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Explorative spatial analysis of the function of landscape in video games

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Explorative spatial analysis of the function of landscape in video games

Abstracts

Visuelles Landschaftserleben im Sinne der neueren Kulturgeographie bedeutet, dass soziokultureller Kontext und Umwelt erst durch individuelle Bedeutungszuweisungen zueinander in Beziehung gesetzt werden. Landschaft wird also nicht als vorgegeben betrachtet, sondern erst im Moment des Betrachtens diskursiv konstruiert. Über die individuellen Konstruktionsweisen von digitalen Landschaften ist in diesem Zusammenhang noch wenig bekannt. Sind Landschaften in Videospielen nur eine detailreiche Kulisse? Locken am Horizont Affordanzen? Oder entwickeln Spieler*innen ihre jeweils eigenen Konstruktionsweisen? Unser methodischer Ansatz zur Beantwortung dieser Fragen ist doppelt experimentell. Zunächst erweitern wir die Methode des textbasierten close reading in seiner Variante des close playing auf digitale walk-alongs im Sinne der geographischen Feldforschung. In einem zweiten Schritt nutzen wir das etablierte Inventar der image schemata für die Annotation von aus Screencasts gewonnen Keyframes. Hauptbefund ist, dass es eine gewisse Spielfertigkeit erfordert, um eine Landschaft überhaupt individuell anders inszenieren zu können als von der Spielmechanik gefordert. Zweitens kann je nach Spielstil Landschaft als eine Aura wirksam werden, die nicht nur das Spielgeschehen als entfernte Kulisse rahmt, sondern auch die Ziele der Spieler*innen in allen weiteren Interaktionen mit dem Spiel beeinflusst.

Experiencing visual landscape in the sense of newer cultural geography means relating socio-cultural context and environment by individual sense-making. Landscape is therefore not considered pre-given, it is discursively constructed in the very moment of watching. In the context of digital landscapes, little is known of the individual sense-making. Do landscapes only set the scene in video games? Are affordances set on the horizon? Or do the players create their own ways of enacting? Our methodological approach to answer these questions is doubly experimental. First, we extend the method of text-based close reading in its variant of close playing to digital walk-alongs in the sense of geographical field research. In a second step we use the established inventory of image schemata for the annotation of key frames extracted from observed screencasts. As main findings, we found that it requires a certain skill level to enact landscape any different than simply compliant to the game mechanics. Secondly, we found that depending on the style of playing, landscape can be enacted as an aura that not simply frames the game as distant scenery, but also influences the mindset for all further interactions with the game.

1. Introduction

Recently, the long-established study of video games[1] made initial steps towards embracing contemporary conceptualisations and framing of space and place[2]. This study leverages methodological and theoretical advances in cultural geographies and the digital humanities to advocate for close playing [3] through a lens of the geographic concept of landscapes,[4] through which we identify and interrogate the functions and assemblages of spacing[5] in different types of video games.

[1] Cf. Aarseth et al. 2003.
[2] Cf. Günzel 2008; Aarseth / Günzel 2019.
[3] Cf. Inderst 2020.

2. Related work

2.1 Constituents of gameplay

Our analysis operationalises Aarseth's[6] core ontology of video games:

- Player: the impersonation of the core game agent by a controlling human being
- Object: a single game element, players can interact with
- Agent: any other being a player can interact with
- Setting: an assemblage of visualized game elements, players cannot interact with without movement
- Event: game situation that occurs regularly or randomly

When conceptualised and presented as embodying Homo ludens,[7] the subject in the player-game relation pursues no higher purpose than generating and extracting joy through software-based freedom of choice in an ad hoc setting. In contrast to the fluidity characterising spaces of play, the act of gaming in the digital space is defined and constrained by a set of well-defined game mechanics, parameters, and affordances. Extrapolating from Esposito, one reduces the video game to a digital apparatus designed and intended for ›ludens‹, in which settings, environments, and narratives collectively constitute a playable space for the resituated subject-avatar.[8] A resituating of the player is functionalised by, and contingent to, forms and degrees of immersiveness and interactivity; Esposito's definition centres this relation on the interactivity of a video game as mediated through audio and visual stimuli and essentialises the digital as medial. The technical and denarrativized design of video game functionality and elements of play, and consequent research within this sphere, indirectly underscore interactivity and immersion as key elements of the player experience.[9] Converse to the technical are the strands within game research, which leverage approaches from the social sciences to explore the societal positionality and psychosocial functionality of games, generally through the use of empirical methods such as surveys and controlled laboratory experiments.[10] The resulting body of knowledge demonstrates the linkages between the player experience, game mechanics, and aesthetics, and highlights the centrality of these elements in contemporary game design.

Humanities-informed approaches situate games as constructing and construing meanings that reflect and / or undermine broader sociocultural and media discourses. Empirically, interpretative methods are most commonly used to examine and deconstruct sense-making within video games; close reading, text analysis, and audience theory are borrowed from other media disciplines such as television and film studies. Social science and humanities approaches

[4] Cf. Rose 1996.
[5] Cf. Schatzki 2002.
[6] Cf. Aarseth 2012.
[7] Cf. Huizinga et al. 1987.
[8] Cf. Esposito 2005.
[9] Cf. Williams / Smith 2007.
[10] Cf. Lankoski / Björk 2015.

may therefore overlap, for example in the case of ethnographic or folkloristic studies, where fieldwork may include a form of observation or pseudo-ethnography of games in an attempt to understand their social and cultural meanings. [11]

We argue that these approaches construct the video game space as a distinctly digital-geographical space, and as such, prior research examining the geographical characteristics of games themselves remain highly relevant.[12] In consideration of these differentiated approaches, we position a spatial situated game mechanics as the primary game function linking the player to his / her own, partially pre-conscious experiences of play.

