Contextually-Ambiguous Pervasive Games: An Exploratory Study

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ABSTRACT
In this paper a player-centric view is taken to illustrate game rules in terms of definition and validation. Games with externally-defined but internally-validated rules are given the term *contextually-ambiguous* games, and it is suggested that a contemporary definition of pervasiveness in games should accommodate contextual ambiguity. Several pervasive games have displayed elements of this ambiguity, but examples of games which feature this as a core gameplay mechanism are rare. Therefore, four such games are implemented in a case study in order to explore the potential of contextually-ambiguous games. Results are tentative, but offer some insight into potentially popular features and target audiences of such games.

Author Keywords
Games; Internally-Validated; Play; Rules; Ambiguity; Pervasive; Interpretation; Definition; Validation.

INTRODUCTION
According to Mäyrä [6], the nature of games depends on the perspective from which they are approached. Because game studies has emerged from such diverse fields as game theory, psychology, humanities, systems science, social science, there are many different perspectives on what a game actually is. Caillois [1] describes games based on the types of experiences they offer to players, while Salen & Zimmerman [11] describe games from a more formal point of view with regard to what they must contain. Nieuwdorp [9] notes that [pervasive] games are often viewed in terms of the technology or equipment required to play, Suits [12] frames games as self-imposed restrictions which make easy tasks more difficult, whereas Meier (cited in [10]) famously described gameplay as series of "interesting choices".

In this paper a formal systemic view of games will be considered, (following Salen and Zimmerman from *Rules of Play* [11]). One of the fundamental traits of games within this view is that they contain rules that restrict play to particular times, places, actions and people, and to act in accordance with these rules is to play the game. However, in recent years a number of *pervasive games* have been designed in order to blur the spatial, temporal and social aspects of rules [7], in order to make the player feel as if the game is 'pervading' their everyday life, thus making the experience more immersive. These games have been investigated at length, from a variety of perspectives, by research groups such as the iPerG Project (www.pervasive-gaming.org), the Nokia Research Center (http://research.nokia.com), and the University of Nottingham Mixed Reality Lab (www.mrl.nottingham.ac.uk).

While the blurring of the 'actions' aspect of rules is missing from Montola's definition of pervasive games, it could be argued that actions, on closer inspection, could be reduced down to social and/or spatial adjustments made over time. For example, the action of 'throwing a ball' could be reduced to hundreds of spatial-temporal movements, but for the sake of practicality these movements are grouped into a recognisable action because of the likelihood that they will be performed together.

So it would seem that the spatial, temporal, social and action aspects of rules are evident and mutable in pervasive games. Normally in pervasive games, some or all of these aspects are made ambiguous, while the context of the game – the narrative and meaning – remains somewhat fixed. **Therefore, it is proposed here that games could be made to pervade the lives of players in a different way: by blurring the *contextual* aspect of the rules, while keeping the other aspects of the rules fixed. This could be achieved by using ambiguity, such that players can interpret the rules in any way they choose, and could lead to gameplay situations which could be more easily interpreted within the players' everyday lives.** The potential for using ambiguity within design to create thought-provoking products has been already been noted [4], and has been used to great extent in astrological profiling, in order to make a general statement appeal to many people [5].

Ambiguity has also been used to some extent in pervasive games, in order to provide the players with the opportunity to perceive game content where it was

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not explicitly defined. For example, the pervasive Live-Action Role-Playing game *Prosopopeia* [8] was embedded in the city of Stockholm and lasted for 52 consecutive hours, and players were told that the game was always active, such that game content might be experienced anywhere, at any time of the day or night, during this time. At one point this resulted in the players spending a considerable amount of time having a conversation with a man about game-related issues, believing him to be part of the game, but afterwards they could not be sure whether he was really part of the game or if he was just an everyday passer-by. It is unclear from the report whether or not he *was* part of the game, but the interesting point is that either outcome would have been believable to the players.

Similarly, the creators of *Uncle Roy All Around You* [3] told players to "Look for a woman with black hair. She will show you where to go". The ambiguity of the instruction ensured that no matter where the player was standing, it would be likely that somewhere nearby there would be a woman with black hair. In this way, the players could adapt the game to their current situation most of the time.

In the examples of *Prosopopeia* and *Uncle Roy All Around You*, this contextual ambiguity was employed as an adjunct to other pervasive techniques, and it is suggested here that contextual ambiguity in games be explored further, with a view to contributing to Montola's definition of pervasive games.

