

Negative Discourse and Emergence of Game Genres

A social networks exploration

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Abstract— The fluidity of game genres can be considered an issue to be solved; however, we propose to look at it as a social value, from a positive and creative perspective. In this study, we analyze emergence of game genres, experimenting with a constructive use of negative discourse from online communities, about the controversial genre of mono-dimensional games (i.e., 1D). Analyzing online conversations, 1D games can be defined as a *non-genre*, since posts about them are almost exclusively negative, referring to it as synonymous of an impossible or meaningless effort. We decided to challenge this attitude towards 1D games, iteratively designing and coding a few 1D games, and then post about them on selected online communities. This exploration of the 1D games-design space was conducted through user centred design and netnography. Our results suggest that 1D games can be recognized as fun and challenging, from the perspective of both players and game designers.

Keywords- netnography; game genre exploration; game design.

I. INTRODUCTION

Users of online forums sometimes start a conversation, for fun, about a particular concept or topic, as quintessentially meaningless. In some game development forums and online articles the idea of a 1 dimensional game has often been discussed as evidently silly, possibly useless or just clearly impossible. However, a few 1D games exist and have received positive reviews. Therefore, it was decided to conduct an investigation on 1D games, as example of emergent games genre, through the method of netnography, a form of ethnography applied to online communities, combined with user centred design (UCD) [1] [2] [16].

The initial survey that we conducted, involving online game development communities and online magazines, convinced us that 1D games might be more than just an evident impossibility, and that we might instead be witnessing the early stages of gestation of a game genre: the moment before a *non-genre* becomes an actual socially recognized class of games.

In order to discuss 1D games we have to investigate more closely what could a mono-dimensional game be like. Moreover, we need to find out whether a 1D game would actually be playable, engaging and if the 1D game space (i.e., the *design space* defined by all the possible 1D games) allows enough room for game developers to be creative.

In the next sub-sections, the motivation and related work are presented (A and B). In Section II the notion of negative discourse and non-genre are introduced, and then in Section III the method followed to conduct the study is presented. Section IV presents the 1D games we designed and in V data from the netnographic fieldwork. Finally in Section VI the outcome from the study is discussed and in VII discussion and future work.

A. Motivation

In order to explore how game genres emerge, intended as fluid social values, this study focuses on 1D games, approximately defined as a game that uses a single line of pixels (vertical or horizontal) as visualization. Working with such a limitation is a challenge, but there is a purity and simplicity in it that we find fascinating.

The emergence of one button games [4] as genre, might represent a similar case to 1D games. It was defined less than a decade ago [4], and perhaps the idea of a game with a single button, as its user interface, must have sounded useless and silly at first. The emergence of one button games seems to have started out as a technical challenge, but nowadays these games are acknowledged as a proper genre by many game developers (especially occasional and indie ones). Particular interest has been expressed by the disabled online community, that quickly adopted one button games and even encouraged developers to create more of this kind of games, to empower disabled players [17]. The recent diffusion of touch-sensitive devices gives even more relevance to the single-button concept, as exemplified by the many tapping-games in the android and iPhone market. There might have been single button games before the [4] article formalized them, but making the idea explicit, and discussing technical issues and aesthetic potentials,

generated discussion and game designs, ultimately establishing one button games as a proper game genre.

This need of technical artefacts as well as social (online) discussion is central also in our attempt to assess the potential of 1D games: we decided in fact to poke at the online communities, and challenge their negative attitude towards the 1D non-genre. For that, we developed simple online games, using free and easy-to-use technologies such as javascript and HTML5 canvas, while keeping a discourse open with players, other developers and game designers. To explore the 1D games design space, we started by re-designing classic 2D games so they could be playable and recognizably related to the original game, even with only a 1D visualization. We call this redesign process *flattening*. Keeping a game recognizable after flattening it, requires to find out what is the spirit or the identity of that game; this identity should have to do with how the players feel, think and interact with the game itself. Flattening a game like Tetris [18] for instance, should result in a 1D game that, when players play it, brings to mind the classic 2D Tetris. Our exploration is therefore centered on the player's perception of games, and on the artistic expressivity that 1D games might offer as a medium for game design.

B. Related work-The social dimension of game genre

In this paper, we investigate the emergence of game genre, in relation to online communities, composed by players and designers. The social essence of ontology and the role of social networks have been discussed in relation to different fields, such as recommendation for academic conferences [5] and a web-based social bookmarking tool called del.icio.us [6].