2.2 Phenomenological framing

Drawing upon methodologies commonly used for real-world environments we argue that the act of experiencing digital landscapes is phenomenologically similar.[13] Of course, bodily exhaustion caused by movement, weather conditions, or air quality cannot be experienced the same way in digital worlds.[14] As the experience of landscape is bound to a predominantly visual experience[15] due to the avatar being constricted to spaces accessible by locomotion, these embodied qualities do not differ significantly. Our phenomenology of experiencing digital landscapes draws on literature from the social sciences and humanities concerning

- the sense-making of place and
- the stream of consciousness whilst moving and interacting;
- thereafter imbuing our framework with conceptualisations of landscape.

Phenomenologically, sense-making of places and integration by movement are closely linked. Cresswell introduces movement as spatiotemporally enacted practices (moving your hand, dancing, travelling to a different town) by locomotion that affords the integration of places with environments.[16] Mobility is socially produced movement, such that it demonstrates contingency of meaning;[17] constructed meanings of movement constitute the backdrop for geographical imagination and therefore place mobility as a key means of resituating the subject in the digital landscape. Within this flow, places can attract attention and provide fields of action as long as they are stably embedded in their spatial context.[18] Agnew distinguishes between this quasi-stable position (locale) and the individual meaning (sense of place).[19] This meaning is closely bound to human activities enacting it,[20] and it is specifically those activities that allows both for observation and social communication. As places are always places of action, they

[11] Cf. Egenfeldt-Nielsen et al. 2015; Lankoski / Björk 2015.
[12] Cf. Aarseth et al. 2003; Ash / Gallacher 2011.
[13] All constituents may be readily complemented easily by drawing upon environmental psychology, for example.
[14] Cf. Cresswell 2006.
[15] Cf. Rose 1996.
[16] Cf. Cresswell 2006; Montello 1993.
[17] Cf. Cresswell 2006.
[18] Cf. Tuan 1977.
[19] Cf. Agnew 1987.
[20] Cf. Relph 1976.

can facilitate some actions and impede others;[21] they offer a field of affordances to which actions can attach.[22] We therefore highlight Löw's emphasis on the highly emotional suggestive power of places.[23] If such fields of affordance are visibly used in the same way in the long run, they are affirmed and stabilised by individual routines, and they become social places. Embodiment plays a crucial role at this juncture, as physical settings as well as discourses can always constrain specific actions. Thus, individual judgements regarding which actions are possible at a certain place are not only bound to embodied preferences, but are also extensively socioculturally mediated.[24] The self-experiences itself always in a tension between a set of social roles / constraints and a free individual. Essentially, it is the social more than a geometric dimension of reality that evokes the feeling of proximity or distance. [25]

The implementation of this phenomenological framework in the study of video game spaces as digital landscapes requires that we assess how streams of consciousness assemble and integrate fields of possible actions in a digital living environment. Implemented in a hermeneutic-phenomenological sense following Heidegger,[26] an object in the game space is real to its subject if it provides action disposition.[27] When considered in conjunction with the emotional aspect described above, a video game can express a high degree of reality independent of its technical presentation or environmental realism.

The agent experiences attention à la vie,[28] characterised by a temporary singularity in their experience of a hermeneutic-phenomenological reality. All bodily and haptic manipulations (re-)produce meaning on a site of action, thereby further constituting place. The basic assumption of movement is that reality can be re-established by (loco-)motion and that everything left behind stays unchanged for further revisit. On the move, reality becomes a rolling panorama gradually changing (stream of consciousness) while floating through a world. Actions as transformative manipulations of place are all soaked with memory of earlier experiences and manipulations and thereby modify memory for the next revisit. Crouch references explicitly the concepts of game and place when he describes acting on place as ritualized practice on pre-given codes, habitually repeated.[29] Those codes, usually constantly reconfigured, broken, adjusted or negotiated in real world environments, act as preconfigured, purposely placed affordances in gameplay.[30]

In this setting, the geographic concept of landscape is right at the edge between visual discovery of fields of affordances and a rolling panorama on the move with a certain atmospheric aspect attached to it. Visual experiencing of landscape in the sense of

[21] Cf. Schatzki 2002.
[22] Cf. Gibson 1982.
[23] Cf. Löw 2017.
[24] Cf. Löw 2017.
[25] Cf. Schütz / Luckmann 2003.
[26] Cf. Crowell 2013.
[27] Cf. Schütz / Luckmann 2003.
[28] Cf. Schütz / Luckmann 2003, p. 6–7; Bergson 1968.
[29] Cf. Crouch 2003.
[30] Cf. visual clues in chapter 2.3.

contemporary cultural geography thus means the active creation of a relationship between social conditions and environment. Landscape is therefore not pre-given, rather, it is actively constructed in the very moment of watching or discovering while moving.[31]

2.3 Space and place in video games

In recent years, research on video games has been established as a distinguished and unique artwork in media sciences.[32] An explicit focus on spatial practices in video games is set by Espen Aarseth and Stephan Günzel who coined the term ludotopia.[33] As shown above, it is the three aspects of (individual) phenomenology, the (objective) epistemology and the cultural significance of space and place that can be questioned.[34]

Pablo Abend et al. assert that research on playful participatory practices constitutes an important part of digital media culture and art.[35] In that context, they argue that playing video games is not simply a use of media, but must be thought of as ongoing (re-)production while playing. Depending on the specific game, certain influences of the player on the game world can be stated according to his / her intentionality. [36] In addition, Günzel highlights that games do not simply enact spatial concepts, but are spatial concepts on their own in the sense of enactivism, if they produce bodily experiences (e. g. Wii, but also VR games). [37]

Domsch stresses that although all video games are preset, rule-bound environments, the player's decisions are relevant.[38] Depending on the individual way of enacting, players inscribe a unique narrative into a game setting while moving and interacting in space. In opposition to sequential narratives like videos, every decision taken and performance done contributes to a gradual development of a narrative story. As a discovery journey into fictional otherness, a spatial narrative functions as evocative space meant to resemble carefully constructed existing conceptualisations of space.[39] In many cases, it is the explicit ambiguity of game elements that helps to evocate individual narrations. Careful constructions are often offered as visual clues. A motivation to (inter-)act is even stronger, if the player does not notice as such. Visual clues can mark both a possibility for interaction or a directional suggestion.[40]

[31] Cf. Rose 1996; Rose 2016.
[32] Cf. Feige 2015.
[33] Cf. Aarseth / Günzel 2019.
[34] Cf. Günzel 2019.
[35] Cf. Abend et al. 2020.
[36] Cf. Domsch 2019; Günzel 2019.
[37] Cf. Günzel 2019.
[38] Cf. Domsch 2019.
[39] Cf. Domsch 2019.
[40] Cf. Domsch 2019.

