a game takes part in discovering affordances, can of course occur in games with an emphasis on performance as well. The point here is that when the challenge of a game is exploratory, persons next to the formal player can in fact have just as much and in some cases even more influence on the game. The whole issue of what I here call backseat gaming needs to be further explored. It might be a task for future research to investigate the pleasures of backseat gaming as well as to what degree the person next to the player takes part in the game.

Performatory challenges

Games with an emphasis on *performatory challenges* are defined as: Games where knowing what action to take is often straightforward and obvious, but performing these actions are challenging for the assumed player.

Examples of games with an emphasis on *performatory challenges* would be most sports. In track and field events like *pole vault*, *high jump* and *hurdling*, the challenge is not to

know what to do; it is to do it better than all the other competitors. The same goes for many video games in the multiplayer shooter genre like *Counter Strike* (CounterStrike Team, 2000) or *Call of Duty* (Activision, 2007). The challenge lies in being good at using the affordances in different situations, to be faster and aim better than the opponents. Many other video games, such as racing and platform games, have the same property. The kind of board games that sometimes are called dexterity games (ref. Board Game Geek) will also be in the family of games with an emphasis on performatory challenges. Games like *Jenga* (Scott, 2006), *Jack Straws* and *Pitch Car* (du Poël, 1995) are challenging the performatory aspects of action. *Table soccer*, *rod hockey*, *air hockey* as well as *pinball games* are also rather straightforward when it comes to perceiving what to do, but they challenge the player's performance.

It should be noted that games with performatory challenges also are demanding in terms of exploratory aspects of actions. A professional soccer or Counter Strike player has a lot of expertise that has to do with perceiving affordances. Seeing and choosing affordances is not supposed to be an explicit challenge in these games but something that adds to the player's skill. When saying that a soccer player is good at "reading the game," it is the soccer player's exploratory ability that is addressed. Yet, unlike in a game with exploratory challenges, it is not enough to be able to see what would be a good move/action; a good game reader with no ball control would not be a competent soccer player. In many games with performatory challenges, the exploratory aspect of action is considered to be a separate domain. Sometimes this knowledge is tied to a person who is not in the actual game, yet allowed to aid players with exploratory aspects of action, a coach or a trainer. Here is a crucial difference to games with exploratory challenges. While a chess or poker player might have a coach or trainer, it would probably be considered as cheating if these players took advice from them in the middle of the game. In games with performatory challenges, it is not a problem if a coach screams out advice to the players in the middle of the game.

Another important note here is that actions are trivial or challenging for an *assumed player*. By this I mean that some disabilities can make things like holding cards or rolling dice a challenge, yet this is not the challenge that the designer of the game had in mind. Most board games are designed for someone without disabilities. It is important to keep in mind that affordances are always a relation between the capabilities of an agent and her/his immediate environment (Gibson 1986). In the Paralympics and Special Olympics, one can find many games that illustrate the importance of always having an assumed player in mind before stating what is challenging or not in a game.

DISCUSSION - BEYOND THE DIGITAL DIVIDE

The main idea in this paper has been to describe gameplay as seeing, using and transforming affordances. A way of explaining gameplay that entails an understanding of challenges in games as being either about perceiving and choosing affordances or using affordances.

This framework can be used to highlight many different issues in the field of game studies. It opens up for discussions about the relation between game studies and sport studies. It shows how certain board games, so-called dexterity board games have a different structure than more traditional board games. It provides concepts for discussing differences and similarities among *game room/recreation room games* like air hockey, pinball, arcade games, etc. These are all matters that can be fruitful to explore in the

future. The focus here has been on how the ecological approach to gameplay overrules classifications of games based on the kind of technology they employ.

As stated, the aim of this paper is not to get rid of the distinction between digital and non-digital games. This division is certainly useful in a historical and technical perspective. Yet, when trying to understand gameplay and the ways in which people interact with a game, it might be misleading to ascribe digital games a special status.

