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Perception, Action, and Game Space

This paper examines the use of the ecological approach to visual perception in relation to action in game spaces. By applying the ecological approach it is believed that we can gain new insights into the mechanisms of perceiving possibilities for action.

Game Space

The perception of game space is a mode of perception in which the game world is seen through a knothole. The screen functions as an aperture vision, a hole in the physical reality, where spatial optical structures emerge to be interacted with. We extend our bodies into the narrow split between our own reality and that of the game. By limiting the physical movement of the body, the joystick functions as a prosthetic limb, extending movement into the space of the game. The experience of being immersed into the game world can be viewed as an experience complex, a way of constraining the body in order to extend perceptual possibilities. The game world is visually present and the possibilities for action are viable because of the presence of the active user in the image system.

The presence of the user in an image system and the opportunity to make alterations in the visual structures are what separates the game medium from other pictorial media. The huge amount of games on the market is still segmentable into very few categories of action styles, based on the construction of the game spaces, their presented viewpoints, and the manipulative constraints. The understanding of the role of perception in game space, must be viewed in correlation with the actions made possible. What is there to be perceived and how do we detect the possibility for action?

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Images

No one would question the statement that visual perception is a key factor in the encounter with the games graphical world. Typically, we tend to look at the game's scenarios as those of films and the use of cinematographical terms is often applied in computer games research. The viewpoint in the game is readily assumed to be that of a camera. The construction of game spaces is, no doubt, inspired by camera techniques, but the user needs to attend to other features than those of the camera's position in order to navigate through the layout. To understand this, we must look at the medium as being able to simulate more than camera movements. In fact, I will state that it simulates something completely different from that of camera movements.

Let us assume, in order to get an overview of computer games as a visual medium, that it is possible to point to a visual media genealogy from which computer generated images have emerged. This is an approach to images that incorporates the technology involved in the process of creating and projecting images and is described by Peter Weibel. The genealogy, as Weibel lists it, starts with the still image of painting, moves on to photography and moving images, and further on to the generating of code based interactive images. Still images study *vision*; film is capable of projecting and synthesizing motion; *vision of motion* and the computer is capable of simulating vision, *vision of vision*, which he labels "opsigraphy", *the writing of seeing* (Weibel 1996, 2003).

Weibel suggests that we turn to theories of perception, since the key feature in his claim is that we, for the first time in the history of images, are a part of the image system much like our every day immersion in the world. Watching movies creates an experiential segregation from the material. The film synthesizes and projects motion in two different processes, but, in the computer system the synthesizing and the projection converge.

The image systems of the computer and computer games are based on the code as material. Codes are not fixed and can be altered at any time, unlike pictures, fixed to the material of celluloid as films. The need for a perceptual approach arises in the convergence of moving image and moving observer. The computer generated image system is thereby not only capable of simulating motion, but is also capable of simulating a moving observer, which is an important statement about the media format.

What Weibel's suggestion opens up is the study of, on one hand, the possibility of motion in the game space, and, on the other hand, the simulation of locomotion of the observer. Simulation of motion has been addressed in computer game studies, but the simulation of locomotion has not. In order to understand the mechanisms of locomotion or self movement, theories of perception and action are needed. Before we turn to the ecological theory of perception, we can take a quick look at some statements about the computer generated space.

New Media

Lev Manovich claims that the key feature of computer space is navigation, which is also a key area in the ecological approach to perception. Manovich states:

> What has received little attention, however, in both cultural studies and in new media theory, is the particular category of *navigation through space*. And yet, this category characterizes new media as it actually exists; in other words, new media spaces are always spaces of navigation (Manovich 2001:252).

In relation to this, I will state that space has been given a lot of attention on the abstract level, but not on a specific level. If spaces in new media are always navigable spaces, it is crucial to look at the perceiver in the act of navigating, in opposition to the moving camera meta-

phor. We could ask: "Is operating a camera the same as navigating?" – Closely linked to navigation is the act of transportation. Before we can start to navigate, that is, obtain information for locomotion, we need the means of transportation and an idea of direction, which are key concepts I will return to later.