A special form of meta-narrative is offered by the game Gone Home which allows it to reflect on cultural artifacts of the 1990s.[41] In this game, players even have the opportunity to reconstruct prominent discourses of this period in their own way. Further, Unterhuber highlights that this process is immensely fostered and only possible by offering it as a game.[42]

Regarding landscape, games produce their own perspectives. Landscapes can, by design, simply create a mood or atmosphere for a narrative setting,[43] but also open a field of open exploration as laid out above. In difference to real world environments, many video games offer shortcuts to prevent real time enactment of navigational tasks.[44]

2.4 Digital walk-alongs

Recurring on the terms close and distant reading,[45] the basic process of qualitative critical analysis of texts can be easily transferred to a number of analyses, including gameplay. In that sense, for example Rudolf Inderst used the term close playing.[46] Without naming it, Joshua Tanenbaum and Jim Bizzocchi propose a similar approach in their paper on Oblivion.[47] In detail, they propose two categories of analysis: adaptivity & believability. Whereas adaptivity describes the capability of a game to adapt to the user's needs, believability reflects the capability of agents in the game to act human-like towards the user. Methodically, they provide an elaborated coding system by which they recorded and classified all observable interactions encountered in gameplay.

In our study, we extend close playing to digital walk-alongs in the tradition of geographic field research. Proposed by Monica Degen and Gillian Rose, walk-alongs add to close reading by distinguishing between a person enacting and a person observing.[48] In their original work, they encourage residents of various cities during an accompanied city walk, to talk as freely as possible about their feelings and evaluations on site. The background is to obtain data as close as possible to the bodily experience on site. Counterintuitively, many subjects on site report their memories of this place in detail, without even taking a look, thus revealing the effect size of individual narratives in sense-making.

Whereas in close playing players and observers are the same person and validity is only obtained by intercoder reliability, digital walk-alongs separate both roles from each other, mitigating priming biases and context switches. In addition, players do not have to be aware of the aspects observed at all, strengthening results in an experiment-like situation.

[41] Cf. Unterhuber 2015.
[42] Cf. Unterhuber 2015.
[43] Cf. Domsch 2019.
[44] This is implemented, for example, through portals, cf. Günzel 2019.
[45] Cf. Moretti 2013.
[46] Cf. Inderst 2020.
[47] Cf. Tanenbaum / Bizzocchi 2009.
[48] Cf. Degen / Rose 2012.

Fig. 1: Key question analysing visual material. [Rose 2016, p. 25]

The soundest approach for visual analysis in geography relates to the work of Gillian Rose.[49] Her code matrix intersects three types of modalities in the production process of visual artifacts with four sites of interpretation.

Modalities are:

- technological: by which means was the visual artifact produced?
- compositional: how was the visual artifact arranged
- social: what is the anticipated social context of the visual artifact?

Sites of interpretation are:

- site of production: how was the visual artifact influenced surroundings?
- site of image itself: how was content of the visual artifact selected?
- site of circulation: how was the visual artifact made accessible?
- site of audience: what are the anticipated surroundings, in which a visual artifact is consumed?

For each cell of the matrix, Rose proposes a number of questions that lead to an interpretation of different aspects of analysis covering content analysis, semiology and discourse analysis.[50]

CONTAINER	BALANCE	COMPULSION
BLOCKAGE	COUNTERFORCE	RESTRAINT REMOVAL
ENABLEMENT	ATTRACTION	MASS-COUNT
PATH	LINK	CENTER-PERIPHERY
CYCLE	NEAR-FAR	SCALE
PART-WHOLE	MERGING	SPLITTING
FULL-EMPTY	MATCHING	SUPERIMPOSITION
ITERATION	CONTACT	PROCESS
SURFACE	OBJECT	COLLECTION

Fig. 2: Selective list of image schemata. [Johnson 1987, p. 126]

[49] Cf. Rose 2016, p. 25; Figure 1.
[50] Cf. Rose 2016.

A more formal and thus more standardized analysis of spatial relatable visual content can be done recurring on Johnson's concept of image schemata.[51] Partially relying on Lynch, image schemata can be understood as a general purpose ontology identifying structural patterns of common-sense geographic knowledge both in language and views.[52] In computer science, image schemata have been used to formalize wayfinding tasks, e. g. at airports. [53] The cooccurrence of the schemata PATH, LINK and SURFACE, for instance, was used to model a movement towards a target.

In our explorative study, we use a reduced tagset of 7 schemata useful for the exploration of games. We identified:

- CONTAINER: physically limited areas that provide a homogenous field of affordance.
- ENABLEMENT: an affordance to interact or react
- BLOCKAGE: a game element constraining players' actions. A special case in gameplay is, if a visualized object does not offer an anticipated opportunity for interaction or a map boundary is reached.
- PATH: directed locomotion towards a target
- ATTRACTION: A visual quality that provides a motivation for (inter-)action, i. e. a visual clue
- COUNTERFORCE: An object, agent or event that prevents a player from acting as desired
- LINK: A perceived junction between different game elements

3. Study setup

With respect to the background knowledge laid out above, we designed a study setup suitable to test our main hypotheses:

- Skill and preferred type of gameplay affect the way players spatially enact a video game.
- Enactivism: Not all observed types of spatial enactment can be explained only by interaction with game induced affordances.

3.1 Sample generation

As the preferred type of spatial gameplay cannot be easily predicted and are part of the research question in this paper, sampling was done by skill level. Skill level was explicitly assessed by possible participants and was verified during the sessions. We looked for suitable candidates on the following skill levels:

- *experienced gamers* have played and finished a large variety of video games and play regularly.

