Representations and Concepts of Borders in Digital Strategy Games and Their Potential for Political Education in Geography Teaching

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Abstract: In Germany, 93% of young people between the ages of 10 and 18 play video games daily. Political geography, in particular popular geopolitics, have found that video games can help to establish and develop people's understanding of geopolitics. Consequently, this affects geography education, providing both challenges and opportunities for teaching. Geography teaching is an integral part of political education as students need to understand how boundaries and territories create spaces with regards to social power and become the object of political conflict. Reflection plays a central role in understanding and deconstructing such spatial constructions. In this article, we examine representations and concepts of borders in digital strategy games and the perception and reflection of these by the players. The results provide an outlook on the potential and the challenges of digital strategy games for political education in geography lessons in secondary schools as well as for teacher training at universities. For this reason, possible approaches for education and training will be outlined on the basis of the results.

Keywords: geography education research; video games; qualitative research; game-based learning; popular geopolitics

1. Introduction

In 2018, Gamescom, the world's largest trade fair for digital games, will be home to many providers in the edutainment sector. Although most games are sold for entertainment purposes, these media contain information and world views that are likely to have a strong influence on students' knowledge and attitudes towards geographical topics. This research focuses on borders, which are important in the context of political education but are an often-neglected topic in geography education [1]. Students often have a limited understanding of the real consequences of social and political constructions of space that accompany the drawing of borders, despite this understanding being part of the German educational standards for geography teaching [2]. However, three out of five young people in Germany between the ages of 12 and 19 play digital games every day [3]. For this reason, we want to investigate whether informal learning about spatial boundaries takes place from playing digital games, whether these also have a strong influence on the understanding of geographical contexts, and to what extent pupils can reflect on the representations of borders in games. The German educational standards for geography emphasise this by highlighting the importance of the ability to deal with the media effectively and reflectively [2]. Following the work of Gryl et al. [4], all material and/or digital representations of space can be summarised in pictorial and textual form using media or geomedia,

which is important in this context as representations of spaces always require a reflective attitude [5]. Dewey states that experiences in combination with reflection lead to learning [6], whilst Kerres et al. [7] found almost any digital game can convey experiences that can be evaluated through reflection and thus be used in learning. Publications such as these enable reflection with regards to borders and the importance of this concept in educational processes, as Fromme and Könitz illustrate [8].

This paper examines the influence and role of digital games on students' perceptions and concepts of boundaries, with a focus on which subject-specific concepts digital games that contain boundaries are based on and the understanding by students. Consequently, the discussion of the results outlines strategies for teaching in secondary schools and teacher training.

1.1. Theoretical Framework

The theoretical framework of this work is based on results from political geography, geography learning, media pedagogy and interdisciplinary game studies.

1.1.1. Digital Games and Their Influence on Political-Geographical Knowledge

The use of everyday media plays a central role in the formation of geopolitical spatial images in terms of popular geopolitics [9,10]. (Digital) media fulfils social and symbolic functions, linking both places and meanings [11]. Media are used to negotiate communities, assign values to people and objects, and divide into "we" and "the other". From this Adams [11] concluded that virtual spaces, such as game environments, may not physically exist but, due to their social and communicative functions, can be understood as geographical spaces [11]. This concept is emphasized further by Dittmer [12], who describes popular culture, to which digital games also belong, as media through which geopolitical models, and thus also spatial images and concepts, are communicated in everyday contexts. Schwartz [13] showed that digital games are also perceived as realistic by users in the representation of fantasy scenarios. For example, life and atmosphere in the cities are portrayed in the games players as "as in real life". Schwartz also explained that even supposedly unrealistic scenarios can convey political and geographical concepts. Salter [14], on the other hand, notes that "war games represent a militaristic, masculinistic, Western geopolitical framework of violence" and can thus only convey specific geopolitical perspectives and concepts, whilst Gregory [15] identified that computer games enable a broad public to actively participate in geopolitical phenomena. Digital games are therefore media that depict information but at the same time are places where players can actively act and experience [16]. Bos [17] highlighted that research gaps in terms of considering the spaces and practices in which geopolitical experiences occur in everyday life.

Educational studies support the perspective of political geographers. Digital games as media offer the possibility for "innovative orientation formats and modes of subjectivation" [18] and thus change or enable learning processes. Meta-analyses of studies in the field of computer games research, such as those by Connolly et al. [19] and Boyle et al. [20], show fundamentally positive effects with regard to learning processes in connection with playing computer games. Parallel to the perspective of political geography, games themselves can be understood as (geographical) spaces in which informal learning takes place. However, Fromme et al. [21] state that informal learning in the context of digital games has so far been neglected in Germany in favour of a focus on the potentials of digital games in the context of formalised school education. However, conversely, De Grove et al. [22] found that the context in which games are played has an effect on the learning processes triggered by computer games, and that playing at home (compared to playing at school) offers an intensive learning experience. In this respect, the intended learning outcomes from computer games or their implementation in a formal educational setting does not necessarily seem to be based on whether learning processes take place. Raudonat [23] argues that multilayered negotiation processes and interactions can be observed in games, which can be understood as different facets in the learning process. In this context, Fritz [24] developed a transfer model where computer games are the link between gamers and games, with the process of playing being the interaction between different schemata that are anchored both in

the players and in the games themselves. The author shows that, on the basis of the interaction of such schemes, transfer processes take place on different levels, whereby "a scheme that was originally linked to the medial world is (also) linked to the real world" [24]. The prerequisite for such a transfer of schemata from computer games into the 'real' world is, among other things, the adequacy of the schemata for an everyday world context [24]. Although the results of Fritz [24] are to be taken with caution, since they are based on the self-assessments of the young people who were interviewed and thus only concern consciously perceived transfer processes, there is the possibility that such processes can also be perceived at an implicit level.

