

Storytelling and Motivation In Serious Games

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Abstract

The article provides a theoretical framework for the usage of storytelling and parasocial design as motivational tools for serious games. Based on socio-cultural approaches to learning and teaching, the centre of this framework is the concept of a virtual extrinsic motivation. This concept is based on cognitive theories of motivation, Zillmann's affection disposition theory and the analysis of the motivational design in current entertaining computer and video games. Specific features of storytelling in serious games are illustrated by means of the ELEKTRA demonstrator, a research-based learning game that deals with physics learning for upper intermediate pupils.

Introduction

Scientific concepts of using games as educational means can be traced back at least to the 18th century (Trapp, 1787). Today, computer games (PC games, video games, mobile games and so forth) are highly popular among children, adolescents and even among a growing rate of adults. Additionally, they are not just fun but they trigger learning processes as well (for some recent empirical research cf. Gebel, 2006; Lee & Peng, 2006). Thus, the idea of using the motivational design of computer games to improve the instructional design of serious games (digital learning games) is obvious.

This idea calls for an educational research on the instructional design of computer games and its link to the design of serious games. This area of research can be called *instructional analysis of digital games* (cf. as a systematic approach Bopp, 2006). This article is a contribution to this field. Its focus is on aspects of motivation, parasocial effects and storytelling.

Computer games are a fast evolving media. What was appealing 15 years ago doesn't have to be appealing today or may be just marginal. Thus, instructional analysis of computer games in general and their motivational aspects in particular (Malone & Lepper, 1987) always has to follow this evolution. Today, almost all state-of-the-art computer games put a lot of stress on storytelling (of course most adventure games are more story driven than most shooters; Atkins, 2005; Carr, 2006; Jenkins, 2003). Less well-known, the parasocial design of computer games gets more and more sophisticated. Parasocial design aims at the triggering of parasocial effects. Parasocial effects are effects that occur in the context of an illusion of a direct social interaction, e.g., when people feel that the host of a TV show is a 'member' of their family (Horton & Wohl, 1965), when they shout angrily at their 'stupid' PC, or when they start to like or dislike Non Personal Characters (NPCs) in computer games.

Thus, it is not surprising that in the last years the motivational power of storytelling and parasocial design is a new and promising focus of the instructional analysis and of guides for the design of serious games as well.

This article provides a shot survey over some basic terms and concepts in this area (motivation and its links to learning, storytelling, parasocial effects), on the tradition of using stories in educational contexts and on the current state of storytelling and parasocial design in computer games. After that, it lines out some specific demands for storytelling in educational games and it gives an example of a story frame for a research game that teaches physics in junior high school.

Motivation and Learning

Motivation, as a psychological term, usually refers to the initiation, intensity and persistence of behavior. In order to describe the motivational design in computer games, many variables must be taken into account. For example, variables concerning the player's knowledge and skills, his or her gender, traits, experience with games, social status, but also inner psychological processes during the game (such as flow), and various design aspects of the game environment itself (cf. different approaches to motivation and games in Vorderer & Bryant, 2006, pp. 91-194). Currently, there is no thorough and systematically convincing motivational theory that integrates all of these variables and their interrelations. Nevertheless, it is common sense to assume that storytelling and parasocial phenomena in games are important motivational aspects that should be considered (Bateman, 2006; Gjedde, 2006; Hug 2005; Ippa & Borst, 2007, XVIII).

A possible starting point for this is to look at the role of cognitions and valuations in motivational processes. A theory that includes these two elements and combines them with the distinction of intrinsic and extrinsic motivation was suggested by Rheinberg (2005). Rheinberg regards motivation as a function of two processes:

The first processes consist of several expectations concerning a situation. The first expectation concerns the result of a situation without doing anything (e.g., "If I do nothing, I will not pass the test."). The second expectation regards the proximate results of an action, e.g. a learning activity, in this situation ("If I do learn, I will pass the test."), the third one regards the consequences of this results ("If I pass the test, I can study at Harvard."). The second process consists of evaluations of possible actions and their

consequences in the light of values of the actor (“I like learning in itself” or “I want to study at Harvard thus passing the test is important”).