The skeptic might object and point out that most digital games are virtual since they take place on a screen and that this is a crucial difference to games taking place in the real world. From an ecological approach, there is no ontological difference between the information from a screen or from the so-called real world. Information about affordances can be found in the perceptual field and discovered by someone even if the source of information is on a screen (Linderoth & Bennerstedt 2007). Most video games are controlled with some kind of tool that extends the player's agency, like a mouse or control pad, into the realm of the game. But this kind of extension of agency "into" a game's realm cannot be seen as an outcome of digital technology. Consider, for instance, pinball games and claw machines where the player uses control mechanisms in order to have agency in the "realm" of the game. This kind of extended agency, using tools for performatory actions, is certainly worthwhile to study, but to see it as something unique for "digital" technology might be misleading.

The skeptic might also point out that digital games restrain the possible actions to the legal moves in a game (cf. Juul's 2003 critique of Bernard Suits game definition). Still, this does not mean that everything that is possible in a digital game is allowed by the rules. Consider for instance the phenomenon of spawn killing in multiplayer shooter games or the case of using hacks, exploits and cheating.

The recent development with pervasive digital technology and ubiquitous computing also challenges our understanding of what it means to interact with computers. Smart phones and tablet computers are already everyday technology and the field of pervasive games is expanding (Montola, Stenros & Waern 2009). It seems fair to assume that labeling a game as "digital" some years from now might seem just as outdated as labeling "light" as being electrical, sound as being in "stereo" or pictures as being in "Technicolor." In order to be prepared for such a change it might be important for organizations like the *Digital Games Research Association* (DiGRA) to look into its use of the dichotomy of digital versus non-digital games.

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BIBLIOGRAPHY

- Activision. 2007. *Call of duty 4: Modern warfare*. [PS3], Activision: Los Angeles, CA.
- Björk, S. and Holopainen, J. Patterns in game design. Charles River Media: Hingham, MA, 2005a.
- Björk, S. and Holopainen, J. Games and design patterns, in *The game design reader: A rules of play anthology*, MIT Press: Cambridge, MA, 2005b.
- Booth Sweeney, L. and Meadows, D.L. *The systems thinking playbook: exercises to stretch and build, learning and systems thinking capabilities*. Sustainability Inst.: Hartland, WI, 1995.
- Cathala, B. and Laget, S. 2005. *Shadows over Camelot*. [Board game], Days of Wonder: Paris, France.
- CounterStrike Team. 2000. *Half-Life: Counter-Strike*. [PC], Sierra Entertainment: Kirkland, WA.
- du Poël, Jean. 1995. *Pitch Car*. [Board game], Lautapelit.fi: Helsinki, Finland.
- Ehrmann, J., Lewis, C. and Lewis, P. Homo ludens revisited, in *Yale French Studies*, 1968, no. 41, pp. 31–57.
- Eskelinen, M. Towards computer game studies, in *Digital Creativity*, vol. 12, no. 3, pp. 175–183.
- Frasca, G. Ludologists love stories, too: Notes from a debate that never took place, in Copier, M. and Raessens, J. (eds.) *Level Up: Digital Games Research Conference Proceedings (Utrecht University, November 2003)*, pp. 92–97.
- Frozenbyte. 2009. *Trine*. [PS3], Nobilis: Helsinki, Finland.
- Gee, J.P. *What video games have to teach us about learning and literacy*. Palgrave Macmillan: New York, 2003.
- Gee, J.P. *Why video games are good for your soul*. Common Ground Publ.: Altona, NY, 2005.
- Gee, J.P. *Good video games and good learning: collected essays on video games, learning, and literacy*. P. Lang: New York, 2007.
- Gibson, E.J. Exploratory behavior in the development of perceiving, acting, and the acquiring of knowledge, in E.J. Gibson (Ed.) *An odyssey in learning and perception*, pp. 599–606, MIT Press: Cambridge, MA, 1991.
- Gibson, E.J. and Pick, A.D. *An ecological approach to perceptual learning and development*. Oxford University Press: New York, 2000.
- Gibson, J.J. The theory of affordances, in R.E. Shaw and J. Bransford (eds.), *Perceiving, acting and knowing: Toward an ecological psychology*. LEA: Hillsdale, NJ, 1977.