DEFINING AND VALIDATING RULES

Within this formal, systemic view of games, this interpretive research takes a player-centric view of interactive applications such as games, such that information is viewed from the player's point of view, and transactions happen either between player and the rest of the system, or between system and system. In player-system transactions, information flows back and forth between the player and another entity in the game system. Whether this entity is a referee, computer AI, or another player, depends on the situation. Because of this player-centric stance, transactions initiated by the player (such as in-game decisions, or interpretations of the current success) will be referred to as *internal* for the rest of this paper. Conversely, transactions initiated by the rest of the game system, such as statements of the current game state, will be referred to as *external*.

In light of the above distinction between internal and external transactions, it would seem that individual game rules could be viewed in terms of how they are *defined* and how they are *validated*.

For example, when a child plays in a playground they might invent their own rules as they go, and these rules are subject to change whenever the child feels it is appropriate. For example, one moment they might be imagining they are a superhero with x-ray vision, but if they get bored of this they might suddenly 'develop' the ability to fly. Here, there are rules, but they are extremely flexible, informal, and completely subservient to the whims of the child. This is an example of *internally-defined* rules – the definition of the rules is completely in the hands of the child.

Conversely, when playing a game of *Ludo*, the majority of the rules are defined by the game system, in particular the rulebook. If the player wants to play a game of *Ludo*, they must adhere strictly to the rules given to them, otherwise the game is not *Ludo*. This is an example of *externally-defined* rules – the player has no control over the definition of the rules of the game.

With regard to *validating* the rules, a similar distinction can be made. For example, in the game of soccer, a player might believe that they have scored a goal, having seen the ball cross the opponent's goal line, but if the referee does not agree, the goal does not count. This is known as an *externally-validated* rule – some other element of the game system (in this case, the referee) validates the player's input in order to contribute to the game state.

Conversely, in some games the player is allowed to validate the rules internally. For example, in the street game *SF0* (www.sf0.org) players are given tasks to do, which often have ambiguous instructions so the players are free to interpret the task in whichever way they choose. One particular task instructs the players to go to a street corner, wait for something interesting to happen, and document it. The definition of 'interesting' is left for the player to decide, hence the rule is *internally-validated*.

Figure 1 illustrates the above discussion in terms of a graph. The *x* axis of the graph represents the spectrum of games with regard to the definition of the rules. Because games often contain numerous rules, it would be theoretically possible to place a particular game precisely on the *x* axis based on the relative proportions of internally-defined and externally-defined rules that it contains. Similarly, validation of the rules is illustrated in the *y* axis, so games which feature a higher proportion of externally-validated rules are placed higher on the *y* axis.

The four extremities of Figure 1 are:

- Free play, such as a child acting as a superhero.
- Performance, in which the player's input is internally-defined but externally-validated, such as a musician playing freeform jazz in a music club.

- Zero-player / ambient games, such as *Ambient Quest* [2] and *Progress Quest* (www.progressquest.com), which exist independently of the player, and in which the player has very little control over the game, apart from the decision to play.
- Contextually-ambiguous games, in which the rules are externally-defined, but internally-validated. Extreme examples of this are rare, hence the suggestion that this be explored.

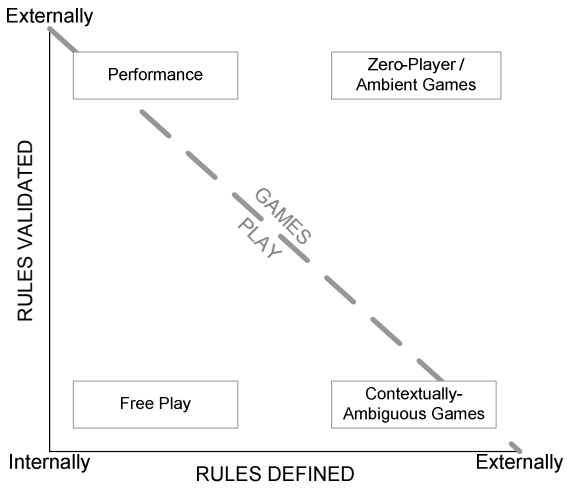

Figure 1: Game types plotted in terms of definition and validation of their rules.

