Nonverbal Guidance Systems

Seamless Player-leading in Open-world Games

Francine Rotzetter

What are nonverbal guidance systems in open-world games? Why are they so important for the immersive aspect in a game and how do game developers design such systems with a high usability? In order to answer these questions, nonverbal guidance systems were analyzed according to their perceptual channels, using an approach based on the semiotic symbol theory. This research process, which started in the context of a Master Thesis in the subject area in Game Design at the Zurich University of the Arts, resulted in six different guidance systems. As a way of showing the applicability of these systems to open-world games, nine different open-world games were successfully categorized according to the identified guidance systems. Furthermore, a survey was conducted with the aim of examining the players' and game developers' views about guidance systems in open-world games.

This article presents a catalogue of different guidance systems and their use in open-world games. It provides the means to a deep understanding of what is necessary for good player-leading, and explains how to improve existing guidance systems.

NONVERBAL GUIDANCE SYSTEMS

Special case: Open-world

Guidance systems are different strategies that game developers use, to lead a player towards a goal. Usually players do not seem to be troubled when they recognize that they follow predetermined ways and paths, but open-world games claim that players can operate in complete freedom. Thus, game developers must

hide their control strategies in open-world games. Ideally, the developer only suggestively communicates the guidance system to the player by a large number of different verbal and nonverbal clues, which together form the guidance systems. These clues can motivate the player to use the corresponding path towards a goal, but the designers do not always succeed in conveying their intentions to the player due to wrong or unalterable use of the guidance systems. Additionally, an overload of information or clues, which are too complicated or hidden can lead to a failure of the guidance system. On the other hand, the player can become bored with clues that are too obvious, and the essential aspect of open-world games, namely exploring, vanishes. If a guidance system fails, the player is left behind confused and disorientated, and the virtual reality created loses its credibility and atmosphere.

The "100-steps method" and the identification of the six guidance systems

With the purpose of identifying the existing strategies of player-leading, and to analyze and categorize these systems, a new approach called the "100-steps method" was developed. This method allows the classification of guidance systems according to their design, perceptual channel (visual or auditive) and effect on a player. In order to record most of the existing guidance systems occurring in an open-world game, one hundred goal-changing choices ("100 steps") made by players were analyzed. For example, in the game "Don't Starve" (Klei Entertainment 2013), the player decides to leave the regular path and head for his camp because his game character is tired and needs to rest. Altogether nine open-world games were examined by this method. As a result, six different guidance systems (with a large number of subcategories) were determined, specifying all the analyzed steps. To identify the preferences of these systems among open-world game players and game designers, two surveys were conducted.

Table 1: Game test: open-world-games examined with the "100-steps method"

Game	Release	Plat-form	Genre	Perspective	Reason for choice
Sid Meier´s Pi-rates!	1987	PC	Action-Adventure, Strategy	Third-Person	Release date
Aardwolf MUD	1996	PC	Text-based RPG	Third-Person	Text-based game
Far Cry 2	2008	PC	FPS, Action-Adventure	First-Person	Map handling
Red Dead Redemption	2010	PS3	Action-Adventure	First-Person	Compare publisher
The Elder Scrolls V: Skyrim	2011	PC	Action-RPG	First-Person	Success
Grand Theft Auto V	2013	PC	Action-Adventure, Third-Person Shooter	Third-Person	Compare publisher
Don't Starve	2013	PC	Action-Adventure, Survival	Third-Person	Indie game
The Witcher 3: Wild Hunt	2015	PC	Action-RPG	Third-Person	Success
Mirror´s Edge Catalyst	2016	PC	Action-Adventure, Platformer	First-Person	Stereotypical guidance system

Source: Rotzetter

Table 2: Game test: primary table to analyze the different guidance systems with the help of steps. (Table from game test "Don't Starve")

Perceptual channel: auditive (a), visual (v)

The six guidance systems and their subcategory

Reasons fort the aim change

			informativ					dynamisch		interaktiv				narrativ	emotional				räumlich			
a	v	z	r	Weg	Wegw.	Sym.	R/F	Kar.	Far.	Q	Z	Gef.	Verl.	Lichteff.	Gest.	Mim.	NQ	HQ	Kam.	Umg.	Far.	M	Orien.P.	Vol.	Arch.E	Bemerkung

Steps

Split Steps

THE SIX GUIDANCE SYSTEMS IN OPEN-WORLD GAMES

In order to recognize a clue from a guidance system, the clue must be in some way different from the other objects or circumstances in the game. A contrast must be made. As a result, the player's attention is attracted, and sometimes followed by a completely intuitive reaction.