[51] Cf. Johnson 1987; Figure 2 for an overview.
[52] Cf. Lynch 1960.
[53] Cf. Raubal et al. 1997.

- *casual gamers* are curious to play video games in general, but only play on special occasions or do not continue playing after a first glance.
- *no-gamers* are aware of video games as means of playing, but refuse to do so for several reasons.

We used a gatekeeper approach on the authors' social network to cast possible candidates. As we intended to conduct an explorative and qualitative study, we limited the number of participants to simply covering the skill levels mentioned above with at least one example. Perhaps due to the popularity of streaming events in the community, we found much more experienced gamers than needed and were able to conduct two spare game sessions for that group. For casual and no-gamers we were able to conduct exactly one game session.

Table 1 provides an overview of the participants with respect to self-reported player type, gender, and age. As we focus on the phase of early spatial accommodation in the game, the minutes walked-along are the first minutes the specific player spent on playing the example game. As our screencast approach did not work out properly on all hardware, the number of minutes captured deviates from the minutes-along. Minutes analysed cover phases of intense interaction with landscape cut from the minutes captured.

player type and ID	gender, age	technical limitations	minutes walked-along	minutes captured	minutes analysed
b: casual gamer	m, 22	game crashed after 16 minutes	45	16	10
i: no-gamer	f, 25		38	38	18
k: experienced gamer	m, 22	video corrupted	45	0	0
n: experienced gamer	m, 23		42	42	10
u: experienced gamer	m, 24	insufficient frame rate	45	45	0

Tab. 1: Participants and amount of analysed screencast. [Kremer et al. 2022]

Our aim was to have at least one recording for each player type. Due to the aforementioned technical problems, we had to conduct three playing sessions with experienced gamers to fine tune our setup and to eventually obtain usable material.

3.2 Technical preparations

All digital walk-alongs were conducted as online sessions. This allowed us to react dynamically to the participants' schedules in times of the COVID-19 pandemic. We checked in advance that existing hardware met the requirements of the game plus sufficient resources to run a video recording in the background. To guarantee an equivalent setup, we first asked the

participants to join a discord server instance established for this purpose that was used for the screencast of this experiment and installed and preconfigured OBS Studio for redundant on-site recording in higher quality. Video connection was deactivated to save bandwidth during the screencast and resources for parallel recording. We guided the participants through the installation process of our example game. Depending on network connectivity and load the technical setup took in between 30 and 45 minutes.

3.3 Lab setup for experiment

After the first start of the game, we guided the participants through the configuration process of the game to make sure the same preconditions applied. All participants were asked to choose the survival mode of the game which focuses on surviving in a snowy landscape and doesn't offer a rich narrative. All participants were told to choose ›Pleasant Valley‹ as the starting region. As the starting location is generated by a random seed in the game, all participants started in different locations, but with comparable visual access to landscape and infrastructure. Figure 3 shows a fan-made map of the game region. The easiest level of difficulty, ›Pilgrim‹, was advised. Only the player can choose to pick another gender than his own. In the end of the configuration process, the game's main mission was shown to the user.[54] All close playing sessions were held in German, the mother tongue of all participants.

Fig. 3: Fan made map of ›Pleasant Valley‹. [XHead / stmSantana 2019]

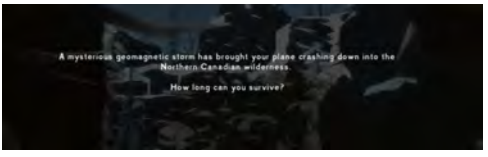


Fig. 4: Main quest of The Long Dark. [Kremer et al. 2022]

[54] Cf. Figure 4.

After the game launched, we gave the participants a short introduction into the game controls and answered their questions. After that we gave them the main instruction: »Now play the game the way you explore new games. Speak to it!« [55] No further information on the target of the study was given. While playing, we only intervened to keep the participants speaking and to ask for their mindset on interesting situations. All players reacted instantly to the loud background music especially with respect to the communication via Discord and reduced the master volume of the game. If we observed problems with game control within the running gameplay, we offered assistance only concerning the underlying interaction metaphor of the game and not for the toolbox provided. After around 45 minutes, we concluded the sessions and did a short 5-10 minutes guided interview on the experiences during the game. The main questions were:

- »What did you experience?«
- »How do you evaluate the game mechanics?«
- »Would you keep on playing, if it was your game?«

The first question was meant to reveal insights into active mindsets that might have been not discovered by observation yet. The second question gave us the opportunity to check to what degree the participants were consumed with complying to the game mechanics and to what degree there was time for random exploration or perception. The last question helped us to understand how motivated the participants were during gameplay. The findings largely verified what we had observed so far.

3.4 Example Game

As an example, we use the video game The Long Dark, a game with simple game mechanics that is easily accessible even to inexperienced participants. As a cultural artifact in the sense of critical Canadiana wilderness discourses,[56] the game is located in a northern Canadian wilderness[57]. The Long Dark [58] is ideally suited for the present study because landscape here functions simultaneously as a socioculturally charged construct, as a playing field, and as a game element, which allows for a broad range of connective actions on the part of the players. Moreover, as a so-called independent title,[59] it is not subject to the mechanisms of the mass market for video games, so that its reception by gamers seems not easily predictable.

Despite the fact that The Long Dark does not require violent actions to survive, the game presents itself from a first-person perspective known from shooter games. While this is absolutely reasonable for the sake of impersonation and the game tries even to intensify this impression by both auditive response on even smaller bodily deficiencies and partially blurring the screen, when players are at the edge of falling unconscious by thirst, cold or injuries,

[55] Cf. Hinterland Studio 2017.
[56] Cf. Henderson 2001, p. 809.
[57] Bonner 2018 problematizes the notion of a wilderness in video games that appears to be visually constructed as pristine.
[58] Initially financed by the Canada Media Fund, subsequently realized via crowd-funding.
[59] Cf. Martin / Deuze 2009.

this might influence the way participants perceive the game in general. Beside of Figure 4 no other narrative is superimposed on the game, which in sum creates a perfect playground for individual sense-making of the landscape.