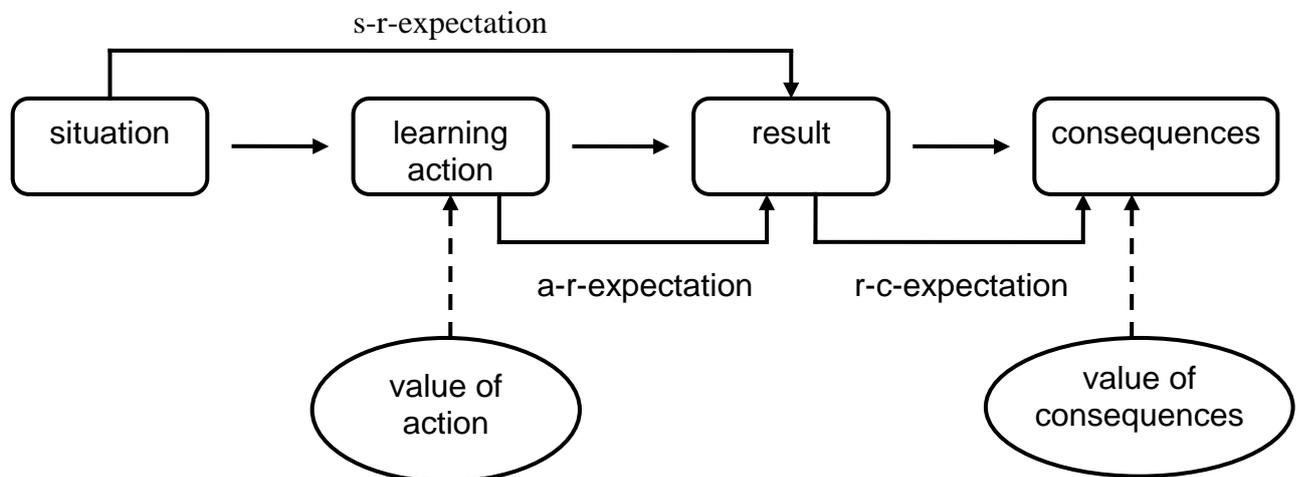


Figure 1. Extended cognitive model of motivation (Rheinberg, 2005, p. 341); translation by the author.

Figure 1 illustrates the combination of various expectations and evaluations in respect to the motivation of actions. According to this model, two basic processes will motivate a student to prepare for a final exam:

(a) The student expects that learning nothing will not lead to a good score in the exam (s-r-expectation). In addition he believes that preparation will actually help him to achieve a high score (a-r-expectation); plus, he expects that a good score will lead to consequences (r-c-expectation) that are of high value for him (value of consequences). Rheinberg (2005) calls the result of these processes a case of extrinsic motivation.

(b) There is a second process that can motivate a student, even if he has none of these expectations: he will prepare for a test if he has the feeling that learning in itself is of high value, irrespective of his expectations concerning his success or the value of passing the test. Rheinberg calls this a case of intrinsic motivation.

Learning in educational contexts usually occurs due to a mix of extrinsic and intrinsic motivation. Sometimes students have a particular interest in the topic, or they are motivated by a general curiosity, achievement motivation, etc. (high value of action), which leads to intrinsic motivation. Moreover, they often learn in order to gain social acceptance or avoid social disadvantages (high value of consequences) and thus they are motivated extrinsically.

In opposition, pupils that do not learn sufficiently can be seen as having intrinsically low motivation, and or in addition, may have unrealistic expectations concerning the unpleasant long-term consequences of 'not learning' in our knowledge society or they may have low confidence in their learning ability. As a result, they are not motivated and do not perform in a desirable way.

Storytelling and Motivation

One of several ways to deal with this problem is the usage of storytelling as a motivational instructional method or, shorter, as a motivational tool (Creswell, 1997). In a simple behavioristic way, this can be done by using storytelling as a reward for learning tasks. For example, if a primary class performs a given task in a good way, a teacher may read out a chapter of an exiting story. From a perspective that stresses socio-emotional aspects of learning and motivation, storytelling can be used as a frame that adds sense to an activity.

Such a frame story provides a) a context for a certain learning task and b) gives the learning activity a specific form in order to link it to the context. For example, in primary school a teacher may motivate pupils to draw by telling them the story of 'poor Pluto' who has lost his doghouse in a

big storm. Next, the pupil's task is to draw a new doghouse for the cute pet.

Besides the motivational function of storytelling, in educational contexts and computer games, storytelling can also be used to give learning content a specific form that is easy to understand and memorize. Humans tend to organize their knowledge in the form of stories (Bruner, 2002), thus it is common sense to give learning content an analogous form. A typical example of this is the parable of the Good Samaritan. Teaching that aim at the understanding of social processes or historical knowledge and human behavior in general naturally has an affinity towards this usage of stories. This article just deals with the motivational aspects of storytelling and learning.