A simple, but effective contrast is used in the games "Mirror's Edge" (Electronic Arts 2008) and "Mirror's Edge Catalyst" (Electronic Arts 2016). By coloring some objects of the rather colorless environment in red, the player is able to recognize these objects very quickly. This is exactly what the game designers intended because fast reaction and action is necessary to succeed in this action-adventure game.

Informative guidance system

The most obvious guidance system is the "informative guidance system". It only informs players, it does not limit their movements or evoke feelings. The players usually have to learn how to use and interpret these systems. The "informative guidance system" comprises elements such as *maps*, *symbols*, *near or far* and *right or wrong* data.

Definition 1, "informative guidance system":
"Informative guidance systems" inform the players about:
a) their own position in relation to a predetermined goal
b) the properties of a specific goal

These guidance systems are usually easily available to the player and very informative. Therefore, a good balance must be found so that the player remains challenged, but not overwhelmed. Strategies using yes or no questions such as *near or far or right or wrong* are accepted well by the player because only directions are provided but not the goal itself. In "Far Cry 2" for example the player can search suitcases with diamonds in it. A specific sound gives the player information about the distance between him and the suitcase without telling him the exact position. This keeps the game interesting and challenging for the player and at the same time provides an efficient guidance system.

In *maps*, especially in *mini maps*, game designers tend to provide players with information about everything in their near surroundings. An overload of information means the player doesn't need to explore the environment and the game will become boring, which is comparable to somebody sitting next to you and telling you the outcome of the next scene of an interesting movie. A so-called "fog of war" that masks parts of the map can reduce the risk of an overload of information.

Figure 1: "Informative guidance system": The top-down mini map from "The Witcher 3: Wild Hunt" shows every detail in the nearby environment of the player.

Source: edited screenshot Rotzetter

The top-down perspective of mini maps is likewise problematic because humans gain orientation through motion in space and a top-down perspective counteracts this process. The mini map from "The Elder Scrolls V: Skyrim" (Bethesda 2011) shows a design with reduced information and a perspective that is better suited to aspects of exploration, suspense and human orientation (Figure 2). Only the position of the character, the goal and two key points are provided on a one-dimensional map. This gives the player enough support to find the goal without ruining the joy of discovery.

Figure 2: The mini map from "The Elder Scrolls V: Skyrim" only shows the line of sight and the goals in front of the player.

Source: edited screenshot Rotzetter

Another way of handling maps is used by the game "Far Cry 2" (Ubisoft 2008). Area map and the mini map are in-game objects, which the avatars can hold in their hands or use as a GPS in the car. While these so-called "embedded maps" are used, the game doesn't pause. This strategy creates additional suspense.

Figure 3: "Informative guidance system": map appeal in "Far Cry 2" by driving a car

Source: screenshot Rotzetter

Interactive guidance system

For the players, the most interesting and highly preferred guidance system is the "interactive guidance system". This leading system uses the players' curiosity and their motivation to guide them. Because of this, the players don't recognize the designers' leading strategies and are under the illusion of deciding in their own way. The system fails if the players overlook clues or can't be motivated enough to go in one specific direction. The "interactive guidance system" doesn't limit the players' mobility. It operates with elements such as *motivation-based decisions* (*menace/ temptation, ways and signposts*) and *interpersonal interactions* (*non-player character gesture, chase/run after*).

Definition 2, "interactive guidance system":
"Interactive guidance systems" guide players by interactions with or properties of the nearby environment, creating an incentive for the players to change their direction by their own motivation.

Because the "interactive guidance system" claims to use subjective reasons to guide a player, it must offer more than one way to reach the goal. Thus, the non-linear characteristic is a part of this system and one of the reasons why it is so valuable for an open-world game.

In *chasing or running after* quests, the players follow tracks or people. These offer the opportunity to guide a player on a completely predetermined path, allowing the designer to place different events on the way. Additionally, they can be used to teach the players something or hand them narrative information. To keep the process interesting, it should not take longer than five minutes.