According to Mika [6], the notion of ontology as an engineering artefact, is too simplistic, as it ignores the social aspect of ontology. Hence the traditional bipartite model for ontologies, based on concepts and instances, has been expanded with the third dimension of actors. The goal of this model is to discuss the emergence of ontologies, intended as folksonomies, which demand for social presence to be created and maintained [6].

Looking into current literature in the field of game genres, it seems that a debate has emerged in relation to the value of clustering games into genres and also to the emergence of game genres [7]. Games can be analyzed as both design objects and emergent culture [7][8], tokens in public conversations of broader societal issues within contemporary offline society [7]. In this sense, studying games through the lens of online communities can contribute to achieve a deeper understanding of contemporary culture and related social dynamics. However, when it comes to game genres, there seems to be a tendency to categorize games in relation to the dichotomy of *ludology*, the study of games as a system of rules [7] and *narratology*, the study of games as texts [7][9]. On the other hand, the

tendency to classify games into market-based categories is seen as hiding the essence and meaning of games, as a new medium. In fact it seems that the many existing game categories are not based on the essence of games per se, but are based on previous media, as a consequence, a cohesive discussion of games as a new media, seems to be missing [9]. This situation seems to be originated, by the tendency to classify games in an uncritical way, based on their different representational strategies and not on other common features. Apperly [9] focuses his analysis on four genres:

- *Simulation*, games that simulate activities such as sports, flying and driving, or social dynamics in relation to towns or other small communities.
- *Strategy*, divided into real time or turn based, they have a similar aesthetics, with a god's eye view over the scene and photorealistic visualization.
- *Action*, divided into 1st person shooter, in which the screen represents the player's own view, and 3rd person, in which the player interacts through an avatar.
- *Role-Play or Adventure*, games inspired by the literary genre of fantasy.

All these genres are based upon visualizations, preexisting media and other leisure activities, leading to a fragmented analysis of games. On the other hand, interactivity, intended as the way a game should be played, is a common non-representative characteristic, which determines players' experience, is seen as a more promising framework [9].

A similar view is shared by Schell [8], who claims that games are *designed experience*, characterized by different forms of interaction. However, in [8] game genres are seen as a fluid, continually changing phenomenon, while the basic principles of game design are based upon human psychology, which is regarded as stable and more reliable set of knowledge, enabling designers to master all the different genres and even invent new ones.

This ever-changing character of game genre is also acknowledged by Arseneault [10], in his study about the emergence and evolution of game genres. Game genres are discussed here as a complex and incoherent notion, as they can be constructed based on different characteristics of games, and in some cases what is considered a genre by someone, is seen as a sub-genre, or "flavor", or even another medium [10]. This difficulty in creating coherent genres is an issue not only in relation to games, but with the very concept of *genre* itself. Interestingly, Arseneault quotes Apperly [9] in saying that he agrees on the genre issue, but he would conclude that there is no suitable solution. He then proposes the concept of the *Great Genre Illusion*, according to which genre is an umbrella word, grouping together disparate things with little relations to each other [10].

Connecting emerging perspectives on the relation between ontology and social networks, this study aims at

analyzing the emergence of new game genres, intended as social values determined by a community. Moreover, the fluidity of genres is seen as an opportunity for innovation, providing new design inspirations and adapting to emerging needs.

II. NEGATIVE DISCOURSE AND NON-GENRE

According to our study, the genre of 1D games is emerging as a meaningless and ludicrous concept, as a consequence there are very few 1D games and most of them are a mockery of the concept itself. Ironically, the negative discourse about 1D games is based on reviews of existing 1D games. Examples could be Tetris 1D [19], where the player always wins, since the only Tetris piece always falls at the right place and gives points. The author seems to be making fun of the fact that in 1D no 2D rotations are possible, leaving no room for the kind of gameplay typical of the classic 2D Tetris.

Another 1D game is Wolfenstein 1D [20], meant mostly as a tribute to the Wolfenstein 3D game (developed by id Software and published by Apogee Software in 1992). Players who know the original game should be able to move around in the 1D version, and enjoy trying to understand what happens in the over-simplified rendering of the original 3D game. Interestingly, having 3 dimensions is a very central element for Wolfenstein 3D, which is usually considered the game that started 3D first-person gaming on PCs, back in the early 1990s. In this sense, the re-design of this game is a meaningful experiment, especially for players of the original game, and provides a sense of nostalgia as well as fun. To reconnect the 1D game to its 3D original, sounds and color theme from the original game are kept.