Looking at learning to draw by drawing a doghouse for poor Pluto, it is obvious that computer games usually use similar methods to add sense to certain gaming activities. For example, the 'core' task in most PC shooter games is to quickly move a mouse pointer on a small moving shape of the screen and then click the left mouse button. In this perspective, shooters are a variation of psychological tests that examine the ability to coordinate hand movements and eye stimuli (Pias, 2001). Such activities may be intrinsically motivating for people that attribute a high value to achievement in itself. However, this does not seem to be sufficient for the motivation of the majority of gamers. Thus, shooter games usually introduce a frame story with a hero who defends himself or his peers to the game world. In order to link the abstract core task to this frame story, the mouse pointer morphs into cross-hairs, the small moving shapes on the screen turn into ugly and mean enemies that fight the hero, and the mouse click is the pulling of a trigger.

A classic example of the usage of frame stories in the area of learning media is the Jasper-Project that produced a series of teaching films narrating The Adventures of Jasper Woodbury. Here, the hero Jasper is engaged in several practical problems the learner then has to solve by using mathematics (Cognition and Technology Group at Vanderbilt, 1997).

Is the creation of a frame story a way to trigger intrinsic or extrinsic motivation? This depends on the range of the process in focus. Taking the whole story-based activity (as in the drawing of a dog house for Pluto) as one unit, a learner is motivated intrinsically if he or she attributes a high value to the action and does not care about consequences that take place after the activity in the real world (e.g., good marks). However, looking at the process of drawing (or fighting enemies etc.) in detail, this activity can be seen as a series of single actions that are performed due to their consequences in the fictional world in which the story takes place. In this case, not the drawing itself, but the fact that this helps the dog, Pluto, to get shelter is of high value. Then the activity is extrinsically motivated. Applied to computer games: for some players the pure act of killing may be rewarding (intrinsic motivation), but for others the fact that a player gets a particularly 'cool sword' when he kills an enemy, may be the motivation to do so. In the last case, the motivation is extrinsic in the sense that it is valued due to its consequences in the game world. To distinguish this form of motivation from the usual types of motivation (extrinsic or intrinsic), I suggest to call it virtual extrinsic motivation.