1.1.2. Borders (and Territories) as Part of Political Education in Geography Lessons

At this point we will briefly look at the current situation in German geography teaching, in which borders are a central concept [25] in political geography. In geography teaching, borders are relevant both to the discussion of spatial conflicts, to geographical socialisation and the formation of spatial identities. As a result, pupils are expected to be able to grasp spaces as human geographical (sub)systems [2]. This understanding also includes knowledge of boundaries as human constructs and being able to reflect on the real consequences of such social constructions. School education, atlases, history and geography teaching and the media convey dominant territorial knowledge and thinking [26] and thus ultimately legitimise specific territorial ideas, practices and discourses of states. However, borders and territories, both in teaching and in popular representations, and thus also in games, are often depicted as fixed, quasi-natural containers with natural borders in the sense of the "Territorial Trap" [27]. Following this concept, spatial identities are often presented as static, unchanging and essentialist. In the context of spatial concepts of geography teaching in Germany [28], this is referred to as container space. In addition to this initial spatial concept, three further spatial concepts exist in this division: space as a system of situational relationships, space as (sensory) perception and space as social construction. For a comprehensive representation of these concepts, boundaries would have to be considered in terms of these four different concepts of space and boundaries [1]. Consequently, borders should not only be viewed as containers with regards to their location but also from constructivist perspectives as they are common in human geography [29–31]. A focus would have to be placed on practices and communication across spaces and particularly for boundaries. Pupils should learn how borders have different meanings and functions and how these are used. As a result, geography teaching needs to use action-centred approaches [32], which would enable pupils to understand the real consequences of the geopolitical spatial images and constructions included in digital media. Through the mediation of human geography, such as the location of territories and borders, geography teaching is part of "spatial socialization" [29], the process by which people are socialized as members of specific territorially limited spatial units. A component of this socialization are the everyday actions and communications, which occur in relation to spaces, places and the people living in a location, as they take place, for example, in digital games.

2. Materials and Methods

2.1. Research Design

This study was based on qualitative research methods, with the aim of generating a method by which to explore the potential of digital strategy games with a focus on borders. The following research questions were examined:

- What representations of boundaries exist in digital strategy games and what significance do these boundaries have in the context of the game?
- How do players perceive the representation of boundaries in the games studied and how do they reflect on them?

Our approach first aimed to investigate and identify the structure of how boundaries are represented in games. For this purpose, an analysis of selected games was carried out. This analysis

was systematized using the background of spatial and border concepts in geography teaching [1,28] in order to identify the underlying border concepts in the games and the structural elements. Subsequent interviews were conducted with experienced players of these games, which had two objectives: firstly, to collect an understanding of the perceptions of the players, particularly with regards to borders, and secondly, to investigate the extent to which players are able to deal with these representations in a reflective manner. The results of this procedure should then serve to identify whether, and which elements of, the games examined can be used to contribute to a reflected understanding of the representation of boundaries.

2.2. Sample, Data Collection and Data Processing: Games

For the game analysis, games were identified that appeared to be particularly relevant to the topic of borders, which was, in most cases, strategy games, due to the focus on the control of territories and thus boundaries, which are usually a central component of this game genre. The analysis was aimed at the representation of borders and the practices that were possible in the context of these games.

Three current, commercially successful game titles were analysed: Civilization V, Starcraft 2 and Total War: Warhammer. These commercial titles were selected because they are the widely known and played by a large audience. These games are often played intensively, as they are consumed in leisure time, as opposed to through school activities. The working hypothesis is that intensive gaming offers lots of potential for the development of ideas and concepts. The three chosen games were selected because they represent central sub-genres of strategy games, they have an age rating "from 12" and can therefore be acquired and played by the target group of this study without restriction, and they represent the best-selling or most popular titles in their respective sub-genres. This selection covers the subgenres turn-based strategy (Civilization V), combination of turn-based and real-time strategy (Total War: Warhammer) and real-time strategy (Starcraft 2). The games were played during the survey with observations undertaken were kept and significant game scenes (screenshots) taken.

In order to give the reader an idea of the games under investigation, the illustration on the following page (Figure 1) shows a scene from Civilization V. In this game, the player has the opportunity to control and manage a nation from the Stone Age to modern times. The game is turn-based, which means that players move their pieces one after the other and perform other actions. At the end of a game round, a period of time passes, whereby a fictitious world history takes place more or less compressed within a game. At the beginning all players have a single settlement and only through expansion and technical progress the map is revealed, and their own territory grows. The figure (Figure 1) shows an advanced phase of the game. On the left and in the middle, you can see the playing field. On the lower left is the city of Rome, on the right a border runs in a north-south direction between the areas of two players, marked by two lines with shades in the respective player colours. The box at the top right shows the current high score. It becomes clear that in this scenario Rome is clearly leading the list under "Augustus Caesar". Looking at the world map on the lower right, it seems that this is related to the fact that the player has settled and occupied the entire North American continent and thus controls the largest contiguous territory. Points are achieved by the size of the population, the control of mineral resources, the expansion of the territory, military successes/conquests, scientific developments as well as cultural achievements (e.g., the establishment of a world wonder, like the pyramid on the coast in the centre of the figure). A variety of technologies are available to the player and theoretically it is also possible to win through diplomatic channels. Nevertheless, military conflicts can hardly be avoided in the course of this game.

Figure 1. Screenshot from Civilization V.

The next figure shows a scene from Total War: Warhammer. This game differs from Civilization in a fantasy scenario in which different human and other races compete for supremacy on a fictitious continent. Borders, however, are clearly represented as coloured lines in a very similar way. The figure (Figure 2) shows a decision situation in which the player is given the choice to allow an "immigration wave" (with negative effects on public order) or to reject it (which surprisingly has no effect at all).

Figure 2. Screenshot from Total War: Warhammer.

Starcraft 2, the last of the games studied, differs apart from a science fiction scenario in a central point from the other two. In this game, the action takes place in real time, which means that all game parties perform their actions simultaneously, without waiting for the moves, making the game flow faster and games much shorter, and borders are not represented as coloured lines.