Starting with free play, we can see that it is different from performance because there is a lack of external-validation – with performance, the audience decide whether an individual is 'playing the game' well, whereas with free play the enjoyment is intrinsic and nobody can tell the individual that they are playing badly. Free play is also different from contextually-ambiguous games, because the rules of contextually-ambiguous games are defined externally, whereas in free play the rules are defined internally, on the fly. Zero-player or ambient games are different from contextually-ambiguous games in that there are external elements of the game system which are evaluating the player's performance. For example, in *Ambient Quest* the external elements assess player progress objectively, based on how many real-world steps they take each day, whereas a more internally-validated version might let the players assess their own performance based on how tired they were after walking.

Finally, while zero-player / ambient games and performance seem quite different from one another, there is a similarity in that both activities are heavily externally-validated. The game system of *Ambient Quest* and the audience of the performance both have a similar level of control of the outcome of the 'game'. The main difference, however, is mainly in the *definition* of the rules – in performance, nobody can tell the performer what to do, although they can critique the product itself. In ambient games, the rules are very clearly defined and the player must act in a particular way in order to be considered to be 'playing'.

It is important to note that Figure 1 is a pragmatic diagram for illustrative purposes. It is likely that different instances of free play (for example) would be placed in slightly different locations on the graph, depending on many different environmental factors. It should be assumed for the purpose of this discussion that no game is positioned exactly at any extreme on the graph – instead the graph should be viewed as a two-dimensional continuum.

A final feature of Figure 1 which should be noted is the diagonal line which distinguishes mainly play-based activities from mainly game-based activities. Again, it should be observed that this line bisects a continuum, rather than 2 distinct categories. Viewed in this way, it would seem that this third continuum is very similar to Caillois' [1] *Paidia-Ludus* scale, which distinguishes games of free play from games of rules. It is likely, therefore, that the more traditional types of game, such as computer, card, dice and board games, would be placed to the right-hand side of this line.

EXISTING EXAMPLES

This research is concerned with exploring the area of contextually-ambiguous games. These are games in which the rules are mainly externally-defined, but mainly internally-validated. As discussed earlier, games such as *Prosopopeia* and *Uncle Roy All Around You* employed small amounts of contextual ambiguity to good effect. In addition to this, many abstract games (such as *solitaire*, *noughts and crosses* or *Geometry Wars*) employ contextual ambiguity, as the boards, playing pieces, graphics and symbols do not appear to represent anything in particular. **However, there are relatively few 'extreme' examples of contextually-ambiguous games, such that the core gameplay mechanism, hence the majority of gameplay, is the creative resolution of the contextual ambiguity. The current aim of the research is to gain a deeper understanding of such games, by investigating games with a high degree of contextual ambiguity in a case study.** Two popular examples of games in the area of interest are *SF0* (www.sf0.org) and *The Game* (www.losethegame.com).

SF0, as mentioned previously, is a street game in which players score points for responding creatively to ambiguous challenges. While there is plenty of scope for internally-validated input in *SF0*, the players receive the majority of their points, and therefore in-game progress, by impressing other players with the effort

and creativity that they have put into a task. It would seem that even games like *SF0* have many externally-validated elements, and this study seeks to explore games which are less so.

The Game is a very simple cognitive game with a reputation for being annoyingly infectious. The only rules are:

- To know about *The Game* is to play *The Game*.
- To think about *The Game* is to lose *The Game*.
- Losses must be announced.

Because losses must be announced, thinking of *The Game* not only makes the player lose, but also sets off a chain reaction of people losing *The Game*. It is not completely internally-validated because although the player is the only person who can tell what they are thinking, their outcome can still be affected by other people.

While *SF0* and *The Game* seem to be among the most prevalent examples of internally-validated, externally-defined games, they are at the same time very different from each other. One difference is that in *SF0*, players are rewarded for interacting with the game system, whereas in *The Game* they are punished. Secondly, *SF0* is much more complex than *The Game*, with many different tasks, regional events, factions, and thematic "eras" on which the nature of the available tasks is based.

DESIGN

To counterbalance the issues of complexity, reward and punishment within *SF0* and *The Game*, four new games were devised:

Game A Rules:

- Your score starts at 75 points.
- Every time you think of the game, you lose 1 point.
- When you lose a point, you have one minute to try to forget the game again, otherwise you lose another point.
- If your score reaches zero before 48 hours have passed, you lose the game. Otherwise, you win.

Game B Rules:

- Your score starts at 0 points.
- Every time you think of the game, you gain 1 point.
- When you gain a point, you cannot gain another point for at least 1 minute.
- If your score reaches 75 points before 48 hours have passed, you win the game. Otherwise, you lose.