Large parts of the game map are covered by snowed woods and fields,[60] nested with a variety of build environments that provide resources and shelter. Roads and power lines connect the different parts of the map and can be used for navigation. ›Pleasant Valley‹ is surrounded by a scenic mountain range, whose edges can be used for orientation. As our key interest was to identify to what degree landscape was perceived as a scenic setting, as a set of sheer affordances or if there were more individual ways of spacing, The Long Dark provides all of these elements. Consistent with the game mechanics, the game even offers the experience of different weather conditions, daylight and night. Every action taken consumes a certain number of calories and even phases of sleeping come at the cost of calories. As opportunities for interaction exist both in the build and non-build environment in The Long Dark, landscape is usable as a field of affordances and not only evocating mood or atmosphere.

4. Results

All results were either obtained from our notes during the digital walk-alongs or the guided interviews. Information from notes was then related back to the video recordings we obtained from the participants after the sessions. Videos were used both for verification of observations and quotes. In the temporal context of these observations, videos were probed for other examples of interaction with landscape.

We focussed on the experience of landscape in the narrow sense and thus excluded a number of elements from our study.

- bodily environment: the systemic importance of the human body for starving and freezing in a survival game was reflected only by actions on the landscape
- built environment: only outside views of built environment were considered part of the landscape

Assigning image schemata, we further followed a prototypical approach identifying screenshots that reflected most the applicability of a scheme. We did not look deeper into the lifecycle of an active scheme from its early beginnings to its resolution.

Of course, our annotations reflect our experiences as players as well. We were able to reflect the following skill levels useful to understand our participants:

- very skilled player, who has played The Long Dark for some hours
- casual player with little experience in first-person perspective games, who has played The Long Dark only for study preparation purposes.

[60] Cf. Figure 5.

After having identified the prototypical key frames of image schemata we used the web tool Recogito to do explorative annotations of the scenes.[61] Beside its primary use case to annotate maps, it can be used to analyse any 2D-graphics as well.

Fig. 5: Annotated key frame with possible anchor regions wood, bridge, road, snowed meadow, building and mountain range. Feature categories can be annotated in the data scheme of Recogito, but not visualized as labels. Blurred edges in the field of perception reflect that the avatar is hurt at the moment (bottom right symbol). The four icons on the bottom left show the state of the four main elements of the game mechanics: cold, tiredness, thirst and hunger. [Kremer et al. 2022]

In essence, our coding did a three-stage annotation of our key observations:

- Identify the key frame representing the scene of interaction
- Identify the possible anchor regions in each scene. For each anchor region we noted the scale as well loosely following Daniel Montello:[62] S: nearby or haptic space; M: vista space; L: visible, but not instantly reachable space
- Identify the image schemata active at a specific anchor region according to the behaviour or self-attributed mindset of the participant.

In the sense of an explorative study, we now discuss the edge cases found in the individual spacings of landscape in detail.

4.1 Participant i

Due to limited gaming skills, participant *i* was not able to perceive landscape any other than a game setting. Interaction with the environment in general was a testing behaviour of real world induced hypotheses (Can I burn this? Can I light up a fire there? Will the ice break?). Navigation reacted strongly on salient features in the scene. During the whole session, participant *i* was completely challenged by complying to the game mechanics and showed no other types of performing landscape.

[61] Cf. Figure 5.
[62] Cf. Montello 1993.

Situation 1: Wayfinding	
active schemata	path, attraction
anchor region	M: bridge
 Fig. 6: Bridge far back in the forest. [Kremer et al. 2022]	 Fig. 7: Bridge appears behind an edge of rock. [Kremer et al. 2022]

Tab. 2: Situation 1: Wayfinding. [Kremer et al. 2022]

In this context, wayfinding tasks were observed. When looking for signs of civilization, elements far in the background were discovered and followed continuously. On first discovery as well as on arrival the element was named:

»Da kommt ne Brücke.« – »There's a bridge back there.« [63]

»Da ist die Brücke wieder.« – »There's that bridge again.« [64]

Situation 2: Ignored affordance	
active schemata	attraction
inactive schemata	path, enablement
anchor region	M: power lines, road, bridge

Tab. 3: Situation 2: Ignored affordance. [Kremer et al. 2022]

[63] Participant *i*, close playing session on 2021-3-26, originally stated in German, authors' translation.
[64] Participant *i*, close playing session on 2021-3-26, originally stated in German, authors' translation.

Fig. 8: Crossing street and power-line. [Kremer et al. 2022]

Tab. 3: Situation 2: Ignored affordance. [Kremer et al. 2022]

While following this route, any other affordances were ignored, including roads and power lines, which could have led to infrastructure elements much quicker.

Situation 3: Realism	
active schemata	blockage
anchor region	M: frozen lake

Fig. 9: Frozen lake. [Kremer et al. 2022]

Tab. 4: Situation 3: Realism. [Kremer et al. 2022]

Shortly after having crossed the road and reaching a frozen lake, this was found to be some blockage:

»Mal gucken, ob ich da einbrech.« – »Let's see if I can break in there.« [65]

[65] Participant *i*, close playing session on 2021-3-26, originally stated in German, authors' translation.

4.2 Participant b

Participant *b* showed a very strong preference for aesthetic qualities right from the beginning. He reacted to attractions of any kind, even if it was not clear if it would endanger him with respect to the game mechanics or cost at least time for backtracking. He also showed a strong collection behaviour which led to an overweight backpack before end of the short explorative session.

Situation 4: Landscape as attraction	
active schemata	attraction
anchor region	M: mountain range
 Fig. 10: Mountain view. [Kremer et al. 2022]	 Fig. 11: Repeated Mountain view. [Kremer et al. 2022]

Tab. 5: Situation 4: Landscape as attraction. [Kremer et al. 2022]

In the very first seconds of the game, the mountain range in the background gained his attention making up his plans:

»Natürlich, mich ziehen die Berge da hinten an.« – »Of course, I'm attracted to the mountains back there.« [66]

Later on, he affirmed his intent to go to the mountains, and even when elements of civilization offering better shelter were already discovered, he only used them for preparing:

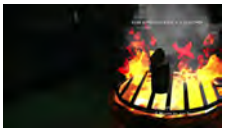
»Ich weiß natürlich nicht, ob das überlebenstechnisch sinnvoll wäre, aber ich würde hier in den Wald hinten reingehen, also die Berge, aber erst mal schau ich, was es hier so gibt.« – »I don't know if that would make sense survival-wise, of course, but I would go in the back of the woods here, so the mountains, but first I'll see what's around.« [67]

[66] Participant *b*, close playing session on 2021-3-24, originally stated in German, authors' translation.
[67] Participant *b*, close playing session on 2021-3-24, originally stated in German, authors' translation.