Menace or temptation elements can prevent or lure a player to enter a specific area. For example, a menace in form of cold weather ("The Legend of Zelda: Breath of the Wild", Nintendo 2017), which the player only survives with the right equipment, or a temptation like food ("Don't Starve") that the player needs at this moment. It can be a very convenient method for defining areas with different challenge levels. However, it is crucial for the designer to know what the player wants at a specific moment. Otherwise, the strategy fails or is implausible.

Non-player character gestures can show a player the right direction (like a pointing finger) or the avatar's or NPC's health (posture), or they can be used to teach a player something. For example, in "The Legend of Zelda: Breath of the Wild", felling trees is taught by a NPC.

Ways and signposts are hybrid guidance systems because they fulfill different purposes in games. For example, routes are a meeting place for traders ("The Elder Scrolls V: Skyrim"), enable the players to increase their walking speed ("Don't Starve") and guide them to interesting places ("The Witcher 3: Wild Hunt", CD Project Red 2015). Additionally, crossroads and signposts can be points of orientation in the game, which help the players to find their way.

Processual guidance system

The "processual guidance system" is part of the "interactive guidance system", but the guiding strategy does not communicate directly with the player. It depends on autonomous linear movements in the environment that the player cannot influence himself.

Definition 3: "Processual guidance system":
A "processual guidance system" depends on movable objects or object parts in the environment. The player can identify a source or a goal from the linear motion.

The "processual guidance system" can use the specific ability of the virtual space to make invisible motion visible. This can happen with help from visual or auditive clues. For example, an enemy can be detected by making his shot visible, or in "The Legend of Zelda: Breath of the Wild", the direction is given by a visible wind current.

The problem with this system is that it is based on human perception. The *visual translocation* is always preferred over the *auditive translocation*. Experts called this effect "visual dominance" (Goldstein, 2002). The designer must always keep this in mind when he creates two different translocations.

Figure 4: "Processual guidance system": A visible wind current gives the player information about source and target through its linear motion.

Source: edited screenshot Rotzetter

Spatial guidance system

The "spatial guidance system" can guide players by limiting their freedom of movement, inspire them to execute a specific action, or it can create a point of orientation. *Points of orientation*, *architectonic elements* and *natural obstacles* are aspects of this system.

Definition 4, "spatial guidance system":
The "spatial guidance system" uses static objects that:
a) the player can use for points of orientation,
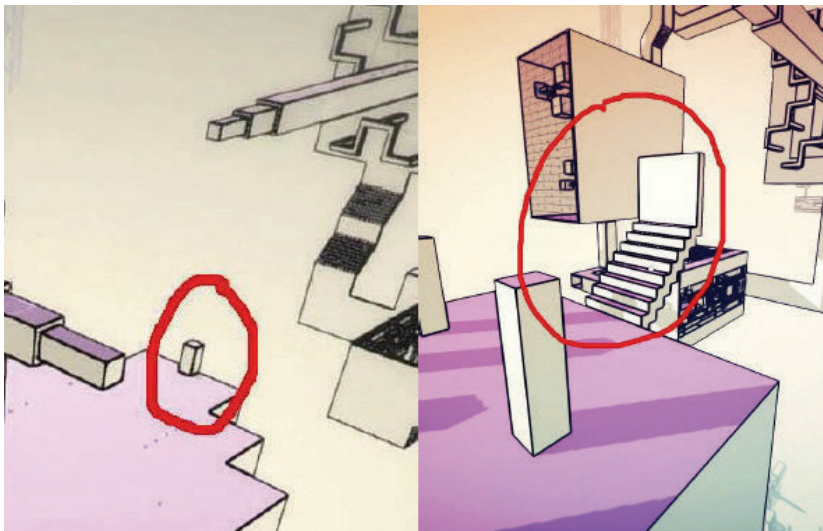b) limit or inspire the player to execute a specific movement

Points of orientation help the player to divide the environment into segments. To define a recognizable object or place, the contrast to the environment must be distinctive enough. The contrast can be auditive or visible. The latter is more easily achieved, for example by architectural elements or natural obstacles. The

greater the contrast, the greater the absolute meaning of a point of orientation, and the smaller the subjective interpretation.

Architectonic elements are building blocks like doors, walls, corridors or stairs. They can limit the players' movements in different ways without troubling them. Additionally, they can animate a player to do something very specific and give hidden clues.