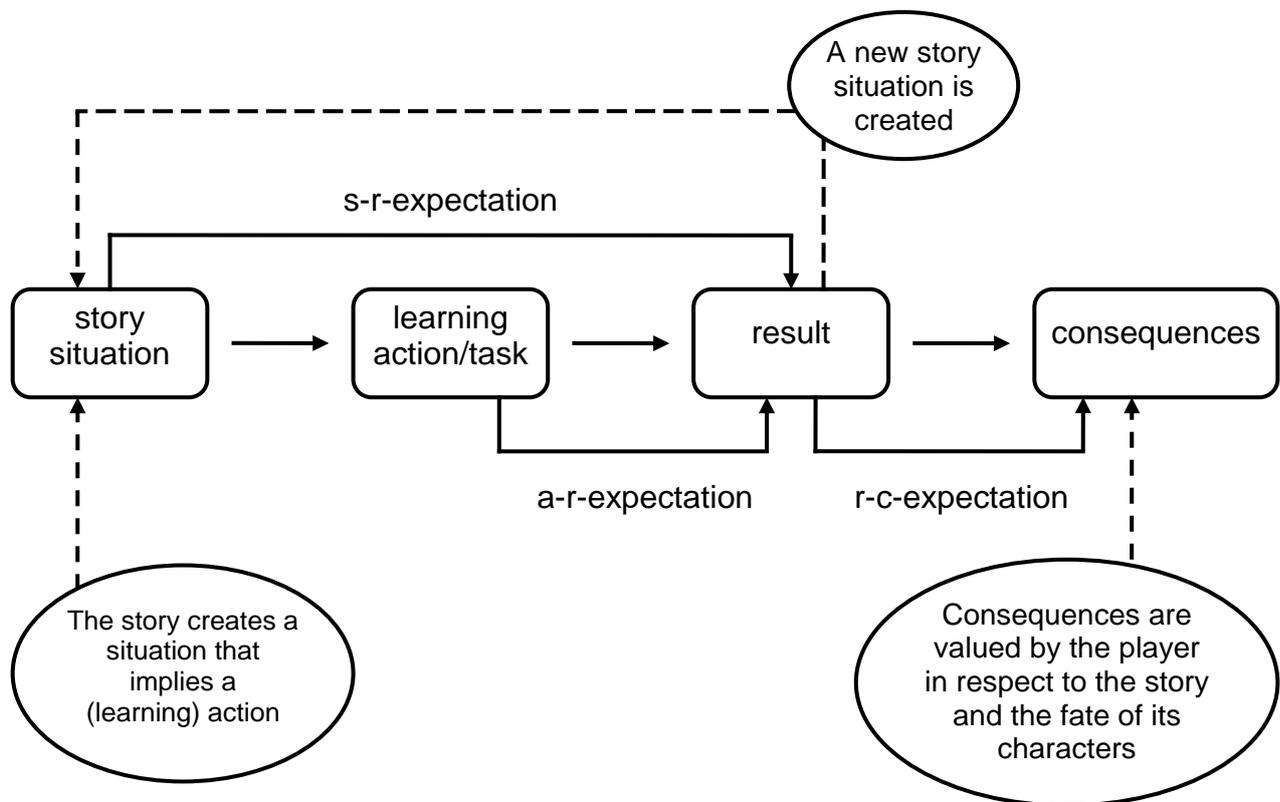


Figure 2. Storytelling, expectations and motivation as a circled process.

To sum up, a process of story-based virtual external motivation includes an actor, who is immersed in a fictional interactive world, takes part in a story and is confronted with a story situation that provides the opportunity to perform a certain task. In serious games, this task can be a learning activity. The actor expects that his attempts to fulfill the task will be successful and he attributes a high value to the result and consequences of fulfilling the task in respect to the story-based world (and not in respect to the real world). Thus, he performs the necessary actions. In digital games, his actions, in return, create a new story situation and so on (figure 2). Learners that are not (or not sufficiently) motivated by usual intrinsic or extrinsic processes

are the main target group of this instructional method.

This given, the next question is how to create a story that leads to motivating learning situations that smoothly fit into the setting and storyline. The following paragraphs will deal with these questions by analyzing aspects interactive story telling in computer games. Of course, this question can only be answered thoroughly, if a general analysis of the instructional design of serious games is taken into account.

Basics of Storytelling in Computer Games

Looking at creative writing guidebooks that are mainly based on structures of successful Hollywood pictures (McKee, 1997; Field, 2005), an entertaining story for the mass-market is structured as a series of events that center around a character, called protagonist or hero (this may be one person or a group). The hero tries to overcome various obstacles in order to reach a goal. Common obstacles are other persons (the villains), nature (Moby Dick), and the hero itself (Hamlet). At least the main characters in stories are more or less multidimensional, they have a personal history, strengths, weaknesses and motives grounded in their personal experiences. For the purpose of analyzing (and developing) the structure of a story, it can be helpful to label characters in respect to their function for the story (cf. their relation to other characters). Such functions may be the 'hero' and the 'heroine,' the 'villain,' the 'lovers,' the 'femme fatal,' the 'helper,' 'boss fight enemy' etc.

In stories for children or adolescents - a genre of storytelling which is of particular interest for educational games), the problems of growing up and finding a place in the world is a typical obstacle (cf. the storytelling guideline for children

of Rojany-Bucciari & Economy, 2005; Lamb, 2001).

This sketch on characteristics of storytelling provided, in the past the level of narrativity in computer games was rather low. They often incorporated some basic story elements (e.g., a main character and a main task) but these elements had more similarity to an Ikea assembly manual ('Do this, then this, then that.') than to narratives to be seen on TV, film and theater, or a fortiori sophisticated stories in classic literature. The characters were one-dimensional, and NPCs were subordinated to the demands of the game play: they provided missions ('Look for my child. '), gave the player information or tools, or they functioned as dumb, violent opponents.

However, such a low level of narrativity is not typical for all kinds of computer games. An exception, of course, is the adventure game genre, containing for example the Gabriel Knight series (Sierra, 1993-1999), the Broken Sword series (Revolution Software, 1993-2006) and the Longest Journey series with Dreamfall: The Longest Journey (Funcom, 2006), a game that incorporates 156 individual characters. But also role playing games like Final Fantasy VI (Square, 1993) and even survival horror games like Silent Hill 2 (Konami, 2001) demonstrate that it is possible to combine interesting game play with a complex story that includes characters with relations to each other, with inner problems, weaknesses etc.

In addition, there is currently a strong trend to put more stress on storytelling across all kinds of computer game genres. This trend may be called the 'narrative turn' in the area of computer games (cf. the controversy between narratologists and ludologists in digital game theory). An example of this narrative turn in the area of shooters is Max Payne (Remedy, 2001), which combines a typical shooter game play with a film noir story. Another

one is Half-Life 2 (Valve, 2004), which incorporates a political science fiction setting and can be seen as illustration of the concept of possible worlds (Ryan, 2003). One of the reasons for this trend is an attempt to attract female customers (who are generally more interested in storytelling with complex characters than are men) to digital gaming.