Situation 5 / 6: Landscape as atmospheric aura	
active schemata	attraction
anchor region	S: footprint, L: wood
 Fig. 12: Footprints in the snow. [Kremer et al. 2022]	 Fig. 13:Snowy tree trunks. [Kremer et al. 2022]

Tab. 6: Situation 5 / 6: Landscape as atmospheric aura. [Kremer et al. 2022]

He paid attention to details of the game visualization itself, taking notice of footprints as special effects and showed signs of irritation to visualizations not consistent with real-world experiences. In detail, he complained about the tree trunks being snow covered from all directions which is in conflict with a major wind heading during a precipitation event.

Situation 7: Atmospheric indoor scenes	
active schemata	attraction, enablement
anchor region	S: grill
 Fig. 14: Grill fire. [Kremer et al. 2022]	

Tab. 7: Situation 7: Atmospheric indoor scenes. [Kremer et al. 2022]

When he reached a barn building, he discovered a grill inside which imposed the strong affordance to him to light up a fire, evaluating his efforts with:

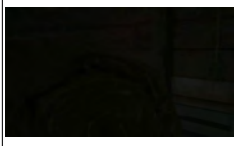
»Romantischer wird's nicht.« – »It doesn't get more romantic than that.« [68]

After he realized:

»Verdammt, ich hab nichts zum Grillen dabei!« – »Damn, I didn't bring anything to grill!« [69]

He looked up his bag and finally discovered that the game allowed him to grill a can of peaches.

Even if it does not precisely fit our understanding of landscape defined above and even if this scene doesn't lack a portion of self-stated irony, it shows how much situational pleasure can be obtained from simply staging explorative game play that does not relate to the core game mechanics at all.

Situation 8: Trap	
active schemata	blockage, container
anchor region	M: farm building
 Fig. 15: Darkness. [Kremer et al. 2022]	

Tab. 8: Situation 8: Trap. [Kremer et al. 2022]

In the same barn, shortly after the grill session, he realized that his joy of grilling peaches led to a blockage situation, because he had no light source to find his way back to the door:

»Oh verdammt, ich find den Ausgang wahrscheinlich nicht mehr!« – »Oh damn, I probably won't be able to find the exit.« [70]

[68] Participant *b*, close playing session on 2021-3-24, originally stated in German, authors' translation.
[69] Participant *b*, close playing session on 2021-3-24, originally stated in German, authors' translation.
[70] Participant *b*, close playing session on 2021-3-24, originally stated in German, authors' translation.

4.3 Participant n

Being the most experienced one amongst our participants, player *n* acted so controlled and calm that he had the opportunity to do some exploration tasks and even took his time to visualize his mindset by movement for the audience. Especially on that low level of difficulty he never got close to failing. Over time he grew more and more bored, especially unsatisfied with the amount of time it took to cross the landscape between different points of interaction. In his approach, landscape acted as a rich context for decision making and explorative tasks.

Situation 9: Contextualization on the move	
active schemata	path, enablement
anchor region	M: road
 Fig. 16: Following a road. [Kremer et al. 2022]	 Fig. 17: Context view from road. [Kremer et al. 2022]

Tab. 9: Situation 9: Contextualization on the move. [Kremer et al. 2022]

He never followed a path exclusively like in situation 2 (table 3). Situation 9 (table 9) shows an example of quick orientation glances he routinely integrated in the performance of a path. This behaviour gave him the opportunity to always think of further options.

Situation 10: Backtracking behaviour	
active schemata	blockage, path
anchor region	M: power line

Tab. 10: Situation 10: Backtracking behaviour. [Kremer et al. 2022]

Fig. 18: End of power-line. [Kremer et al. 2022]

Tab. 10: Situation 10: Backtracking behaviour. [Kremer et al. 2022]

When he reached the end of a power line, but not the end of the road yet, he instantly realized that he must have reached a level boundary of ›Pleasant Valley‹, which caused him to backtrack immediately.

Situation 11: Shortcut	
active schemata	blockage, path
anchor region	M: tree trunk

Fig. 19: Path blockage by tree trunk. [Kremer et al. 2022]

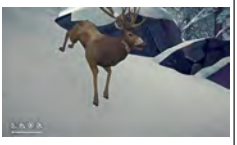
Tab. 11: Situation 11: Shortcut. [Kremer et al. 2022]

Returning from an exploration lap to the starting point, he once more complained about the time it took. After facing a tree trunk as a visual blockage, he started to walk right in the woods, what he hoped to be a shortcut:

»Wo läufst Du jetzt grad hin?« [observer] »Ich hab keine Ahnung!« – »Where are you going right now?« [observer] »I have no idea!« [71]

[71] Participant *n*, close playing session on 2021-4-7, originally stated in German, authors' translation.

Interestingly, this decision point marked the beginning of him growing bored. Shortly thereafter, he tested if a steep slope would do harm to his avatar and after eventually experiencing some injuries, he fell out of impersonation and started to talk about his avatar as »you« and not as »I« further on.

Situation 12 / 13: Non-human actors	
active schemata	counterforce
anchor region	S: animal
 Fig. 20: Wolf back the road. [Kremer et al. 2022]	 Fig. 21: Nearby passing deer. [Kremer et al. 2022]

Tab. 12: Situation 12 / 13: Non-Human actors. [Kremer et al. 2022]

Animals are usually distant encounters on the easiest level of difficulty, if the player does not explicitly intend to fight or to hunt. A wolf far down the road did not scare participant *n*. The more he startled, when a deer overtook him in high speed, just to turn around in an erratic movement pattern and pass his other side:

»Jesus! Der Hirsch hat mich erschreckt!« – »Jesus! The deer scared me!« [72]

In this case it was less due to gameplay then to the unanticipated movement pattern.