2.3. Interviews

A total of eight interviews were conducted and evaluated. The interview partners were aged 17 to 19 and attended secondary schools in North Rhine-Westphalia in Germany (6) or were students at the University of Cologne (2). The interviewees were acquired via social networks and through advertising the study in corresponding player groups and forums, as well as via chats within the chosen study games. Only experienced players with extensive knowledge of the respective games were selected for the study. All respondents were male, as no female participants responded to the advertising for the study, which is in line with the results of the JIM study [3], according to which significantly more boys than girls regularly play digital games. Nevertheless, this study also shows that 43% of girls regularly play digital games. It is not clear to us why we could not win any female interview partners. It is possible that our advertising for the study did not address this group, or that exactly these games are actually played primarily by boys. However, there are no concrete data on this. In order to solve this problem, we will discuss methods in the later discussion, which are also suitable to integrate pupils who are not familiar with such games into the topic. In addition, it should be emphasized that the games examined all have millions of times the sales figures. These are widespread products that are often played. The aim of this selection was to interview players who were already familiar with the games, in order to avoid long familiarization periods, and to interview players who were focused on victory conditions. Three interviews with Civilization players, three interviews with Starcraft 2 players, and two interviews with Total War players were conducted. For the interviews, player games were recorded using the "OBS Recording Studio" software and the guideline-based interviews with phases of "Loud Thinking" [33] were conducted in parallel. The aim was to capture the act of playing as directly as possible and to obtain information from the players about their actions in the game. In addition, this recording served as support for questions during the course of the interview and facilitated the analysis of the interviews. The sound recordings of the interviews were then transcribed and categorized using the MAXQDA software (see Table 1):

Table 1. Overview of interviews.

No.	Age	Gender	Game
1	15	Male	Civilization V
2	16	Male	Civilization V
3	15	Male	Civilization V
4	17	Male	Starcraft 2
5	16	Male	Starcraft 2
6	19	Male	Starcraft 2
7	18	Male	Total War: Warhammer
8	18	Male	Total War: Warhammer

2.4. Data Evaluation and Data Display

2.4.1. Development of the Game Analysis

When analysing the game, the technical concepts were considered first, as these form the basis of the representations of boundaries in digital games. Based on the findings of [34] where a story is simultaneously experienced and a game with complex rules is played, both Ludological and narrative elements of the game were analysed. With this in mind, the games were initially played in detail. Analysis was based on the observations made during the game, which were grouped into theory-based categories and coded, with the classification based on the concept of borders from geography lessons [1]. Central questions were taken from the model of border concepts [1] and adapted for game analysis in

order to determine to what extent technical concepts and the representations in the games were similar. These categories are introduced in Table 2.

Table 2. Categories and Codes.

Category	Codes with Explanations:
Existence of borders and territories at the start of the game	0 = The expansion of one's own borders or territory is mentioned in the game objectives. 1 = At the beginning of the game, the playing field is restricted to a single area, while the rest of the playing field is not visible or covered. 2 = In the game there is a map with given regions and their borders, which can be controlled. 3 = The playing field is designed in such a way that the playing pieces cannot move everywhere, and the players cannot see everything; limitations of the playing world prevent them from moving
Visualization of borders and territories during the game	0 = No visible boundary lines. 1 = Borders are displayed as (dashed) lines on the playing field 2 = Territories and their borders are coloured differently 3 = Territories are distinguishable and delimited from each other by different surfaces. 4 = Fences, walls and similar boundaries mark the area of influence. 5 = Regions and territories have names, and thus distinguish themselves from others. 6 = Fog of War = only your own sphere of influence is permanently visible, other areas are delimited by "fog".
Consequences of border crossings in the game	1 = A border crossing leads (a) immediately to a battle or (b) to a deterioration of relations with the other party up to and including war. 2 = If your own game pieces hit the territory of another game party, this leads to negotiations.
Border practices in the game	1 = fix = erect fences, walls, watchtowers, etc. 2 = control = use of figures and observation of the border to detect crossings. 3 = Actions with the aim of changing the boundary line. 5 = negotiate = all actions with the aim to change the meaning of the border (e.g., in terms of permeability). 6 = Actions which, by naming their own territory, distinguish it from others.

The category "Existence of borders at the beginning of the game" serves to identify the first link between gamers and borders in the digital games. The category "Visualization of boundaries in the game" refers to the visual—not linguistic-textual—representation of boundaries in digital games. This visualization is central insofar as it is an explicit confrontation of the players with boundaries. This is logical as a central experience of boundaries exists in precisely this confrontation [35]. In the category "Consequences and Effects of Crossing Borders" we examine how the crossing of borders affects the game. Border crossings are indispensable in all the games examined in terms of achieving the game's objectives. In order to defeat opposing groups, occupy territories and resources and ultimately win a game, the players are forced to cross borders. The category "border practices in the game" deals with actions that are directly related to borders. The perspective of the investigation refers to the possibilities of the players in dealing with borders.

2.4.2. Interview Analysis and Development of the Category System

To analyse the interviews, they were transcribed and then numbered anonymously. The analysis of the interviews was carried out in two steps. In the first step, the focus was on the perception of the players, and consequently the interview statements of the interviewees were assigned to the category system of game analysis. For this purpose, self-contained interview statements were coded accordingly.

For example, the statement "Yes, so you can see the borders here in your city, at the line." (No. 1) was assigned to the category "visualization in the game" and the code "border line visible". This assignment was based on the explicit naming due to the visibility of the line. The results of this assignment are shown in the results section. The focus here is on the qualitative comparison of the content with the categorized statements and the observations of the researcher during the game analysis.

For the second step of the analysis of the interviews, the statements were examined in the context of the background of the game analysis with the help of the structuring qualitative content analysis [36]. The statements were analysed and interpreted with regard to their content and in relation to the categories of game analysis and their reflectivity [37]. These results were made clear by means of anchor quotes.