For example, in an early version of "Manifold Garden", the players did not realize that they had to step on a cuboid to progress in the game. After the developer added a set of stairs instead of the cuboid, the players knew very well what they had to do, and the problem was solved (Chyr, 2016).

Figure 5: "Spatial guidance system": The problem (described by William Chyr at GDC 2016) that the players did not recognize they had to step on a cuboid (left) was solved by adding a set of stairs (right) instead of the cuboid.

Source: edited screenshots Rotzetter

Additionally, architectonic elements have the ability to predefine the direction of sight. For example, players usually look straight ahead in a corridor or after opening a door.

Natural obstacles limit the freedom of movement just like the architectonic elements, but in this case, the obstacle is part of the natural environment. With these elements, the game designer can define natural borders, which the player cannot cross. To create a plausible border, the game designer should always use

natural obstacles of appropriate dimensions. The player will not accept a river that is one foot wide as a barrier. On the other hand, a wide, heavily flooded river will be accepted as a barrier without generating any confusion. And locked doors are also not so easily accepted by players. By playing a short sound sequence of a door locking, this problem can be easily solved.

Emotional guidance system

The "emotional guidance system" intensifies other guidance systems and has the ability to evoke feelings in the players that may influence their movements. It is a very subjective guidance system, and it can easily fail, but if it works, the gain in immersion from this strategy is extraordinary. *Atmosphere*, *light*, *music and sounds* and *camera and environment* are elements of this leading strategy.

Definition 5, "emotional guidance system":
The "emotional guidance system" evokes feelings in the players and influences their movements.

Atmosphere is quite difficult to create. It depends on different sensory perceptions; light and music play important roles.

"And so, I put this on the board: Silence-and-Light. Silence is not very, very quiet. It is something which you may say is lightless-darkless. These are all invented words. Darkless – there is no such a word. But why not? Lightless; Darkless. Desire to be; to express. Some can say this is the ambient soul - if you go back beyond and think of something in which light and silence were together and maybe are still together, and separated only for the convenience of argument." (Kahn, 2013)

Additionally, other atmosphere qualities can influence the movement of the player, like weather for example. Fog or rain can complicate the player's view or hearing process.

Light is a many-sided element. The change of little aspects such as brightness, color, angle of incidence and duration can communicate different things to the player, and the meaning changes completely if the game designer alters only one of these aspects. Additionally, light naturally creates its own contrast unlike any other element. The game designer should be aware that light creates "no light", as the architect Louis Kahn describes in the following text:

 "I cannot speak enough about light because light is so important, because, actually, structure is the maker of light. When you decide on the structure, you´re deciding on light. In the old buildings, the columns were an expression of light – no light. No light, light, no light, light, no light, light, no light, light – you see. The module is also light – no light. The vault stems from it." (Kahn, 2013)

Light can emphasize one thing and completely hideanother. Therefore, with the use of light, the game designer steers the player's attention.

Music does not have the ability to communicate a direction to the players, but it can influence their movements. For example, if battle music starts, experienced players look for enemies or other causes of danger. Some players begin to sneak, others try to hide or simply run away. And the end of the battle music suggests that the situation is safe for now. (Polus, 2016)

Sounds can communicate more specific information to the player. They can be *natural*, *cultural* or *abstract*. Abstract sounds, which indicate 'right' or 'wrong', are part of the "informative guidance system" (Polus, 2016). Cultural sounds like the chime of a bell provide information simultaneously about the culture and time and may be able to evoke emotions. Natural sounds can inform the player about natural phenomena like thunder, or they simulate the avatar's body. Heartbeat is an example of a natural sound with an emotional aspect (Hug, 2016). Footsteps also simulate a part of the avatar's interaction with the environment, and provide the players with important information about the ground they are walking on. This helps the players orientate themselves, particularly in a first-person perspective.

Camera and environment can steer the player in the same way as light does. But in this case, the player's actions are limited in some way. For example, the fixed position of the player's camera prevents the view being rotated. In the game "Journey", a fixed camera position is used to show the player the ultimate goal in the game.

Figure 6: "Emotional guidance system": The fixed camera position in the game "Journey" determines the field of view and shows the ultimate goal.

Source: screenshot Rotzetter

Other player restrictions can be created by elements of the environment, for example by mist, which complicates the perception. These elements impact the clarity of the environment and the player's feeling of safety.