Situation 14: Spatial decision making	
active schemata	path, enablement
anchor region	S: road signs, M: road, M: path

Tab. 13: Situation 14: Spatial decision making. [Kremer et al. 2022]

[72] Participant *n*, close playing session on 2021-4-7, originally stated in German, authors' translation.

 Fig. 22: Road signs indicating mining. [Kremer et al. 2022]	 Fig. 23: Path followed so far. [Kremer et al. 2022]

Tab. 13: Situation 14: Spatial decision making. [Kremer et al. 2022]

Similar to situation 9 (table 9), he stopped on his path when he reached signs and a path pointing to a mine up in the mountains. He oscillated a few times back and forth between the two views, clarifying his decision making with the words:

»Mine oder Zivilisation?« – »Mine or civilization?« [73]

Situation 15: Heading calibration	
active schemata	path
anchor region	L: mountain
 Fig. 24: Mountain view. [Kremer et al. 2022]	

Tab. 14: Situation 15: Heading calibration. [Kremer et al. 2022]

During his way up to the mine, he repeatedly raised his head to get feedback from a nearby mountain on his heading, because the path to the mine was not clearly visible in all places. This marked one of a few key frames that showed the usability of vertical elements of a landscape as landmarks.

[73] Participant *n*, close playing session on 2021-4-7, originally stated in German, authors' translation.

Situation 16: Landscape as atmospheric glance	
active schemata	attraction
anchor region	L: waterfall, L: mountain scene
 Fig. 25: Panorama with waterfall. [Kremer et al. 2022]	

Tab. 15: Situation 16: Landscape as atmospheric glance. [Kremer et al. 2022]

After leaving the mine and before returning to the path downhill he stood for a few seconds perceiving an atmospheric mountain scene with a waterfall. Whereas this must not be overstated, he would not have done so, if nothing had attracted him.

4.4 Observed patterns and similarities

As expected, we were able to identify *landscape* both

1. as means of complying to game mechanics (find resources and survive) and
2. as a rich setting that invites exploration and interaction (grill some peaches).

Nevertheless, amongst the two more experienced players two very individual ways of performing gameplay on a landscape were observed:

- Landscape as aura: participant *b* made the plan to hide in the forest and try to reach the mountain from the very first glance on the mountain scene and regarded all possible shelters as only a possible source of equipment afterwards. He also reacted very strongly to the aesthetic quality of the visualization of footprints and the performative quality to grill food.
- Landscape as context: participant *n*, never happy with the game setting right from the beginning, systematically scanned the landscape for game elements providing the experience of joy and took any opportunity for explorative backtracking behaviour. When the relation of playtime and played time started to bother him and he started to get bored, he focused on the exploration of the game mechanic.

In essence, individual spacing in video games varies not only with gaming skills, but also with individual preferences of enacting landscape-like environments.

Methodically, all types of pre-chosen image schemata can be observed. Non-recurring patterns cover *container* and *counterforce*. Container as a cognitively very productive, hierarchy building pattern[74] was not observed, as exploration of the valley did not last long enough to either identify different regions of the ›Pleasant Valley‹ or neighbouring top level regions. Counterforces are not observed as the landscape does not present itself as immediately hostile in terms of aggressive animals or avalanches, but starts a silent process of freezing and starvation on a more subtle level. All other image schemata resample a rich variety of opportunities for interaction with the landscape and obstacles blocking them. Attractions can be both an iconic view or an object offering an affordance to act upon (Table 16).

Image schema	Number of scenes (n=16)
Container	1
Enablement	4
Blockage	4
Path	7
Attraction	6
Counterforce	1
Link	1

Tab. 16: Number of image schemata applied (multiple tagging). [Kremer et al. 2022]

A simple similarity measure can be applied. A scene is therefore represented by its vector of all image schemata. Each component is assigned to one of the ordinal values *active*, *inactive* or *non-existent*. Formally:

An image scene is a vector: s = (Container, Enablement, Blockage, Path, Attraction, Counterforce, Link) with s # {active, inactive, non-existent}[7]

Similarity is then computed by a simple component distance measure on the defined ordinal scale divided by maximum value of 14 for normalization purposes. The derived index ranges from 0 (maximal similarity) to 1 (maximal dissimilarity). The measure is symmetric.

Taken from the scenes above, Figure 26 shows an example of two different scenes with maximal structural similarity (index: 0), both tagged with ›blockage‹. In contrast, Figure 27 shows two pictures of a road but in completely different tasks and perspectives (index: 0,36).

[74] Cf. Tversky 1993.

Fig. 26: Example of structural equivalent scene (blockage; participant i vs. participant n). [Kremer et al. 2022]

Fig. 27: Example of structural different scene (functions of road and power-line, participant i vs. participant n). [Kremer et al. 2022]

5. Discussion

All pre-identified image schemata are useful to provide information on individual spacings of landscape in our close playing walk-along sessions. Due to the exclusion of the systemic environment of the avatar body and the exclusion of build environment, tasks of landmark driven navigation (paths) are most productive. Because the experiment was laid out to observe early appropriation of a game unknown before to the players, a lot of explorative behaviour including reaction on attractions as affordances[75] or back-tracking[76] was taking place. From our limited sample, we can raise the hypothesis that skilled players are more likely to show curiosity or enjoying familiarization of a new game, as they have the capabilities to adapt quickly to game control and are trained to anticipate the core principles of any game mechanic. Observations made during the digital walkalongs reveal that the comparison to other known games are made on early appropriation in order to accommodate with the game. Of course, the sheer aesthetics of the visualization of landscape in video games can be observed several times while watching mountain scenes. As The Long Dark as a survivable game doesn't offer rich possibilities of interaction outside shelters and puts a focus on a proportional relation of played time and play time, not many other agents were perceived as counterforce.