In order to understand the virtuality of game space, Espen Aarseth (2005) points to the simulation aspect: In his discussion of simulation in games, as the hermeneutic other of texts, Aarseth reaches the conclusion that fiction can be viewed as an element of construction instead of an overall term for something that is not real, namely the computer game space. The virtual space can be seen in the mimetic perspective as something that mirrors the real world, as fiction. The question, in response to that, would be if the engagement in computer games equals that of the engagement in fiction, which I believe is what Aarseth is in opposition to. Playing games is not like the engagement in fiction if fiction is understood in opposition to reality. Playing games is an act of simulation, where fiction is viewed as a building block. He states: "In short, games are not fictions, but a different type of world, between fiction and our world; the virtual" (Aarseth 2005, 60). He further adds that it holds no significance to distinguish between virtual or simulated. Both terms will do. What he points to is that we need to approach the game's "world" as a world with its own internal construction and not as a text or a film. Textual or filmic features can be parts of the game world construction as structural elements, but are not useful as a description of the media format. The notion of the simulation as world points back to Weibel's notion of the image system.

In order to understand the aspects of simulation, a framing of the computer games world will be suggested later on. For now, it can be concluded that navigable spaces is the "new" of new media and that there is a leaning towards definitions of space in games as simulations.

If simulation is the framework for further studies into the mechanisms of computer games, we need to look at simulation as a term. A dictionary defines: "The representation of the behavior or characteristics of one system through the use of another system, esp. a computer program designed for the purpose". – To state that the computer game simulate space and objects in space is a representational approach to the graphical environment, and a strategy that can end up in a description of the world's features based on pictorial cues or cinematographical structures. Inspired by Weibel's remark about the convergence of moving image and moving observer, I will describe the simulation in game spaces as the simulation of the visual perceptual system, which carries us right into the core of this paper; the visual perception of the game space. As the dictionary explanation outlines, one system is capable of simulating the characteristics of another system. What constitutes the characteristics of these systems is what we should try to answer.

Questions put forth in the previous passages will be addressed when the framework for the understanding of perception in general and in games spaces has been outlined.

Visual Perception

James J. Gibson formulated the Ecological Theory of Perception. The theory was being developed for about 50 years and was not completed when he died. His work is often seen as a rebellion against other more mainstream theories, but he was really trying to correct something he thought was truly wrong. His theory of direct perception has been under fire, since the ruling paradigm in his time and (for that matter) now, is that perception is indirect and based on cognitive constructions. To understand why his ideas can seem radical we can look at some more mainstream approaches to perception.

Perception is, on an everyday basis, understood as something that has to do with the senses or derives from the experience of having

sensations. This view has been trickled down from the constructionist way of understanding perception. Basically, this approach holds that the world or the environment is perceived visually via the light waves that enter the eyes. In this approach to perception, the world cannot be seen directly, and; a construction of the world is conducted cognitively. This means that we are unable to see the world as it is and need to construct internal representations of the world. Since it is possible to agree upon patterns of behavior in space; there must be an underlying order by which we construct the world. The Gestalt theorists worked with essential principles that we all make use of, such as laws of grouping or the figure/ground concept. Perception in this sense was very much understood as a choice of directing attention to certain features of i.e. symmetry or an act of differentiation. The constructionist way of understanding perception can later be seen in David Marr's (1982) computational approach; where he claims that regarding the experience of depth, something has to be added cognitively, since something is lost in the act of perceiving space in 3D. An important and underlying conception that most theories of perception have in common is the notion of the retinal image, the image that is claimed to be formed on the retina when light enters the eye. Marr says that the retinal image must be a 2D image, since the retina is something, a surface, that light falls upon; which means that the third dimension is lost in the process of perceiving spatiality. The third dimension is then added in a cognitive process of constructing what is lost and our experience of space can be said to be in 2½D. Further notions of perception within the constructionist paradigm is the role of perception in creating cognitive schemata, an approach that has been applied in computer games studies, where the more psychological and emotional experience of the gaming situation is being investigated. An example is that of Torben Grodal (2003), who describes the engagement in games as a PECMA – flow where Perception gives rise to Emotions that again

gives rise to Cognition or the creation of schemata upon which we can base our Motor – Action. The idea of a PECMA-flow is based on a bottom-up view, where perception moves up to the level of cognition which creates the top-down activation of action. I claim that, in these views, perception seems to be merely incidental to the carrying out of actions, and action is viewed mainly to be based on cognition. In Grodal's example the situation could be as follows: Hans sees (P) a dragon, he gets scared (E), he rationalizes that he must do something (C) and he then kills the dragon (MA).