Game A is an adaptation of *The Game*, designed to remove the external influence of other players, and includes a scoring system so players can keep track of how many times they lose within the 48-hour time period. Game B is simply an inverse version of Game A. The reason for this is because of the difference between *The Game* and *SF0* in terms of positive versus negative player reward: It would be interesting to investigate whether or not players find it more enjoyable to forget something with negative gameplay consequences than to remember something with positive gameplay consequences.

Game A and Game B are very simple cognitive games. However, there is also a difference between *The Game* and *SF0* in terms of complexity, so Games C and D seek to accommodate this by increasing complexity slightly. However, the complexity is still fairly modest, mainly so the games are easy to learn and play over the 48-hour period, but also because it would not be as feasible at this exploratory stage to implement something as complex as *SF0*.

Game C Rules:

- Your score starts at 50 points.
- The theme is "conflict" – every time you perceive some form of "conflict", you lose 1 point.
- When you lose a point, you have one minute of immunity before you can lose another point.
- If your score reaches zero before 48 hours have passed, you lose the game. Otherwise, you win.

Game D Rules:

- Your score starts at 0 points.
- The theme is "expression" – every time you perceive some form of "expression", you gain 1 point.
- When you gain a point, you cannot gain another point for at least 1 minute.
- If your score reaches 50 before 48 hours have passed, you win the game. Otherwise, you lose.

In Game C, the player loses points every time they perceive conflict. This does not necessarily need to be a war-like conflict: it could be the conflict of two very different architectural styles in adjacent buildings, or two people having a heated conversation, or a salmon trying to swim upstream. The context of the conflict is supplied by the player. As with the reversal of Game A to make Game B, Game C has been reversed to make Game D. The themes of 'expression' and 'conflict' have

been chosen to match the nature of the respective rewards and punishments. However, it would be interesting to (carefully) investigate the rewarding of players for perceiving negative themes, and similarly the punishment for perceiving positive themes.

METHOD

The study was conducted entirely by email, in order to minimise the required effort from the participants. After giving consent and answering questions about their game-playing habits, participants were emailed the instructions, rules and question sheets for each game, and were told to play the games in a specific order, which had been randomised to avoid order effects. Each game was to be played for 48 hours, and the participants were allowed to rest for as long as they felt they needed in between games. Despite the relatively long duration of the games, the players were told that they would only be *actively* playing while they were thinking about the games. After each game, players were asked about their experiences of the game. After all four games had been played, participants were asked to answer some follow-up questions, in order to gauge their overall experience of the participation itself. Apart from these follow-up questions, all questions asked were open-ended in order to allow the participants to state whatever they felt was relevant.

PARTICIPANTS

All potential participants were staff and/or students of the University of Portsmouth. Of the 10 participants who volunteered for the study, three completed the task to various degrees, while the rest have yet to respond.

Participant 105 is male, 20 years of age, and mainly prefers first-person shooter and third-person action (computer) games, but also spends a relatively large amount of game-playing time in the virtual world *Second Life*. His written responses to the games were very brief in places, which made it difficult to draw conclusions from his experiences.

Participant 106 is male, 22 years of age, and spends most of his game-playing time playing role-playing (computer) games. Of the three participants described here, participant 106 provided the most data, often expanding on his answers and making suggestions as to how the games could be improved.

Participant 107 is male, 27 years of age, and divides the majority of his games-playing time between puzzle, adventure and first-person shooter (computer) games. He has yet to finish the study, but has given permission for the data that he has provided so far for two of the games to be used.

RESULTS

Findings from Game A

Participant 105 stated briefly that he enjoyed playing the game, and got a relatively high score because he managed to forget about it.

Participant 106 stated that "…I had trouble getting my mind off the game and so had to frequently interrupt what I was doing…". He also stated that the game made him feel under pressure because he had no control over something that he felt occurred naturally. He reported that this situation was worsened because he lost a lot of points in the first hour of play alone. For him the game quickly became irritating due to a sense of no reward, and he reported that he lost the game long before the time expired.

Findings from Game B

Participant 105 stated very briefly his score, and that he felt that he "…didn't do so well…".

Participant 106 experienced some confusion over which thoughts would be considered "worthy" of a point. He created a file on his computer desktop so he could record the points scored, the appearance of which paradoxically reminded him of the game when he booted the computer up. Interestingly, he also stated that sometimes he updated the file without even thinking about why he was doing it. At the end of the 48 hours, he stated that he did not feel particularly disappointed at not scoring many points "…since there was no reward for winning anyway".