Although our coding scheme is designed to annotate partonomies of anchor regions or taxonomies of image schemata, we were not able to observe such complex patterns. Our observations indicate that active image schemata are always bound to a set of higher-level intentions rendering other potential image schemata inactive. Only participant *n* performed a continuous active scan for context. Partially due to a lack of recognition capabilities with less experienced players, we know from computer and cognitive science that intentions are a powerful filter mechanism in general.[77] In detail, we saw:

1. Active intention sets effectively block affordances.[78]

[75] Cf. Gibson 1982.
[76] Cf. Kremer et al. 2013, p. 3.
[77] Cf. Kiefer 2012.
[78] Cf. Kiefer 2012; situation 1, wayfinding (table 2): »There's something red back there!«.

2. Empty intention sets[79] react to almost any environmental affordance.[80]
3. Higher level intentions stay active for a long time.[81]

In addition, very strong occurrences of the scheme ›attraction‹ like the farm building in scene 8 that reveal to provide major blockage schemata on entering simply by darkness can be classified as a trap.

We showed that similarity of (active) image schemata provides solid means to compare the visual relevance of scenes to different players. Other than close readings of sceneries that superimpose external attribution by the coder on the one hand and intention sets that focus completely on the player's mindset on the other, image schemata provide structural means to identify task oriented active and inactive visualities and thus act as a link between the other two approaches. Of course, similarity measures can be easily fine-grained to include the scale and feature type of anchor regions and tested on their specific effect sizes.

Our study setup proved to provide a solid ground for testing of our hypotheses as we used a widely controlled lab setup, a well-established method of observation (walk-alongs) and a well-understood annotation technique (image schemata). The game itself revealed to be the right choice as a playground for different sense-makings of landscape. Neither a dense narrative nor a common-sense context of fighting was superimposed to the game situation, which encouraged individual intentions. As opportunities for interaction exist both in build and non-build environment in The Long Dark, landscape was usable as a field of affordances and not only evocating mood or atmosphere.

Nevertheless, as our study setup was experimental, we can ex post recommend several opportunities for optimization. As the study setup was held in private via screencast, it was not possible to control a number of factors including hardware resources, incidence of light, brightness of monitor on site and effect of possible other persons present. Also, due to the experimental setting, we tried to focus widely on observation and only encouraged ongoing verbalization of perceptions, plans and (inter)action. With the coding scheme derived from the data, it should be easy now to ask in detail for active intentions to distinguish between not recognized game elements and those filtered by task orientation. To keep on not disturbing the participants in their choice making in the game, confronting the participants with the video material captured directly after the playing sessions for cross validation purposes would provide optimal results. This approach would accelerate the check for usable material at the same time. The skill level of the participants now relies on self-attribution and observation. A more structured approach would be to hold a questionnaire in front of the playing session or even on sample generation.

[79] For information on the computational approach of mobile intention recognition see Cf. Kiefer 2012; due to boredom: cf. Kiefer et al. 2014.
[80] E. g. situation 11, shortcut (table 11).
[81] This is reoccurring in situation 4, landscape as attraction (table 5) with the wish to visit the mountains.

A variety of future research is fostered by our findings. As image schemata are a structural query ontology suitable for carrying different semantics, it should be easy to transfer the method of digital walk-alongs back to real world situations. Especially interesting is to capture not only video material of these walks, but also to record eye tracking data from the first-person perspective.[82] This would also allow for verification of relevant features and measure focus times. Using such temporal structured data would also allow for an analysis of the temporal lifecycle of active image schemata, i. e. from their very beginning (discovering) to the end of relevance (leaving behind).

6. Conclusion

In our experimental approach to obtain more detailed information on individual sense-making of the geographic concept of landscape in video games, first, we used a phenomenological framework to look for individual differences in both perception and conception of landscape. We frame landscape as primarily visual accessible, (re-)constructed by socio-cultural assumptions in the very moment of watching. While on the move, landscapes can be understood as a stream of consciousness continuously reshaped and evaluated according to the intentionality and (silent) expectations of the player. Landscapes can be used to create a certain mood or atmosphere but can also offer a rich field of affordances, evocative spaces that hide their opportunities for interaction behind visual clues. Taking advantage of that, narratives in the game do not necessarily have to be told explicitly, but are produced by players on interaction with the game environment.

Second, we extended the established practice of close playing to accompanied digital walk-alongs, separating the roles of player and observer. In doing so, we mitigated priming biases and context switches and were able to strengthen our results in an experiment-like situation. Following the well-understood instrument of image schemata, we developed a simple coding scheme to annotate active visual elements of engagement and interaction in screencast videos obtained from playing sessions. Our expectation was to observe individual ways of sense-making of landscape in video game environments, varying by skill of player and type of enacting. We selected the game The Long Dark, a survival game in the Canadian wilderness that does neither superimpose a strong narrative nor a context of fighting used in many other games. This gave us the opportunity to watch different types of gameplay unfold.

In essence, we found that an individual sense-making beyond sheer affordances can only happen with a certain skill level in the familiarization process of games. Our participant not used to playing video games was continuously challenged by the task of managing the game mechanics and simply had no time for individual sense-making. One of our more experienced participants used landscape intensely as context for exploration behaviour, both to learn about evocative spaces and game mechanics. A third participant strongly reacted to the visual quality of landscape as an aura which significantly determined his intentions for the whole session. Making use of our structural annotation scheme of image schemata we proposed a

[82] Cf. Kiefer et al. 2014.

simple similarity measure to compute the degree of congruence between different styles of interaction in comparable scenes. Interestingly, we were able to observe that intentions can act as an effective filter for visual-sense making, rendering different conceptions of similar views.

Next steps cover the opportunity to use our study setup, which proved to provide solid ground for observation, in real-world environments. Our current approach can be further enhanced by focusing more on the influence of active intentions on visual sense-making of landscapes. Technically, this could be assisted by using eye-tracking to identify specific areas of interest of focus regions, and in doing so, will enable the development of a more thorough understanding of the entire lifecycle of player-landscape interactions.

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