There are, however, a few actual 1D games, which are often not even explicitly presented as mono-dimensional. Among the most interesting: Z-rox [20], Line [21] and Gauge [22] for iPhone. Z-rox is a game in only 1 dimension, in the sense described by Flatland [11], where a bi-dimensional shape (a character in this game) crosses a line, and the player has to guess which character it was, just by observing its 1D projection. The authors of the game Line talk about exploring the possibility of a one-dimensional shooter game; they decided to develop their game as a collection of mini-games, with minimalistic graphics and using mostly grays. The comments on the forum that followed the post about line are generally positive. Finally, Gauge is a commercial game for iPhone where the player tap on a single button (i.e., the entire screen) to control a horizontal gauge that changes size. The closer the gauge gets to the edge of the screen, the more points the player gets, but if the gauge exceeds the screen the player loses. While this game is clearly mono-dimensional, nothing about its 1D essence is explicitly written in its description. In this sense, the existence of such games confirm that a 1D genre is in the process of its definition and still in need to be acknowledged by the developer community.

III. METHOD

Based on our first encounter with the concept of 1D games, it was decided to conduct our investigation, through the method of netnography (form of ethnography applied to online communities [1] [2]) in combination with user centred design. Netnography is broadly applied within the marketing field, as it allows to conduct exploratory studies in an unobtrusive way [1], getting in touch with a large number of users. The procedure of applying netnography to a particular study has been formalized according to traditional ethnography. Hence according to Kozinets [1], netnography requires four essential steps, which can be reconducted to common ethnographic practice: 1. cultural entrée, 2. gathering and analysing data, 3. ensuring trustworthy interpretation, 4. conducting ethical research [1] [2].

The first step requires to identify particular online forums, based upon the product or service to be investigated and the "specific research questions" [1]. Moreover, in order to gain rich data, the communities of interest should have exchanges on a focused segment or topic, high rate of posting, with detailed and descriptive messages [1]. The researchers can also choose if engaging in pure observations or in participant observations, joining the selected communities as active members [2]. Our study started in the opposite way, since we identified 1D games as an intriguing domain of investigation, after we read comments reported in online forums. Hence, we decided to follow six communities, including Facebook, through which it was possible to expand the basis of our participants, also addressing to people in our network. Hence the author of the games joined two communities of game design, which seem particularly focused on the topic, for participant observations, directly asking feedback on the games.

The second step required by netnography is to copy the conversation exchanges from the Internet and write annotations, regarding observations on a community and its members' interaction and meanings [1]. This step responds to transcriptions of verbal exchanges, in structured methods such as conversation analysis and grounded theory.

Regarding achieving trustworthy interpretations (step 3), netnography is based upon textual discourse, which on the Internet expresses the identity of their authors. In this sense, texts posted online probably represent a "controlled self-image" [1] of the community members, so that it may be more difficult to reason upon their motives. However, this is a risk also in ethnography, in which the focus is to study the behavior expressed by a group of people, and not to analyze the individuals expressing it [1]. Moreover, to provide a solid ground to netnographic data, Kozinets [1] and Seraj [2] suggest to combine other methods, such as in person interviews. In the present study, netnography is combined with user centred design, an approach to design that has become popular in different research communities. UCD is an iterative design method, which prescribes to involve users as informants, since the beginning of the design

process, so to formulate design requirements based on the users' needs [16]. Hence a few prototypes are created and iteratively tested, so to fine tune design requirements and create better prototypes. This approach may include different methods, such as ethnography and interviews, supported by video and conversation analysis. In the present study, we engaged in designing 1D games, based upon the conversations we spotted on the net, the resulting games were then posted on the more focused communities, on Facebook and showed to a group of players from our University. We approached data collection with a "purposive sampling of material" [9], an approach to netnography used in marketing research, according to which noteworthy messages and conversation are selected and interpreted "in terms of a particular sample," [9], hence it is not necessary that the sample is representative of other populations. Our focus was on people interested in games and in exploring their essence, in terms of visualization and experience. Analysis of row data was inspired by grounded theory, as suggested by Seraj [2], so that we went through the conversations, copied on a separated file, and coded them. The aim of this analysis was to identify emerging themes, in relation to how people perceive 1D games and possible design inspirations. Recurring and interesting utterances were transcribed on post its, which were pasted on large sheets of papers, so to represent emergent themes into tangible and visual clusters, as it is common practice in design research [16]. Since the conversations we analyzed were concise and straight to the point, and we did not know exactly what to expect, this method revealed to be effective and well suited for the study. In this way, we were able to gather comments about the playability of our games, on their similarity with the original games, suggestions to improve them and create new ones.