Narrative guidance system

"Narrative guidance systems" are not pure nonverbal guidance systems. They are always based on a narrative background, which is presented to the player in speech or in written form. Once the players understand the basics of such a system, they are able to comprehend very complicated issues within the environment of the game.

Definition 6, "narrative guidance system":
"Narrative guidance systems" guide the players by specific circumstances that they are able to understand only if they know the narrative background of the respective system.

"Narrative guidance systems" are not as commonly used as the other five guidance systems, and their use is more passive. It appears that game designers fear that the players are left behind without orientation and not knowing what to do. But "narrative guidance systems" are very suitable in combination with other guidance systems such as the "interactive guidance system". They are able to ex-

tend the story from a single point in the game to the whole world. In this way, the open-world game gains more substance. Elements such as *places with history* and *characteristics* are elements of this guidance strategy.

Places with history have the ability to link together different places in the game and reveal a greater meaning. For example, ruins in a specific architectural style have a narrative connection. They can also suggest specific circumstances, helping the players understand the importance of the place so that they are able to recognize that place later on. In the best case, a point of orientation is created in this way. In a Let's Play episode of "The Legend of Zelda. Breath of the Wild", the player suddenly recognizes that the NPC in front of him lives in a house he can see. Afterwards, the player is able to easily locate the NPC because he knows where the NPC lives.

Figure 7: "Narrative guidance system": The player connects the place with the NPC (lookslikeLink, 2017): "Is this his house? … He lives here!"

Source: screenshot Rotzetter

Characteristics are evidence that allow the players to infer something. Smoke may indicate a fire. The clues can only be understood when the narrative system is completely recognized. Like in a riddle, the players must understand all parts of it in order to be able to successfully solve the mystery. Otherwise they will be frustrated. In this case the game designer must give the player subtle hints for the right answer without creating the impression of failure.

Evaluation of the six guidance systems in the tested games
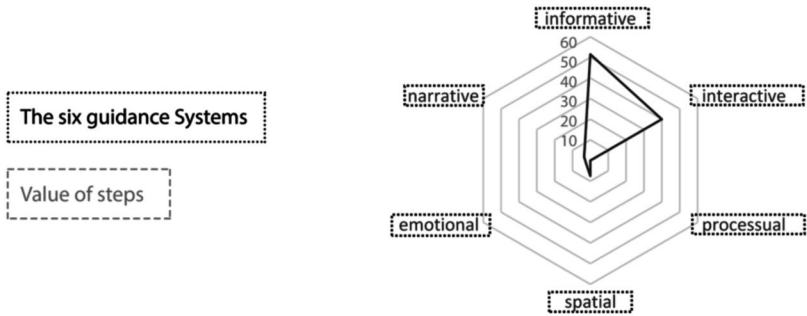
The following figures illustrate the distribution of the identified six guidance systems in the games tested under the "100-steps method". Most decisions are indicated by visual clues. In "The Elder Scrolls V: Skyrim" and "Grand Theft Auto V" the value of auditive steps reach nearly 40 percent. Additionally, the examination shows that shooter games like "Grand Theft Auto V" and "Far Cry 2" have a short interval between steps and a fast clue output.

Table 3: Game test: distribution of visual and auditive steps in the tested games and the length of time (minutes) to the next step

Game	Visual steps	Auditive steps	Duration between steps (minutes)
Sid Meier´s Pirates!	88%	12%	6,7
Far Cry 2	76%	24%	1,8
Red Dead Redemption	82%	18%	5,0
The Elder Scrolls V: Skyrim	63%	37%	6,3
Grand Theft Auto V	64%	36%	1,7
Don't Starve	91%	9%	2,6
The Witcher 3: Wild Hunt	85%	15%	2,9
Mirror´s Edge Catalyst	93%	7%	6,7

In most games a major part of the 100-steps are split in two guidance systems: the "informative" and the "interactive" system. Only in "Elder Scrolls V: Skyrim" and "Mirror´s Edge Catalyst" one system is clearly preferred. No game has an equal distribution of steps in different guidance systems. In "Don´t Starve" the player has to make the most "emotional" steps of all surveyed games – nearly a third of all steps. This means that the player faces the most emotional decisions of all tested games. Overall, the "processual" and the "narrative" guidance system are used the least.

Figure 8: Game test: classic example of the evaluation of the "100-steps method", shows value of steps in the six guidance systems.