3. Results

This section may be divided by subheadings. It should provide a concise and precise description of the experimental results, their interpretation as well as the experimental conclusions that can be drawn.

3.1. Results of the Game Analysis

At this point the results of the game analysis are presented. The analysis categories were used to investigate which border concepts [1] form the basis for the presentation of the games.

The existence of boundaries at the beginning of the game becomes clear through visualisation. Firstly, a visual boundary known as the "Fog of War" is the central boundary in all the games examined. Large parts of the playing field are covered by grey fog. This situation was developed in digital strategy games to compensate for deficiencies in the AI of computer opponents [38]. However, modern, powerful games still use these elements to increase excitement and encourage gamers to expand and explore. Consequently, players are supposed to expand their own territory and increase their influence. Predefined game goals in games such as Total War: Warhammer and Civilization motivate players to expand their territory and conquer certain regions in the Total War example. In this respect, borders are "physical" in nature and form containers. Their identification is particularly aimed at their location and existence.

With regard to the visualization of the playing field, in games such as "Total War" and "Civilization", there are lines on the playing field that clearly mark one's own and foreign spheres of influence and make these boundaries clearer through different colours and planar colourings. In addition, the names of regions and cities in these games make it clear whose sphere of influence they belong to. "Starcraft 2" adds different surfaces to this, meaning some game groupings can only erect buildings on certain surfaces and must first produce and expand them to erect settlements. At the same time, they will be separated from the rest of the environment, and other groups will not be able to build buildings on those surfaces. An aspect that all games have in common is that a "we" or "mine" and a "them" exist and are separated from each other in different ways, even spatially on the playing field. Unlike on the globe, borders exist in many games as coloured lines on the surface (e.g., in Total War: Warhammer or Civilization) and form obvious edges of container spaces. This is logical in the context of the games, because it is important for the players to recognize in which areas they can act in which way, what belongs to their own sphere of influence and what belongs to their opponents. Here, too, the colouring of buildings, game figures and surfaces (e.g., Starcraft 2) can be used to clearly differentiate between "own" and "alien", thus defining containers and groups at the same time.

Two types of consequences of border crossings can be observed in the games examined. This is due to the complexity of the options. "Starcraft 2" and "League of Legends" do not offer any diplomatic options, and a game can only be won by a military confrontation with the opponent. Crossing a border or entering enemy territory is always part of an offensive, warlike action to win the game. In this respect, "Civilization V" is more complex in the way that it is simulated, as there are more options for action available, and the possibility to negotiate exists. However, ultimately, crossing one's own

boundaries remains a central element of the game. Crossing borders triggers an expansion dynamic in all games, which is an integral conceptual aspect in all of these games.

Finally, we consider the practices in dealing with borders. A central action in the games is the construction of border fortifications, which appear in all the games examined, through the erection of such objects as watchtowers and walls. The construction of border fortifications is a central element of all the games examined. In "Starcraft 2" it is also possible to monitor the course of the border by playing figures and thus prevent unwanted border crossings. In all games it is possible to send your own characters across foreign borders, mostly with military intentions, but also, as in "Civilization", to initiate trade or diplomacy. Through diplomacy and negotiations in "Civilization" and "Total War" the permeability and the course of the border can be influenced, but this is always limited for the military game pieces. Migration only takes place in "Total War" in the form of an action card. If the end of the game allows migration, the value for public order decreases. Rejecting the opening of the border, on the other hand, has no consequences and thus contradicts the world outside the game to a large extent.

In all the games examined, it is necessary to expand one's own territory in order to win. This can be done both by conquering enemy territories and by settling uninhabited territories. The control of resources and geopolitical influences are important, which is why much of the action in the game is about expanding your boundaries. This can be compared with political theories such as neorealism in international relations [39,40], which also focuses exclusively on the level of states and ignores other structures such as networks and scales. Agnew [27] criticizes this representation for depicting states as homogeneous entities or containers. The representation of the games largely remains on a single spatial level of contending parties (in "Civilization V" and "Total War: Warhammer" internationally between states (in "Civilization", for example, already by naming the selectable game parties such as "Roman Empire", etc.; in "Starcraft 2" peoples/contending groups in regions) and, with this subcomplex representation, conceals the scale systems and spheres of influence above and below, and their borders. Internal heterogeneities, diversity of opinion and democracy, as they exist in the world outside the game, are masked by these representations. The problem of such abridged representations lies in the fact that these depictions of space and their boundaries are nevertheless important for the formation of (spatial) identities [41,42] and can thus promote exclusion. Consequently, pupils can develop misconceptions due to these games. Internationally operating networks, which are in contrast to the territorial, location-related and scalar container representations of the games, represent an alternative spatial structuring of societies [43], such as international environmental movements, multinational corporations and supra-governmental organizations, and thus largely all processes associated with globalization are not represented in these games. In addition, this also means that relational representations of borders and their influences on location relationships and spatial structure [1] only occur in a simplified way within these games. The organization of border exchanges only plays a role in Civilization V and Total War: Warhammer because it prevents the game from crossing borders directly. The player is always informed that an unauthorized border crossing can lead to war and that there is the possibility of negotiation. However, civil exchange and trade are not taken into account, as on the one hand there is no civil traffic in these games, but on the other hand, trade exists completely independently of geographical conditions as a pure exchange of numbers. In other words, trade has no spatial component in these games and means of transport are not necessary. A typical trade in "Civilization V", for example, amounts to exchanging one unit of iron for 20 gold coins for 30 game rounds. This happens automatically, without any movement on the field. Games that exclusively simulate battles, such as "Starcraft 2", offer no possibilities to negotiate and entering enemy territory can only have the goal of defeating the enemy.

Other spatial concepts and their limits, such as relational influences on the spatial structure, subjective perceptions and specialist constructivist approaches [1], are not explicitly mentioned. The games revolve around the domination of space, whereby the players alone decide and control container spaces within their borders. In the context of the games, for example, it is not beneficial to accept the

opponent's perception as a legitimate point of view. Borders serve the definition of one's own or a foreign sphere of influence.