Finally, as there is the possibility of psychological harm in inadequately reporting messages and utterances from online conversations, a researcher is supposed to act correctly with respect to privacy, and informed consent [1]. In respect of the rights of online communities members, it is recommended that researchers reveal their identities and purposes to the communities they follow. They should also be careful when reporting literal quotes, which online represent the individual identity of the members. Taking these recommendations into account, the communities that were followed through participant observations, were informed of this study and affiliation of the researchers. Moreover, in respect of the privacy of the communities, we decided not to report literal quotes from individual members. The data are reported in a descriptive way, in relation to emerging themes, which were identified from the observed conversations and used for the design of our games.

Application of netnography is supposed to require a long time commitment [1] [2], at this point our study is being running for five months, starting from May 2012, when we occasionally encountered conversations regarding 1D

games. Most of our games were developed during the month of July, after the games were shared within the three communities, a systematic netnographic analysis was undertaken. Currently the study is still ongoing, focusing on a deeper reflection about non-genre of 1D games and the creation of new original games.

IV. GAMES

The games were created following a user centred and iterative development approach, inspired by agile development. The main goal with these games was to transpose classical 2D games in 1D, possibly in various different ways, and keep in contact with players, to validate the design as quickly as possible.

All the games are written in javascript, they all use HTML5 canvas for their graphics, and the code is willingly simple and portable, so that the games can run on most browsers and on most WIFI enabled mobile devices. Dropbox was used to distribute our 1D games. In line with the principles of agile development, we had daily code releases, in most of the cases few hours apart, to show and discuss online our games with the players and other developers.

The famous games we decided to flatten in 1D are: Tetris, pinball, Bloxorz [23], Sokoban [24] and Rogue [25]. For each of these games we designed different flattenings, so that different 1D games have been derived from the same original 2D game, and for each 1D game prototype many version have been developed, usually between 3 and 5. All our games are freely available [26].

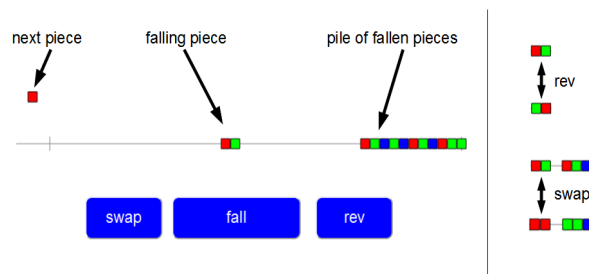


Figure 1 - 1Dminos, our transposition of Tetris onto 1D. As in the classic Tetris, a piece is falling (from left to right) and will join the pile of fallen pieces. The game also shows the next piece that will fall, to help the player better plan a strategy.

Figure 1 shows the game *1Dminos*, our 1D remake of Tetris. To decide how to reduce Tetris pieces and operations from 2D onto 1D, we followed a structuralist approach [3]. First we considered all Tetris pieces (as in figure 2) and the operations available to the user: horizontal translation, and clockwise and counter-clockwise 90 degrees rotation.

Moreover, according to our analysis, the key factors of 2D Tetris are:

- shape, i.e., distribution of squares in 2D to form connected figures,
- horizontal, vertical position and orientation of shapes.

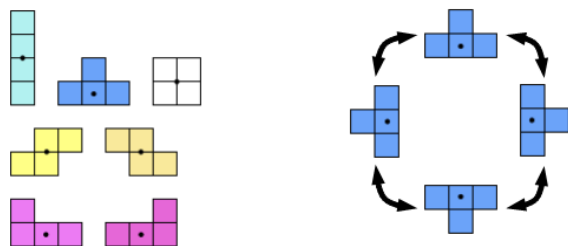


Figure 2 - On the left the basic 2D Tetris pieces. On the right the rotation group defined by the 'T' shape.