- Gibson, J.J. The ecological approach to visual perception. LEA: Hillsdale, NJ, 1986.
- Gredler, M.E. Educational games and simulations: A technology in search of a (research) paradigm, in Handbook of research for educational communications and technology: A project of the Association for Educational Communications and Technology, edited by D. H. Jonassen, pp. 521-40, Macmillan Library Reference USA: New York, 1996.
- Hitchens, M. and Drachen, A. The many faces of role-playing games, in International Journal of Role-Playing, vol. 1, no. 1 (2008), pp. 3–21.
- Holopainen, J. and Björk, S. Gameplay Design Patterns for Motivation, in Proceedings of ISAGA 2008 (July 2008, Kaunas, Lithuania).
- Juul, J. Half-real: video games between real rules and fictional worlds: Ph.D. dissertation. IT-University of Copenhagen, 2003.
- Launius, R. and Wilson, K. 2005. *Arkham Horror*. [Board game], Fantasy Flight Games: Roseville. MN.
- Linderoth, J. Why gamers don't learn more: An ecological approach to games as learning environments, in Proceeding of DiGRA Nordic (Stockholm, 2010).
- Linderoth, J. and Bennerstedt, U. This is not a door: An ecological approach to computer games, in Proceedings of the International DiGRA Conference 2007 (Tokyo, September 2007), pp. 25-30.
- LucasArts. 2000. *Escape from Monkey Island*. [PC], LucasArts: San Francisco, CA.
- Maxis. 2000. *SimCity*. [PC], Maxis: Walnut Creek, CA.
- Maxis. 2000. *The Sims*. [PC], Maxis: Walnut Creek, CA.
- Media Molecule. 2008. *Little Big Planet*. [PS3], Sony Computer Entertainment America: Foster City, CA.
- Meier, Sid. 1991. *Civilization: build an empire to stand the test of time*. [PC], MicroProse Software: Hunt Valley, MD.
- Montola, M., Stenros, J. and Waern, A. Pervasive games: Theory and design. Morgan Kaufmann: Burlington MA, 2009.
- Mosher Butts, A. 1938. *Scrabble*. [Board game], Alga: Stockholm.
- Murray, J.H. The last word on ludology v. narratology in game studies, presented at the International DiGRA Conference (Vancouver, June, 2005).
- Norman, D.A. The design of everyday things. [New ed.] MIT: London, 1998.
- Norman, D.A. Affordances, conventions and design, in Interactions, vol. 6, no. 3 (1999), pp. 38-43.
- Pearce, C. Theory wars: An argument against arguments in the so-called ludology/narratology debate, in Proceedings of the International DiGRA Conference (Vancouver, 2005).

- Rambusch, J. *Mind Games Extended: Understanding gameplay as situated activity*. Diss: Linköping University, 2010.
- Reed, E.S. Why do things look as they do? The implications of J.J. Gibson's The ecological approach to visual perception, in A. Costall and A. Still (eds.) *Cognitive psychology in question*. Harvester Press: Sussex, 1987.
- Reed, E.S. *Encountering the world: Toward an ecological psychology*. Oxford University Press: New York, 1996.
- Scott, L. 2006. *Jenga*. [Board game], Hasbro: Pawtucket, RI.
- Shaffer, D.W. *How computer games help children learn*. Palgrave Macmillan: Basingstoke, United Kingdom, 2007.
- Säljö, R. Learning, theories of learning and units of analysis in research, in *Educational Psychologist*, vol. 44, no. 3, pp. 202–208.
- Thiagarajan, S. and Thiagarajan, R. *Design your own games and activities: Thiagi's templates for performance improvement*. Jossey-Bass: San Francisco, CA, 2003.
- Traveller's Tales. 2008. *Lego Batman: The videogame*. [Wii], Warner Bros: Burbank, CA.
- Traveller's Tales. 2009. *Lego Indiana Jones 2: the adventure continues*. [PS3], LucasArts: San Francisco, CA.
- Wittgenstein, L. *Philosophical investigations*. Blackwell: Oxford, England, 1953.
- Zagal, J.P. and Bruckman, A. The game ontology project: Supporting learning while contributing authentically to game studies, in *Proceedings of the International Conference of the Learning Sciences ICLS (Utrecht, June, 2008)*.
- Zagal, J.P., Mateas, M. and Fernández-Vara, C. Towards an ontological language for game analysis, in *Proceedings of the International DiGRA Conference (Vancouver, 2005)*.