In summary, all games examined use simplified representations and, in the sense of game design, reduce and focus on specific aspects of boundaries. Borders, for example, have only a very limited meaning beyond their function as the edge of individual space containers [1]. However, this does not mean that boundaries do not fulfil central roles in these games. Borders define spheres of influence. For example, players can only build settlements and buildings, exploit resources or freely move their own game figures within their own sphere of influence. Since the games are also designed for conflicts with other game parties, boundaries also provide the opportunity to limit enemy movements and secure individual interests. Games of this kind would not function without the existence of an opponent that has their own boundaries. Therefore, perceptions of boundaries play a subordinate role. This concept relates to the basic premise of the games that the player always takes a quasi-godlike position and makes all decisions alone. The representation remains on the scale of the states and does not allow any other views than those of the container representation, in which the fate of a number of game pieces is controlled by a player. In this respect, players can only regard borders as limitations of their own or foreign sphere of influence. This makes sense in the context of the game objectives, as boundaries serve to secure and enlarge one's own sphere of influence and thus ultimately defeat the opponent(s). While in "Starcraft 2" this always means conquering enemy territory or destroying enemy pieces, in "Civilization V" this can also happen through economic superiority. However, in this case, the player must first expand their boundaries as much as possible in order to have sufficient influence and access to resources. Furthermore, the social construction of borders does not play a role, since they are not revealed by demarcation within groups but are instead determined by game design, and their actual permanent reconstruction processes [29,31] play no role. This can be problematic because it conceals elementary concepts of space and boundaries and can cause misconceptions. However, pupils should be able to question such constructions, explain their real consequences and deal with their media representations in a reflective way [2]. The game analysis alone does not reveal to what extent players can identify their actions as geography-making in a constructivist sense [32] and to what extent they can reflect the (medial) representations. For this reason, the results of the interviews will be examined in the next step.

3.2. Results of the Interview-Analysis

The interview statements are first presented, followed by an in-depth qualitative analysis of central quotations. The first category of game analysis "Existence of boundaries at the beginning of the game" is explained first:

It is at this point that the player's own basis of boundaries, i.e., the only visible area that the player can see in all the games examined from the beginning, is set. This seems to be of central importance for the differentiation of the own from the foreign, as the following interview quote on Starcraft 2 makes clear:

Interviewer: "Are there limits at the beginning of the game?"

No. 5: "Yes, to my base here."

The interviewee refers to the visibility of their base, while the rest of the card remains hidden at the beginning of the game, and the representation directly illustrates to the players what their "own" is in the game. However, predefined cards with defined cities and regions at the beginning of the game only exist in one of the games examined (Total War).

"Physical limitations", i.e., the simulation of physical-geographical obstacles, such as oceans or mountains, on the map were only named on demand. This is thought to be due to the names of these features not necessarily being important in the beginning of the game.

Five codes were used in the context of "visualizing boundaries in the game". The code "Names" from the game analysis was not assigned or not named. This could be related to the fact that "Names"

again did not appear in every game, and the names of areas and cities as they appear in "Total War" may not have been perceived as part of the boundaries. The "Fog of War" that limits players' view may not have been directly considered a boundary, similar to the "physical limits" in the previous category.

"Building boundaries" represent a clear visual demarcation, as can be seen from this quote from Civilization:

Interviewer: "Where do boundaries become visible in the game?"

No. 1: "So you can build walls for protection. City walls, but they're really just around the city. Or the Chinese Wall, it's really visible at your border."

"Coloured areas" are an element that appears in the titles "Civilization" and "Total War":

Interviewer: "What's with the colours?"

No. 7: "Well, the border itself has no colour, it just has this colour marking of your nation and this transparent shimmer."

The player connects coloured markings (nations in the game each have a unique colour) with their own area or nation. The last two codes refer to visible (Civilization, Total War) or invisible border lines (Starcraft 2). The "visible border lines" can have different meanings during the game, as this statement from Civilization shows:

No. 3: "This dotted line means that it is not from a civilization but from a city-state".

This statement shows that, although it makes sense in the context of the game, civilizations are parties that can be played by the player, while city states are controlled exclusively by the computer. However, in reality, no distinction is made between city states and civilizations. This would be a good starting point for reflection on the rules and elements of the game and the meaningfulness of representations of real phenomena in the game world.

"Non-visible borderlines" are regarded as realistic representations in the games, as this example from Starcraft 2 shows:

No. 6: "So in the real world, boundaries in the real world, in connection with the game, in both the boundaries are not directly visible, so I just don't know exactly where the boundary of my territory is. You don't actually see them in real life either, so highest with signs but not if I'm in Germany or Holland."

The interviewee comes from Germany, and the "borders in the real world", which are not directly visible, refer to borders within the Schengen area in the EU. The statement of this player shows that the representation from the game is assumed to be realistic. The experience from "real life", which without hints such as "signs" it is not clear where exactly one's own ends, is related to the game representation. It becomes clear that this representation from a game with science fiction themes can also be perceived as realistic.

In terms of how the players perceive the consequences of crossing borders, the "consequences of border crossings" make it clear that conflict and war play a central role in the players' point of view. For this reason, this code is considered first. In a game such as Civilization, in which there is initially no war between the game parties, approaching the border is already a possible "reason for war":

Interviewer: "So sometimes you also use that when you really want to start a war with someone in order to provoke them?"

No. 3: "What I mostly do is, I gather my troops at his border and then the person comes to me, asks, why are you doing this? And then I can either choose, yes, my troops just want to pass by. [. . .]. And then there are things, you've found out my plan, and then I can go straight into his territory."

From this player's statements it becomes clear that the game is ready to accept troop concentrations at the border as a potential reason for war and cause the opposing game party to react. The player can then choose whether he really wants to cross the border and start a war. It is interesting to note that this player actually uses this method to start wars, and ultimately to expand his boundaries.