Source (Figures 8-16): Rotzetter

Figure 9: Sid Meier's Pirates! (1987), Third-Person, Action-Adventure/Strategy Game for PC, 12 hours gameplay for 105 steps.
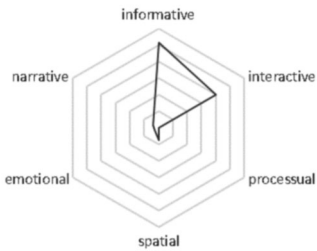
Figure 10: Far Cry 2 (2008), First-Person, First-Person Shooter/ Action-Adventure Game for PC, 3.5 hours gameplay for 118 steps.
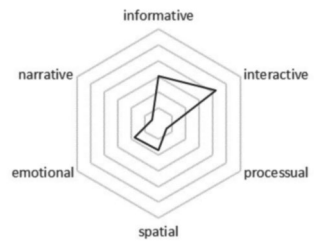
Figure 11: Red Dead Redemption (2010), First-Person, Action-Adventure game for PC, 9 hours gameplay for 107 steps.

Figure 13: Grand Theft Auto V (2013), Third-Person, Action-Adventure/Third-Person Shooter, 3 hours gameplay for 108 steps.
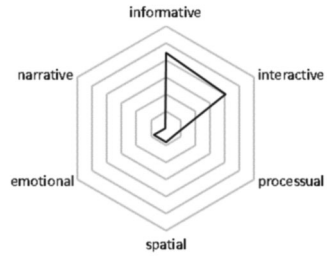

Figure 12: The Elder Scrolls V: Skyrim (2011), PS3: First-Person, Action-RPG, 11 hours gameplay for 108 steps.
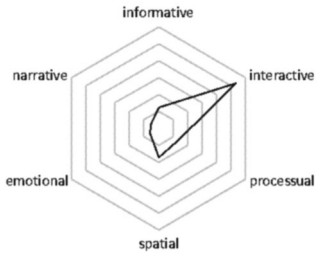

Figure 14: Don´t Starve (2013), Third-Person, Action-Adventure/Survival Game for PC, 4.3 hours gameplay for 100 steps.
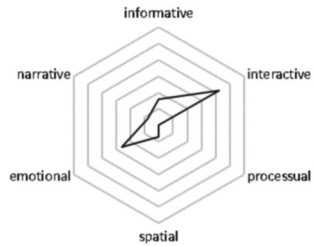
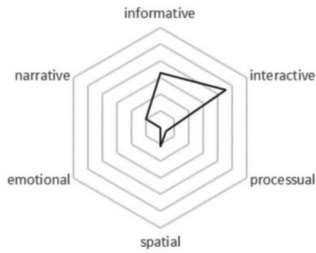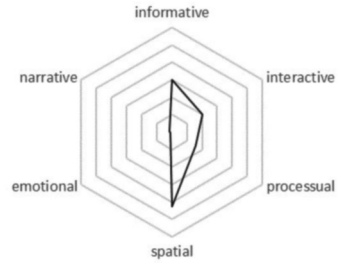*Figure 15: The Witcher 3: Wild Hunt (2015), Third-Person/Action-RPG for PC, 5 hours gameplay for 104 steps.*
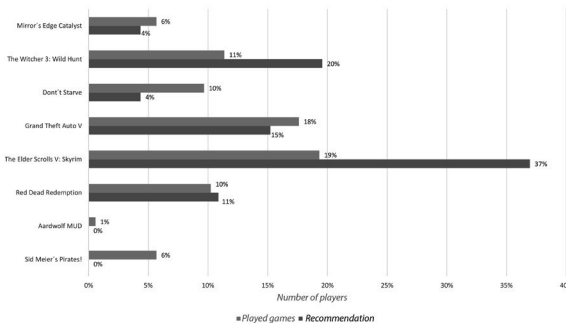
Figure 16: Mirror's Edge Catalyst (2016), First-Person, Action-Adventure/Platformer for PC, 12.25 hours gameplay for 111 steps.

What players want

In the survey, open-world-game players were asked which of the nine tested open-world-games they had played. Afterwards, they had to choose their favorite and give the reason for that choice. "The Elder Scrolls V: Skyrim" was both the game most often played and most often chosen. The reasons provided for this rating were the high quality of the atmosphere, the opportunity to explore, the story and the design of the world.

Figure 17: Player survey: Shares of played games (data total 176) and recommended games (data total 46).