The goal of a game can then be expressed in relation to pieces and operations: in Tetris, connecting shapes in particular ways, a kind of *fitting*. Rotation and horizontal translation affect shapes, their fitting might change. The player has to find strategies to control the rotation and position of the one falling shape with respect to the shapes that already fell.

This structuralist analysis helps when defining a flattening of Tetris. We proceeded considering:

- how shapes would be in 1D
- which operations can be defined on the 1D pieces, that "remind of" the original operations; for example 1D operations that define symmetries similar to the rotation groups of the 2D game

Shape is a key factor in Tetris, we decided to represent them as *color patterns*, in 1D. A 1D shape is therefore a sequence of a few squares, each with a specific color; another way to consider a 1D shape is to see it as a string: the falling piece in figure 1, for example, is a red square followed by a green one, so it can be represented by "RedGreen" or simply "RG". As operations we choose **reverse** (reverse of "RGB" is "BGR") and **swap** of the right-most square of the falling piece and the top square on the top of the pile (see figure 1). Now we can rephrase Tetris' main goal in 1D, as string concatenation in particular ways, i.e., a kind of *color fitting*.

Figure 1 also shows the user interface of the 1Dminos game, composed of 3 buttons. The player can also press keys instead of use buttons, but the presence of buttons allows the game to be played on mobile devices that usually don't have a physical keyboard (and a software keyboard is not always available while running javascript applications).

V. CONVERSATION WITH DEVELOPERS AND PLAYERS

Four main themes emerged, from our analysis of online conversation about 1D games:

- non-genre

- essence of what is a 1D game
- experience
- design

These themes were identified analyzing general conversations, which focused around existing games like Super Mario Bros, but also newly developed 1D games. Afterwards the same themes were used as a framework to analyze the feedback we received for our games.

The first theme, non-genre, emerged from comments stating that a 1D game is impossible, this kind of comments inspired us to take the challenge to explore our own 1D games. These comments are of three kinds: either direct critics of the concept of 1D games, or ironic celebrations of a 1D game, which was found dull by the community, and its author, and finally through positive comments in relation to a new game that was found engaging to play. These last kind of comments, express surprise from the part of an individual, who started with a negative utterance about 1D games being nonsensical, but then change her mind, after playing a particular mono-dimensional game.

Other exchanges deal with the essence of what is a 1D game. In this regard two main points of view emerged, and we have coded them into two sub-themes: *geometry* and *view*. The comments clustered in the geometry sub-theme tend to claim that 1D games should respect the basic geometrical principle that a 1D space should be mapped on a computer screen, on a line of pixels. Hence the game should be represented only on one axis, vertical or horizontal, in general there should not be any change in the other axis, otherwise the game is 2D. On the other end, some comments reflect a different understanding of the essence of 1D games, more related to the visual rendering and movement of the character. Hence Super Mario Bros could be seen as a 1D game, as the character moves towards the same line, although he can jump and go underground. Moreover, some individuals commented that a 1D game could be the 1D view of a 2D world, some even recalled the book Flatland [11], a satirical novel that criticizes Victorian society mapping its hierarchical structure into a 2D world. Others accept that a designer can take the freedom to scale a line of pixels to a larger size, for usability purposes, such as facilitating view and understanding of the game. Furthermore, some comments are placed in between the geometry and view themes, a game was said to be 1D, in relation to the feeling provided by the game play, however, they felt the need to specify that the visual rendering of the game is, technically speaking, 2D. This metaphorical understanding of 1D, related to game play and the user experience, was applied to the design of our games.

Regarding the theme of experience, two main sub-themes emerged, which are called appreciation and critics, as the members of the communities we analyzed, expressed positive and negative judgments. On the positive side, these comments overlap with the absurd theme, as they express surprised, praising the game for being interesting and challenging, despite being 1D. Moreover, other comments

praise the authors for being a creative and original thinker, in some cases the authors of such comments said that they would have liked to design a 1D game or that they have tried by themselves before. Similar comments were posted also regarding our games. These comments are particularly interesting as they show that 1D games can be engaging not only from a players' perspective, but also from a developer's one. However, there were several negative comments, stating that these games are "not so fun" or that the game play is vague and not very engaging. A sub-theme, called understanding, seemed to emerge within the category of experience, as several comments stated that these games are too difficult to understand, so that it takes a while before being able to enjoy the game or that it is too easy to die. The same comments appeared also in a positive light, as some individuals enjoyed the fact that they had to find out how to play by themselves, as it was part of the game play.