However, the risk of war also leads to opposing strategies, as this statement from another player shows:

> No. 1: "So if you have a well-developed area here, you think I'll do something else now. But now you have another strong nation next to you. If you think yes, okay, then I start to explore the sea. If you find islands, you'll expand your area like this. Of course, you can now compare that with the colonial period, in which Europe was already relatively densely populated."

This player avoids a war with a neighbouring nation and instead explores in other directions beyond his borders in order to expand his territory into uninhabited areas. He also draws comparisons with real developments and compares his own approach with the colonial aspirations of the European nations. His own actions are thus reflected in the mirror of historical events. The category border practices were mostly frequently commented on, which is thought to be partly due to the fact that the players constantly commented on their actions and practices within the framework out loud during the games. This offers the opportunity to examine the actions and the degree of reflection within this category in a particularly intensive way. Certain codes from the game analysis could not be assigned to the statements of the players. This concerns, among other things, "identification/naming".

"Expand" is by far the most commonly used code. In all the games examined, a considerable part of the game time was devoted to expanding one's own sphere of influence. This is made clear by these statements:

> No. 2: "I mean, in the beginning, I suppose, was it also the case that one tried to take as much as possible for oneself. At the first beginnings of countries. Therefore, I mean, in itself it makes sense for the nation at the beginning to spread as far as possible."

> No. 8: "I mean, in every respect it has a practical advantage to extend borders and claim more, because more resources, more power. You have to become practically bigger."

These two statements from players of Civilization and Total War, respectively, also make it clear that "expansion" is central to the game and ultimately provides the benefits needed to win. Of particular interest here is the consideration in the statements of No. 2 and No. 8 in reflection. No. 2 makes a reference to developments he assumed to be real by pointing out that nations and groups have repeatedly tried to take possession of as much land as possible. It also becomes clear that the player directly understands his own sphere of influence as a nation and can draw corresponding parallels. Consequently, the implicit effect is to create a clear demarcation by means of coloured lines. At the same time, the assumed effect of the "Territorial Trap" [27] also works in the game and the expansion logic of the container space is considered to be meaningful. No. 8 refers to the pressure of the game design. However, this reflection remains limited to the compulsion to act in the sense of the game goals. For example, no alternative actions are addressed, and the comparisons with development in reality, especially in the statement of No.2, remains limited to equating action logic within the game and the real phenomena.

The code "Controlling" deals with the question of controlling one's own borders and territory. One player emphasized the importance of this practice as follows:

> No. 5: "Now I can, for example, here, that is also very important. There is also this sensor tower here. It shows the locations of enemy towers and the radius you can see. That's also part of this map control."

With "Map-Control", this player describes the control of his own area and the overview of the playing field in order to prevent the opponent from making undetected moves. However, this code played a minor role as this practice was not required in the turn-based games Civilization and Total War, only in the dynamic real-time gameplay of Starcraft 2.

The "fixing" of one's own boundaries was named in Starcraft 2 and Civilization. In both games, players took advantage of the opportunity to secure their own territory and its borders and restrict the movement of their opponents.

> No. 2: "And it's also easier to defend, because you're in your territory. In theory, you can heal the damage that happens to you. But those who attack have to move from their borders to your borders first. That's why you have the advantage of having a city wall. It can shoot at your opponent, I say now".

> No. 4: "As a Terran, it's very interesting to build up this access first".

It is interesting to note that basically all codes examined in the context of the category "border practices" are in the context of conflicts with opposing gambling parties. Players' actions are primarily aimed at winning the game, and this can only be achieved by expanding their own boundaries.

3.3. Reflection and Comparison of Boundaries Inside and Outside the Game

If we look at the statements of the players regarding the comparison of boundaries within and outside the games, it becomes clear that the statements of the interviewees were, to a large extent, related to their prior individual knowledge. Player No. 1, for example, drew parallels between playing "Civilization V" and European colonial history, religious spread and the conflict over the Crimea. He explained the expansion of borders with the power-political advantage of an enlarged sphere of influence, as had happened in the case of the annexation of the Crimea. The interpretation of representations in the game is thus made by comparisons with one's own previous knowledge and with actions outside the game, such as the annexation of Crimea being compared with the victory conditions of the game (increasing one's own influence offers advantages). The findings from the game analysis, in particular that the games primarily show a representation of boundaries in the sense of containers, are repeated here and are also perceived by players. The references to imperialist actions, colonial times and neorealistic, geopolitical logics also become very clear here. Player No. 5 compared the scenes from Starcraft 2 with the First World War. He emphasized the importance of space control and as strong a spread as possible. The relation to container borders [1] also becomes clear; Player No. 3 identified realistic representations of Russia and Germany in "Civilization V":

> "For example, the Germans, they have an advantage in the economy. Makes sense [. . .] For example, Russia has such an advantage. That if the one city bets that the two terrain fields get directly in addition. Which makes sense because Russia is huge."

What is particularly interesting about this comparison is that the interviewee describes the game representations as realistic and thus logical. As described previously, an observation from the game is applied to reality and described as occurring in the world outside the game. Nevertheless, the players also recognize differences. The statements of player No. 5 make clear that the players may well have limitations within the game, for example if they cannot negotiate the course of borders but can only fight. However, with regard to the reflectivity on the game design this statement of a Starcraft player is particularly pertinent:

> No. 5: "I wouldn't start a war right now. But in the game, I can't communicate with the enemy and try to find other ways. So, because in real life there are other ways to deal with the other and talk about it, which is a big difference between game and reality."