What Grodal's approach oversees is that the flow or flux in the gaming experience, or in any experience, does not follow each other sequentially as in a chain. We seamlessly perceive the world around us while acting. His idea is fit for a schema, not for a process of experience. What his theory is not really concerned with is the specificity of the layout and its informational function in relation to the act of navigation. Since perception, from the constructionist paradigm, is more or less incidental sensations that happen to the body, the concept of action in computer games is often explained from the cognitive level; with no specific description of the functionality of the layout.

Ecological Optics

To cut across the board, Gibson's theory of perception has its own branch in perceptual theories (Gibson/Pick 2000). Gibson claims that we cannot study perception unless we take into account what there is to be perceived. He has an evolutionary, biologically inspired approach stating that the senses must be much more functional in our getting about in the world, and coping with the changes that constantly occur in our environment, than has been given attention. In other words, it seems strange to him that we should be equipped with senses that we cannot immediately make use of, as the case in constructionist theories. On the contrary he states we are capable of

perceiving the world directly. The senses should not be understood as 5 channels that bring about sensations. We are equipped with perceptual systems that function in cooperation, the visual perceptual system being one and the auditory perceptual system being another. (Audio-visual media can be viewed from the ecological theory as being a medium that activates the cooperation of the audio-visual perceptual systems. When more perceptual systems cooperate perception is enhanced.) What is immediately interesting about Gibson's way of describing the perceptual systems is that he pays attention to the environment and claims that the environment is part of the perceptual system. The environment and the perceiver are complementary and should be examined in tandem. The main activity of the perceptual systems is to pick up information from the environment, which, in the case of computer games, would be the picking up of information for navigation and future directed actions. The process of picking up information is an explorative activity. We turn our head and we move our body around in order to gain more specific or detailed information about properties in the environment. Turning the head is labeled *Ambient Vision* and moving the body is labeled *Ambulatory Vision*.

The information we obtain is based on the changes and the persistence in the environment, and change is directly perceived in relation to persistence. What we normally would describe as motion, as in the motion of an object moving from one place to another, Gibson would describe as changes in the optical structures in the ambient optic array. It is an important notion since a more detailed knowledge about changes in the optical structure will inform the perceiver if the motion is caused by him/herself in locomotion or if other forces put the objects into motion. In certain types of games, it is important to know if the changes in the layout are caused by objects in the game or by the simulation of self movement/locomotion. To approach an object is a different experience than that of something approaching

you. If you approach a figure in the visual field and it turns out to be dangerous, you are already given the possibility to reverse the action, but if something approaches you, you cannot be certain that reversal of locomotion is possible. If we look to the game space, the encounter of an enemy will be detected as disturbances or changes in the layout. An enemy will be a detached object simulating locomotion and the motion towards you would be experienced as an expansion of that object in the layout. Seen together with your opportunities for simulating locomotion, what can be simulated in the game space is therefore not only just "motion", but specific styles of motion. A change in the optical structure is specific to the movement carried out; and an optical change that occurs on the basis of mutual approach, as is often seen in games, is the simulation of two locomotors or self movers. Locomotion is based on possibilities and constraints in the environment. As humans, we are given a perceptual niche where there are limits for our perception on both the macro and micro level. Some things are too small to be detected and some are too large, like atoms and galaxies. Every animal inhabits a niche where the information is nested within systems. A cave is nested within the mountain, just as furniture is nested within a room. The notion of nesting systems is interesting in the discussion of virtuality versus reality, since real changes occur in the layout in front of the observer while playing games. Instead of getting lost in the translation of game spaces into concepts, we can look at game worlds as nested realities; that it is a reality existing on its own premises within our larger reality. Playing games is a real activity, an experiential sense of being present, navigating through a nested reality. This statement can be supported, at least momentarily, by Christian Metz's notion of motion in film: "Because motion is never material but is always visual, to reproduce its appearance is to duplicate its reality" (Metz 1974:9). The motion of the body takes place in physical reality, while locomotive consequences are detectable as visually changing structures in

the game space. So, in the case of navigating through game spaces it holds no significance, regarding the activity, to point out that we are disembodied in the process. The optical structures change according to locomotion, and that is what is real about it. We can state that the game world is a nested reality where the optical changes are caused by the bodily constraints and the prosthetic extensions of our perceptual system.