Finally some members of the forums were able to push further their critics or appreciation, providing interesting design guidelines to the designers. Most of these guidelines are aimed at supporting the player in understanding the game, so that tutorials or menus, explaining the function of the game features, were suggested. In other cases, given the difficulty of the game play, it was suggested to implement a button that allowed the player to start from the beginning of the level they were playing and not from the first level. Since these games occupy a little portion of the screen, some members suggested that they could be interesting apps for mobile platforms, such as smart phones and Nintendo DS. Other purists instead advised the authors, to make their metaphorical 1D game into a real 1D game, redesigning it with 1 line of pixels.

All these comments were carefully analyzed, as they provided inspiration in exploring what a 1D game can be, hence the same themes were applied as a framework to analyze the feedback we received for our games.

VI. A PROMISING NON-GENRE

We posted about our games in two online communities and we used Facebook to discuss them with friends, our students, colleagues and acquaintances. The same 4 themes (mentioned in V) also emerged in relation to our own 1D games.

Regarding the non-genre theme, our games elicited surprise. Some comments pointed at the fact that the 1D genre was unknown. Some people in our network, in the University and on Facebook commented that "only we" could have thought of them, in a teasing fashion. Other comments claimed that 1D games are interesting and that designing them does not seem an easy task.

Moreover, some community members expressed perplexity in relation to our definition of 1D; these comments are in between the non-genre and essence themes. From a purely geometrical point of view (and according to

some posts) our games do not use only 1 dimension, i.e., a line of colored points. As visible for instance in figure 1, we have text and buttons in a 2D arrangement, and our points are scaled up to look like colored squares. According to this interpretation it is perhaps impossible to create an actual 1D game since screens are bi-dimensional. Interestingly, other community members answered for us that a 1D game could also be the 1D visualization of a 2D space or that designers are entitled to violate the geometrical definition. Regarding our games, people seem to be divided between a purist *geometrical* stand and a *visualization* one. Among the comments, we also got signaled games that could be classified as 1D, such as Gauge. Some comments even pushed the discussion further, questioning if text-based games could be considered 0D, since no pixels are used to visualize the state of the game. Finally, the domain of 1D games was said to be interesting and that it is surprising how many games could be flattened into a 1D visualization and still be playable. In a community in particular, we got in touch with a member, who after getting acquainted with the idea of 1D games, proposed to consider 1D a game he created years ago, during his studies. Other members claimed that after having realized of the existence of this genre, they will try to design new 1D games.

Under the theme of experience, we received many critical and positive comments. For instance, a few members of the same online community claimed that they tried all the games seem "nice". However, they cannot see many possibilities for 1D games from a commercial point of view, since nowadays we are used to high quality graphics. Another comment was instead positive regarding the experience of playing a 1D game, but concluded that it seems to require too much effort to design a similar game, or that 1D might be too constrictive in terms of ideas and inspirations. Finally a few negative comments reported confusion and difficulty in the game play. Positive comments instead pointed out how inspiring it can be to design a 1D game, as the space limitation may push to think out-of-the-box. On the players' side we received some enthusiastic reviews of our 1Dminos; the comments stated that our game looked more like a puzzle than the original Tetris, therefore it was more engaging. Another interesting post said that our games emphasize how the quality of the graphics is secondary to the game experience, supporting the idea that engaging games do not necessarily need glamorous graphics if the concept behind them is sound. Furthermore, some players enjoyed the difficulty of playing our 1D prototypes, saying that they liked to have to figure out what to do.

More directly usable and interesting comments were design suggestions, which we often took as requirements for the next versions of the prototypes. For instance, we were suggested to try to flatten a Pinball game and see what the outcome could be. Most comments focused instead in suggesting improvements; regarding our 1Dminos for example, different individuals provided interesting ideas,

such as to make two blocks fall at the same time, to have a button to rotate colors in the falling piece, to allow for easier matches, or to alter the color palette because some colors were confusingly similar. Following a player suggestion, in one version of 1Dminos a *randomizing function* was added, with the effect of scrambling the colors of the falling piece. Later this randomization was criticized for making the game too easy, and we removed it from one line of prototypes. Finally it was mentioned that 1D games could work well for devices with small screens, such as tablets and smart phones. Hence, a few of our games have been rewritten with Android and iPhone in mind (e.g., changing the resolution required to see the whole game canvas, or rotating the graphics from horizontal to vertical), and tested by players in our network. In these cases, comments focused mainly on the usability, so that our 1Dminos for instance was said to work fine, but to be difficult, as there was some issues with the size of the buttons. It is clear that the user interface of our 1D games should work with gestures as well as buttons, to better integrate in tablets and mobiles.