This statement clearly refers to the player's perceived limited options for action compared to reality. The statement makes it clear that it is not only necessary to grow in order to achieve the game's

goals but that the game design itself does not provide other options available in reality, such as the communicative negotiation of conflicts. This would offer starting points for discussion and reflection. This points to a certain understanding of the constructive nature of territories and borders, because the world outside the game recognizes the possibility of negotiation. On the other hand, discussions about border demarcations are not the dominant discourse today when it comes to borders. In fact, current debates about borders revolve much more around their functions and meanings, in terms of for whom they remain closed and for whom or what they are open. In this respect, the representations conveyed by games could be problematic because they do not address real problems but rather refer to discourses that played a role in the times of colonies and imperialism. The same concepts also emerged in other conversations, especially in the context of warfare. The players can see that the focus on war to spread and win the games would not work in reality and that there are other possibilities, such as negotiation.

In summary, the aspect of the reference to reality can be divided into two areas. On one hand, there are statements that describe that it is a game and thus refers to the fact that actions and representations within the framework of game logic make sense. A reflection that goes beyond this are those few statements that compare this game logic with reality and thereby determine similarities and important differences. It also becomes clear that the games focus on container boundaries in their representation and thus have little in common with current geopolitical discourses on the functions of boundaries.

4. Discussion

The aim of the study was to analyse the potentials and challenges of digital strategy games for addressing borders in geography teaching. At this point, we discuss the results of game analysis and interviews. In doing so, we consider game analysis and interview results in terms of which representations of boundaries exist in the games studied, which elements play a role in the representation of boundaries in the games, how players perceive these boundaries in the games and how they reflect on these representations. Subsequently, we will discuss the extent to which these insights can be used didactically, and which approaches are suitable for teaching the subject of boundaries and their media presentation in digital strategy games. The statement that "our main experience of them [borders] is by confronting or crossing them" [35] can be confirmed for this study. In particular, the visualizations and the work with visual boundaries (lines, colours, surfaces, visible and invisible areas) serve to identify one's own spheres of influence and the boundaries of strangers and are recognized by the players in this form as well. The idea that fantasy or science fiction scenarios can also contain realistic elements for gamers [13] is confirmed, since the interview results clearly show that gamers compare gaming experiences with phenomena in the real world and sometimes equate them with them. For the gamers, fiction is especially the depiction of combat actions and the focus on warfare and expansion to solve problems and win games. The relationship between the player and the game, as established by Fritz [24], and the transfer of both prior knowledge about the world outside the game and experience from the game were observed in the interviews, as clear references were drawn between the worlds inside and outside the game. This is particularly evident in those statements that were made before the interview implied questions in this direction. It cannot be excluded that later statements were made in this direction due to the interviewer's questions. What is particularly interesting is that all the titles examined have extending one's own boundaries as a central element of playing, which is ultimately crucial to winning a game. In this respect, the game designs are comparable with neorealist theories of international relations [39,40], since the logic of the games calls for the expansion of one's own boundaries. The representations of the games and the approaches of these theories are very similar in their focus on a single relevant scale at which homogeneous parties (in theory states, in games states/people, etc.) are in conflict with each other. It can be assumed that the theories form the basis of the representations of the games or their basic assumptions.

In this respect, the game representations must also be viewed critically from a similar point of view and, in the sense of a reflected handling of these media, require a stronger consideration of the constructive character of borders and territories [29,31]. Here, especially with a view towards the

use of the games in the context of formal learning settings, an important starting point would be to provide deeper reflection on the discourses underlying the games and the possibility of dealing with the medium. What is particularly interesting here is to whether the representations are contemporary, and whether the points of contention, conflicts and discourses about borders in the games (focused on processes, control and power) coincide with those of today (meaning, function, permeability). These discrepancies make it possible to refer to the fact that the representations in the games are largely focused on container spaces and borders and thus do not address situational relationships, perceptual spaces and spaces as social constructions. For the interviewees, the representation of the game world in the context of the game goals was meaningful. It would therefore be important to engage in reflection on two levels and, on the one hand, to question the game logic and how it can be recognized in contrast to the world outside the game. The survey presented already shows approaches that the strong focus on warlike action is perceived by the players as meaningful in the game but unrealistic in reality when it comes to changing borders and territories. However, it would be more useful to ask more questions about the functions of borders and to use different border concepts and the associated functions [1]. Pupils could then use these functions to investigate whether borders serve to mark and control container spaces (container border), whether they influence patterns of connection and exchange (border in a system of situation relationships), whether they serve their own positioning, identity formation and location (border in sensory perception) or whether they go hand in hand with social and communicative practices of inclusion and exclusion (border as social construction). This could lead to the constructional character of borders and the associated negotiation processes. On the other hand, the representations of borders within and outside the games could be examined with regard to their similarities and differences. It would make sense to use the concepts of spatial boundaries [1] to examine the representations within the framework of the games and to reflect on them against the background of real spatial concepts. This critical reflection is particularly important because the representation of boundaries and space containers, which describes the respective groups as internally homogeneous, ignores internal differences and influences on other scale levels. However, monochrome and consequently unambiguous boundary lines, which are unique for each game party, strengthen the container perspective. The critique of neorealist theory as formulated by Agnew [27] in the form of the "territorial trap" thus also applies to the representation in the digital strategy games studied. Here, the games examined do not depict the complex interdependencies and relationships spanning different scale levels that influence decisions in reality and therefore at the same time offer potential for questioning such representations.