Similarly, participant 107 experienced little enjoyment of the game, stating that because he was busy he "…simply forgot about it", and that even when he remembered the game he didn't play competitively, and "…certainly didn't sit there and wait for a minute to go by so I could rack up another point". Moreover, while remembering the game, participant 107 reported that he felt like he was merely counting, rather than playing.

Findings from Game C

Participant 105 reported that he enjoyed playing the game. He commented that it reminded him of a game he used to play - he was actually referring to *The Game*. Participant 105 also reported that he lost very quickly because he perceives conflict a lot, in videos, computer games and in personal situations.

Participant 106 also experienced conflict while he was playing computer games, but deducted a point for every *session* he spent playing a violent game, as he classified an entire play session (rather than each minute within that session) as a single perception. Other points were lost during cognitive conflict, when deciding what to have for dinner. However, participant 106 did not feel as aggravated by losing points as he did during Game

A, because he found it easy to switch his focus to "…something devoid of conflict".

Findings from Game D

Participant 105 seemed to score higher in this game than he did in the other games, reporting that he lost count of the points he accumulated. Much of his response was focused on how many forms the concept of 'expression' *could* take, rather than what forms it *did* take. However, he seemed to enjoy the game, as he ended his account with the comment "Was still fun though".

Participant 106 seemed to enjoy playing this game more than the other games. The concept of 'expression' was perceived via artistic expression within his surroundings, including images on the Internet and music in the background. He stated that it was much less stressful than Game A, because of the positive reinforcement (rather than punishment) received for interpreting the game space. However, despite the more positive tone of his comments, he reported that he "…didn't care much neither for losing nor winning".

Participant 107 sought 'expression' in positive responses from other people, by "…doing something to help them, or generally trying to make them feel more positive about themselves". Because he was trying to do this without revealing that he was playing a game, he commented that scoring points was a lot more difficult than he had expected, and he consequently lost the game.

DISCUSSION

It is interesting that for both Games A and B participant 105 managed to forget about the game, however his response to Game A was noticeably more positive (i.e. he actually stated that he enjoyed the game) when pragmatically the only difference was his final score, which in both cases would have hardly changed. Participant 106, on the other hand, clearly found Game A to be a nuisance, because of a lack of control.

Game B got a negative or neutral response from all participants, so it would seem that providing a simpler game and rewarding players just for being players is not enough to sustain interest.

While Game C received a neutral or mildly positive response, it seemed to be quite thought-provoking, as participant 105 commented that it reminded him of *The Game* (the randomisation of the play order meant that he had not played Game A by this point) and participant 106 was forced to think about how to quantify a gaming session which was filled with conflict, creating a 'session-based' interpretation as opposed to a 'minute-by-minute' or 'event-based' interpretation. Participant 106 in general appeared to have made the most effort with the games, and gave comprehensive answers to questions throughout the study, even for the games which he did not enjoy. Looking at his games-playing habits, he usually spends most of his gaming time playing role-playing computer games, whereas the other two participants had a greater tendency towards action games. Role-playing games are one of the computer game genres which permit a greater amount of internally-validated actions. Players are often given a wide range of options within the game, but choose to restrict their actions to a realistic subset, based on the context of the character they are 'role-playing'.

In contrast to the other three games, Game D was generally well-received by all of the participants. This game was one of the more complex games, it rewarded the player for interacting with the system, and was thematically-positive. The speculation of participant 105 over the potential of the game's additional ambiguity indicates that the game was thought-provoking, and in conjunction with Game C this would agree with the recommendations of Gaver et al [4] with regard to ambiguity in design. Also during Game D, participant 107 modified his everyday behaviour in order to play the game, by doing positive things to people in order to try to elicit an expressive response. As discussed elsewhere [2], this modification of behaviour could be a useful by-product of playing such games, in particular for health or education benefits within *serious games*.

In response to the follow-up questions about overall enjoyment of the games and the study, the respondents agreed that participation in the study was enjoyable. This indicated that the study was successful at avoiding unnecessary stress to the participants during each 48-hour period of play. When asked whether they would consider playing such games in the future, participant 105 commented that he did already, as him and his friends play *The Game*. Indeed, participant 105 preferred Game A, which was derived from *The Game*.

The favourite game of participant 106 was Game D, because "…it encouraged doing something engaging in its own right without penalising for involuntary actions". Despite this, participant 106 stated that he didn't "…see much point in continuing [with the games in general], as neither a victory nor a loss seems meaningful given the current set of basic rules". This suggests that the inclusion of at least *some* tangible or significant rewards, such as competition or external-validation, might be beneficial for future games of this ilk.