VII. DISCUSSION AND CONCLUSION

From the online discussions we had with players and developers, 2 views emerged circa the definition of 1D games: a purist *geometrical* interpretation and a *visualization* one. This lack of a clear and accepted definition might be an integral part of a non-genre, and perhaps the main reason why a new genre will never become established. But it might be also considered an opportunity to innovate by challenging apparently contradictory concepts, as in single-button games. For this reason we decided to develop an inclusive and socially acceptable definition for 1D games, and then use it to create games of this genre. We believe the reactions to our approach show that the game genres are not simply a way to classify existing games, but a tool to stimulate discussion and creative thinking.

Our revised definition of a 1D game is: a game that can be rendered and played, at least in principle, with a single line of pixels, either vertical or horizontal.

In our exploration of 1D games, we worked with 4 rendering styles for 1D games, from simple to complex, and also from literally 1 dimensional towards more artistically free renderings: *black and white*, *colors*, *rich* and *artistic* rendering. With black and white the state of the game can only be presented to the player by a line (vertical or horizontal) of black or white pixels, i.e., the result of rendering the game can be seen as a binary string. The color rendering is the same, but the pixels can be colored. The rich rendering is done using a finite set of icons, all of the same size; when rendering, a number of icons (eventually repeated) are arranged in a vertical (or horizontal) strip. The last rendering style is the artistic one, where freedom is allowed: icons, possibly animated, and of different size and shape can be used, still in a predominantly vertical or

horizontal alignment. Special effects as rotation or wiggling in 2D are allowed, to draw the player's attention or highlight particular situations. The rendering should still result in a linear arrangement, but the line could be twisted in 2D, e.g., icons could be drawn along a sinusoidal line, instead of a straight line as in rich rendering.

According to our definition, even when a 1D game is developed with an artistic rendering, it must be possible to play the game with only a black and white (or color) rendering; it might be necessary to use 2 or more pixels in the color rendering, to properly represent an artistic one, but if it not possible at all or if it makes the game so hard to play to be meaningless, then the game should not be considered 1D.

So far we have flattened adventure and puzzle games, and 2 reusable techniques emerged to map 2D game in 1D, i.e., spatial and temporal mapping. A 2D space can be sliced in horizontal strips, with a single strip perceived while playing (i.e., time acts as extra spatial dimension) or all strips can be visible, in a long line, on the screen (i.e., more space to cope with the loss in dimensionality). The player can stay within a strip by moving left/right, and moving up/down she can jump from strip to strip.

Another general technique, that worked for us, is to perform a structural analysis before designing a flattening of a 2D game. The results of the analysis suggest, but do not dictate, what the flattening should focus on, still leaving plenty of artistic freedom to the 1D game designer.

In conclusion, our artistic and social exploration of the non-genre of 1D games provided us with a working definition of what a 1D game should be. We have also shown that different genres can be flattened (re-conceptualized so to be visualized and played in 1D), and that some games leave room for creative level design (e.g., our Sokoban in 1D).

A typical reaction in developers, who play our 1D games is starting to suggest improvements or new directions to explore. Hence it seems that 1D games, even when fully functional and with refined graphics, are perceived as being at a prototypical stage, usually associated with low-fidelity prototypes [16]. Therefore, these games might be useful as designerly tools to think out-of-the-box when exploring new types of games.

Results from this study suggested also new research directions, such as to study how the presence of constraints forces designers and players to analyze the identity of a game, in relation to "central" elements, operations and dynamics as game identity. Moreover, design of minimalistic games could be used as a challenging task, to support students in learning of game design and development, focusing on the aspects characterizing the essence of a game.

Following an approach similar to [12], we are currently planning to involve a group of students in the co-design a 1D Super Mario game, as part of a participatory game

design event; the flattening of a platform-type game could offer the opportunity to reflect in depth upon typical genre mechanics, game play and visualizations. In this sense, we believe that challenging a non-genre (or an emergent game genre) in participatory design workshops can become a viable tool when teaching game design and game programming.

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