Source: Rotzetter

What game designers do

In the second survey, game developers were asked how they design a guidance system. Most of them look to other games for inspiration or use guidance systems from the real world (cartography, architecture, signage etc.).

Among the important contributing factors to successful player guidance in open-world games are non-linear guidance systems. They give the players opportunities to choose. In the best case, the players intuitively decide to follow one of the predetermined interactive guidance systems. Thus, the intention of the game designer is completely hidden, and the players have the illusion they can do whatever they want.

"They're doing what they want to do and not what you, the designer, wants them to do. The more open, the more reactive you can make it, the better the player experience." (Howard, 2008)

"The Elder Scrolls V: Skyrim", one of the most successful open-world games, confirms Todd Howard's statement. But "Skyrim" does even more. There is an obligatory tutorial that feels more like the "narrative prologue" as the developers call it. It is not a pure learning exercise. Both game basics and the main story are introduced in this tutorial, and the players keep learning afterwards by exploring the environment on their own. The developers do not confine the information to a single point, but spread it over the whole world. The players get to know and learn it step by step. A huge number of accidental events appear in "Skyrim". These events give each player the opportunity to enjoy a unique experience.

CONCLUSION AND SUMMARY

Nonverbal guidance systems have the ability to improve the atmosphere and the immersion of a game if they are used smartly, have sufficient contrasts and are correctly placed in the game design. The most important guiding strategies and their elements can be summarized in six guidance systems. They guide the player by varying motivations, movement steering and restrictions and also point out strategies and information. The exploration aspect and the desired intuitive guidance through an open-world game depend on understanding human perception, balanced information allocation to the player and the diversity of the offered guidance systems. Of the six guidance systems, the majority of the players preferred the "interactive guidance system". There is no guarantee that a guidance

system works because it always depends on interpretable game aspects. Yet a combination of the six guidance systems and the deliberate use of their different capabilities reduces the risk of failure and may improve immersion and atmosphere considerably. While all guidance systems are predominantly visually perceptible, a combination of the different perception channels (visual and auditive) is recommended for every open-world game.

REFERENCES

Literature

Chyr, William (2016): GDC Vault (http://www.gdcvault.com/play/1023553/ Level-Design-Workshop-Level-Design).

Goldstein, E. Bruce (2002): Wahrnehmungspsychologie [original title: Sensation and Perception], 6th edition, Heidelberg and Berlin: Spektrum Akademischer Verlag.

Howard, Todd (2008): "The complete history of open-world games (part 1)". In: ComputerAndVideogames, May 24, 2008 (https://web.archive.org/web/2012 1107143427/http://www.computerandvideogames.com/189591/features/the-complete-history-of-open-world-games-part-1/?page=2).

Kahn, Louis I. (2013): Silence and Light. Lecture for students at the Department of Architecture of the Eidgenössiche Technische Hochschule (ETH) Zurich, February 12, 1969. Auditorium Maximum, ETH Zurich: Park Books.

lookslikeLink (2017): YouTube, April 07 (https://www.youtube.com/channel/ UCF4SYePLWZyMUWOPe3q_Sww).

Interviews

Rotzetter, Francine (2016): Interview with Christoph Polus, October 19, Zurich University of the Arts.

Rotzetter, Francine (2016): Skype-Interview with Daniel Hug, November 30.

Games

Aardwolf MUD, Imm Team, Microsoft, 1996.

Don´t Starve, Klei Entertainment, Klei Entertainment, 2013.

Far Cry 2: Fortune´s Edition, Ubisoft Montreal, Ubisoft, 2008.

Grand Theft Auto V, Rockstar North, Rockstar Games, 2013.

Journey, Thatgamecompany, Sony Computer Entertainment, 2012.

Mirror´s Edge, EA DICE, Electronic Arts, 2008.

Mirror's Edge Catalyst, EA DICE, Electronic Arts, 2016.

Red Dead Redemption, Rockstar San Diego, Rockstar Games, 2010.

Sid Meier's Pirates! MicroProse, MicroProse, 1987.

The Elder Scrolls V: Skyrim, Bethesda, Bethesda Softworks, 2011.

The Legend of Zelda: Breath of the Wild, Nintendo Entertainment Planning & Development, Nintendo, 2017.

The Witcher 3: Wild Hunt, CD PROJEKT RED, CD Projekt, 2015.