Whether the findings have implications for the design of future games with internally-validated rules is yet to be ascertained. One observation which is particularly apparent from the findings is the lack of participation, which means that conclusions reached in this paper

remain very tentative until more data is available. Several more participants are currently taking part in the study in order to provide some of this extra data.

CONCLUSION

The long term aim of this research is to investigate decentralisation of gameplay, so it is not fixed to specific times, spaces, people, and contexts. As discussed in this paper, contextually-ambiguous rules could contribute to this end. It was proposed earlier in this paper that alongside the temporal, spatial and social aspects of pervasiveness proposed by Montola (2005), a complementary, *contextual* dimension to pervasiveness might exist. If pervasiveness is the act of making the player feel as if their everyday life is being pervaded by the game, then it would seem that using contextual ambiguity within rules could be used to achieve this. Games with contextually-ambiguous rules allow the players to flesh out the details of the experience using inspiration from wherever they choose, including their everyday surroundings, and several games (*Prosopopeia*, *Uncle Roy All Around You*, *SF0*, *The Game*) already use various amounts of these rules. Four games were devised in order to explore this phenomenon further, and while participation was limited, tentative conclusions can be drawn.

Firstly, it would appear that a more complex game with rewards for seeking interpretations seemed to please players the most, and from the follow-up questions it would seem that providing more significant rewards would increase participation. Another tentative conclusion from the study is that the one participant who plays mostly role-playing games engaged far more with the study than the others, so therefore it could be that the player-types associated with role-playing games might be a suitable target audience for games with internally-validated rules.

The two most popular games were Games C and D, which suggests that the more complex design, with room for interpretation rather than just an awareness of the game, is favourable. Furthermore, the most popular game was Game D, which suggests that providing positive rewards for active participation, rather than penalising the players for participation, is favourable. It would also seem that Game A, although it was an adaptation of a popular game, was subject to a mixed reception when played in practice.

One final conclusion which can be drawn from the study is that the lack of participation might be indicative of an inappropriate research environment. For future studies a more naturalistic approach will be taken, using games which are known to be popular, and participants who already play these games. Therefore, the next stage of the research is to interview people who play *SF0* and *The Game*, in order to further explore their experiences.

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REFERENCES

1. Caillois, R. *Man, Play, and Games.* The Free Press, New York, NY, 1961.

2. Eyles, M. and Eglin, R. *Entering an age of playfulness where persistent, pervasive ambient games create moods and modify behaviour*, 2007. Available at http://www.eyles.co.uk/mark/files/Ambient-games-cybergames-paper-V3.pdf

3. Flintham, M., Anastasi, R., Benford, S., Drozd, A., Mathrick, J., Rowland, D., Oldroyd, A., Sutton, J., Tandavanitj, N., Adams, M. and Row-Farr, J. *Uncle Roy All Around You: Mixing Games and Theatre on the City Streets,* 2003. Available at http://www.digra.org/dl/db/05163.14092.pdf

4. Gaver, W., Beaver, J. and Benford, S. *Ambiguity as a Resource for Design*, 2003. Available at http://www.equator.ac.uk/var/uploads/2002-gaver-0.pdf

5. Kurtz, P. *The Transcendental Temptation*. Prometheus Books, Buffalo, NY, 1986.

6. Mäyrä, F. *An Introduction to Games Studies: Games in Culture*. SAGE Publications, London, 2008.

7. Montola, M. *Exploring the Edge of the Magic Circle: Defining Pervasive Games*, 2005. Available at http://iperg.sics.se/Publications/Exploring-the-Edge-of-the-Magic-Circle.pdf

8. Montola, M. and Jonsson, S. *Prosopopeia – Playing on the Edge of Reality*, 2006. Available at http://iperg.sics.se/Publications/Montola-prosopopeiakp06.pdf

9. Nieuwdorp, E. "The Pervasive Discourse: An Analysis". In *ACM Computers in Entertainment*, vol. 5, no. 2 (April/June 2007), article 13.

10. Rollings, A. and Adams, E.. *Andrew Rollings and Ernest Adams on Game Design*. New Riders, Indianapolis, USA, 2003.

11. Salen, K. and Zimmerman, E. *Rules of Play: Game Design Fundamentals*. The MIT Press, Massachusetts, USA, 2004.

12. Suits, B. *The Grasshopper: Games, Life and Utopia*. University of Toronto Press, Toronto, 2005.