This leads us to application in the classroom and in the training of teachers. For this, we first want to consider the use in teaching at secondary schools. The games under consideration are entertainment media that show simplified representations of boundaries, some of which are not accompanied by current research discourses. Nevertheless, they offer potential for teaching, because these games represent and visualize political-spatial developments in time-lapse and in simplified form. In these games, the players can observe how borders change over time, how a growth in territorial influence goes hand in hand with an increase in power, and precisely because the games make this very clear through colour design, etc., how borders can constitute one's own and the foreign, and consequently, what influence borders have in the formation of spatial identities. Accordingly, there would be potential at this point to promote this competence ("ability to explain the consequences of social and political spatial constructions"), which is required, for example, in German educational standards for geography [2]. If these representations are reflected in an appropriate way, the students are given the opportunity to question such everyday representations against the backdrop of the subject's theoretical background. The following aspects should be considered:

As a starting point prior knowledge of borders should first be asked (Personal experiences in relation to borders lead to very different prior knowledge, especially in heterogeneous class groups, which is shaped by travel, etc. [44]). Pupils should then become familiar with the content of different spatial concepts [28] or border concepts [1]. In this context, particular emphasis should be placed

on highlighting the different functions of borders. This includes the fact that borders have different functions and effects depending on individual position, origin, scale, etc., and a special significance for the communicative and social construction of spaces and spatial identities. In addition, interdisciplinary references to historical concepts such as imperialism and colonialism or political concepts such as neorealist approaches to international relations are advantageous. Pupils should then analyse the games with this background knowledge in order to be able to question everyday media representations. The analysis can basically be carried out in three steps:

1. In the first step pupils should first look at and describe the representations of borders. The key questions for the students are: How are boundaries represented in the game? Which functions have boundaries in the game? This can be done, for example, by forming groups in which a student who knows the games starts a session while the rest of the group makes observations. If no player is part of the class, let's-play-videos or screenshots can be used as replacements.

2. In the second step a comparison should take place against the background of the theoretical patterns of interpretation (spatial, border concepts, etc.) These observations and descriptions should be compared with the theoretical background introduced before the analysis. For the students, this would mean investigating where the representations of boundaries in the games coincide with the collected prior knowledge and where differences exist. As part of this comparison, students should answer the following key questions: Which representations of boundaries as well as their characteristics and functions, which we discussed at the beginning, can be found in the games? And which ones cannot be found? A simple, relatively obvious example would be that boundaries on the Earth's surface are not to be seen as coloured lines. The consequences would then have to be reflected in the following step.

3. In the concluding third step, the reasons (game design, etc.) for the for these representations, for parallels and differences between game world and real earth surface can be discussed with the students in order to be able to classify such representations appropriately in the future. This section is about guiding students to a critical reflection of what is portrayed. The following guiding questions can serve this purpose: What is realistic and what is not about the representations of boundaries that you have studied? What can be the reasons why some characteristics and functions of boundaries are not represented? The goal in this phase should be to convey to the students that even a popular medium like a video game can transport geopolitical meanings, but that these are often limited by game design and not easily transferable to reality.

A fundamental problem in this context is the availability of the games, because if not all students play these games, it cannot be expected that all students will purchase them. There are two possible solutions: Firstly, if there are students in the class who own these games, groups can be formed in which one student is an expert on the game and the others observers; secondly, if there are no experienced students in the class, the Internet offers a large number of Let's Play videos on platforms such as YouTube, in which these games are presented. Alternatively, screenshots are easily available via google and other search engines, but with the restriction that images of course do not reproduce any game plot, and appropriate knowledge of the game is necessary in order to establish the connections and recreate game actions. Both offer the possibility to perform the educational analysis as described above.

For the training of teachers several aspects are conceivable: Firstly, it is quite possible to carry out the same analysis steps as for the school lessons in seminars at the beginning of the study in order to arouse a sensitivity for these topics; secondly, also more experienced teachers should be familiarized with the possibilities and challenges of new media in further training meetings. The aim of such sensitization should be to make it clear that popular culture as a component of popular geopolitics [9] transports meanings and shapes everyday ideas. The understanding of such shaped learning perspectives is crucial in order to use learning methods and tools that can reach students and impart knowledge and concepts. Despite their limitations, digital games clearly offer a potential here, since on the one hand, they are widespread and already known, and on the other hand, in contrast to

other media, they offer the possibility to let players act on their own [16], to move borders, to fix them or to control them. This offers a multitude of possibilities to lead to a critical reflection of these actions as well as the underlying representations, as we have presented it exemplarily.

5. Conclusions

This study confirms that digital strategy games represent boundaries in a variety of ways but in contrast to reality these borders are limited and tailored to game design. Borders in the games make the "own" and the "foreign" clear to the player in a simple way, often in clear colours, and thus show him his sphere of influence. In addition, they show how border lines can change in time-lapse, how territorial expansion can lead to a gain in influence and power and, assuming appropriate reflection and prior knowledge, how spatial identity and the division into "one's own" and "foreign" can be created. This can be criticized especially from the point of view of a critical political geography [1,27]. However, players accept these representations as comparable to reality and refer concepts from the games to real examples. In some cases, they can judge representations in a different way. This seems to be strongly related to individual prior knowledge about conflicts over borders and territories. In particular, knowledge about history and spatial conflicts plays a central role, for example, when expansions within the game are referred to in the context of the Crimea by Russia.

We see the following initial starting points for dealing with this phenomenon in the context of geography teaching. Students regularly play various commercial games. As we have shown, certain representations of boundaries are assumed to be realistic and are set in relation to real phenomena (e.g., colonization), while at the same time, often a lack of comprehensive reflection was observed. In addition, the depictions of the games are accompanied by a focus on container boundaries. Current discourses about the meaning of borders remain hidden. Possible misconceptions and limitations associated with this could be counteracted by intensifying the promotion of a reflective approach to strategy games and a sensitization to their influence on the construction of worldviews. Games certainly offer potential as a resource for teaching [45,46] but must always be accompanied and reflected upon. In the discussion of our results, we have presented an approach that makes it possible to use them in teaching and that focuses on precisely this reflection.

For the development of learning games, the potential of games in terms of knowledge acquisition and understanding of content [19] is also interesting in terms of experience of boundaries. The representations of borders as constituent parts of container spaces and the associated logics of possession, belonging and demarcation are not sufficient to generate experience and understanding for a globalized world. In this respect, the designs, the representations and above all the objectives of the games examined here can only be used with great effort. Suitable learning games should ask questions about functions, effects and the construction of boundaries and encourage players to reflect. Regarding the formal context, the media pedagogical support and media pedagogical professionalisation of teachers is also an important aspect for exploiting the learning potential of computer games.

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