Key Ecological Concepts Outlined

Ambient, and Ambulatory Vision, is what we achieve by moving our head around and moving our body around. Getting information from the environment or optical ambient array is the main function of the perceptual system. Information pickup is an exploratory activity that involves the whole body. The perceiver obtains information by locomotion, which is an activity of transportation. We move about on our feet or in vehicles where the speed involved in transportation causes specific optical changes in the structure of the layout. In a stabile, solid environment, as in a living room; objects do not move on their own; but there *can* be changes in the optical structure caused by locomotion. Relative to locomotion, the optical changes are specific to the means of transportation. The ambient optic array will change according to the velocity.

Gibson formulates two sets of laws for navigation and manipulation with objects. The laws of Visual Kinesthetic and Visual Control (Gibson 1986[1979]) are not to be seen as laws in a rigid way, but more like guidelines for the description of changes in optical structures. The laws for Visual Kinesthetic describe changes in the layout caused by different styles of action; and the laws for Visual Control describe what to do to change the optical structures in relation to desired actions. I will give a few examples that are relevant for game spaces. In regard to the laws for Visual Kinesthetic, we look at the basis for locomotion:

1. Flow of the ambient array specifies locomotion, and nonflow specifies stasis.

2. Outflow specifies approach towards, and inflow specifies retreat from.

3. The focus or center of outflow specifies the direction of locom tion in the environment.

These examples have their equivalents in the laws for Visual Control: An example is the rules for *starting, stopping, and going back. To start, make the array flow. To stop, cancel the flow. To go back, reverse the flow.* In the case of encounters with enemies in the games space, we can look at the rules for *flight* and *capture*: For moving predators and enemies, *flight* is an appropriate form of action since they can approach. The rule for flight is, *to move as to minify the dangerous form and make the surrounding optic array flow inward.* If, despite flight, the form magnifies, the enemy is catching up; if it minifies, one is getting away. From the predator's point of observation, of course, the rule is opposite to that of the prey: *to move as to magnify the succulent form by making the surrounding array flow outward until it reaches the proper angular size for capturing.* – In game spaces it can be difficult to distinguish the prey from the predator. The player may be in the role of the prey, but act as a predator.

Ecological Optics in Game Spaces

I have tried to interlace the use of ecological optics in game spaces into the text and have not explicitly made an analysis; but as a clarification, I will point to genres that have action styles based on locomotion; that is, games that enhance the convergence of moving image and moving observer. The term "first-person-shooter" refers to games having first- or third- person perspectives, games that simulate the presence of a locomotor. In the visual perspective, it holds no sig-

nificance to the styles of action where the game is situated on the narrative level. Be it a futuristic environment or that of the Second World War, the styles of actions will be describable in the terms of ecological optics. We simulate Ambient and Ambulatory Vision in the exploration of the game world, manipulating the image system's point of observation in order to gain information from and about the game world.

We simulate Approach and Retreat, as in the rules for Flight and Capture. When we shoot a figure in the graphical layout, we are simulating the removal of the dangerous form in the layout. As we simulate locomotion in the layout, we are engaged in a process of picking up information for action, and the consequences of our actions are immediately present as changes in optical structures in the layout. In "speed"-games we direct our attention to the surrounding changes in the optical structure, which will inform us about the velocity and the direction we are heading as described in the rules for starting, stopping, and going back.

Weibel's framing of the medium as a convergence of moving image and moving observer is a radical notion if used on computer games as image systems. The application of Gibson's ecological optics opens up the possibility to create strategies for the analysis of the complementary relation between the observer and the game space. What it points to is that the layout of the computer game space can be analyzed from a functional viewpoint and not merely as a visually arousing style of aesthetics. When we engage in visual media that we cannot control, we can address the mechanisms of the aesthetic experience on the pictorial level, but in the controlling of manipulative and navigable spaces, we need to direct our attention to the functional level of the informative layout present at hand.

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Biography

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