Figure 3. Cutout of a screenshot from Half-Life 2; the NPC heroine, Alex, is kissing her father in order to establish a multidimensional character.

Common methods to tell complex story in digital environments are the use of video clips (especially as intros and after the end of a level), e-mails, phone or video calls and especially the usage of multiple-choice dialogs between the avatar and NPCs. In adventure games and role-playing games, the audio files for these dialogs sometimes account for more than half of all game data, and dialogs all together can last dozens of hours. A rather new design method is the use of scripted events that display actions and interaction of NPCs. For

example, in *Half-Life 2: Episode 1* (Valve, 2005), the strong emotional link between Alex, the heroine of the game and her father is staged in this way (figure 3.) The game environment then turns to a kind of 3D theater (Murray, 1998). Currently nearly all computer games use an approach with a rather determined and fixed plot, sometimes with a few branches (especially at the story's end). In the future, maybe there will be games with more flexible branching stories, but until now AI driven approaches of automated story telling are still in very basic (Hoffmann, Göbel, Schneider & Iurgel, 2005).

Parasocial Design and Interactive Storytelling in Computer Games

Attempts to use interactive storytelling as a motivational tool have to understand the underlying structure of this new way of narrativity. One perspective on this is Zillmann's affection disposition theory (Zillmann, 1996), an empirical media psychological approach to describe the structure and reception of entertaining stories, like soaps on TV. According to this theory, recipients typically classify the characters of a story into two main categories: positive characters (usually the heroes and heroine and their friends) and negative characters, the villains. The positive characters often incorporate a main couple in a more or less problematic romantic relationship. In certain complex entertaining stories, some characters cannot be easily subsumed to one of these categories, which add suspense to the story. In a dramatic story, there is a basic conflict between the main two categories of characters. According to Zillmann, the categorization of a character is the result of a moral judgment of the actions of a character. (Aesthetic judgments may

be of importance as well.) These judgments lead to the emergence of emotional relations between the recipient and the characters. In respect to the heroes, this relationship is mainly characterized by liking, caring or identification. In respect to villains, it is characterized by disliking or enmity.

Zillmann's affection disposition theory is designed in respect to 'non-interactive' media with a recipient that has no influence on the fate of the characters and the presentation of the story. In opposition, in digital games this is more or possible: the player can control one or more characters in the virtual world. These characters are called avatars. In addition, there are characters that are controlled by the computer and interact with each other and the player's avatar. They are called NPCs. Merging this distinction of avatar and NPC with the distinction of positive and negative characters, there are three main types of characters in digital games: friendly and helpful NPCs, the avatar(s) that usually fulfill(s) the role of the hero/heroine, and hostile NPCs, the villains.

The ability to interact with NPCs creates a whole new world of computer games, serious games and digital media in general. Its core is the illusion of a direct (usually face-to-face) social (meaning human-human) interaction, although one of the interacting 'partners' is actually just a computer controlled character. By creating such an illusion, certain emotions, actions, and relationships can be triggered and used to support learning activities. In reference to Horton and Wohl (1957), who first described similar processes between viewers and hosts of TV shows, I suggest to call these emotions, interactions and relationships 'parasocial' (cf. the literature review of Giles, 2002; on children's parasocial

interactions with favorite television characters (Hoffner, 1996).

In respect to games, it can be useful to differentiate between

- different *triggers* of parasocial behavior in different media (e.g., TV, literature and digital games)
- different reactions of the media user (thoughts, feelings and behavior) in reaction to these triggers
- and the consequences and functions of these reactions.

For example, a male player can feel attracted to a female avatar (reaction) and start to write poems for her (consequence). Lara Croft, heroine of the Tomb Raider series is a famous example for this. Alternatively, the player can get angry about the 'stupidity' of an NPC that is supposed to help him, but instead acts in a clumsy way (trigger), causing the player to start to shout at him (reaction). A gamer can feel challenged by NPCs that scorn him (e.g., *Far Cry*, Crytek, 2003), and he may feel proud if an NPC or a crowd of NPCs praises him (e.g., *Fable*, Big Blue Box, 2004). Player does this even though they know that it is just a machine, they are dealing with.

According to calling these phenomena parasocial, the term parasocial design can be used to refer to all aspects of game design that aim at the triggering of the illusion of a direct social interaction between a player and an NPC. Common general triggers are the use of language, filling of roles traditionally held by humans, the use of voice, and eye contact (Nass & Steuer, 1993). Obviously, all of this is more and more the case with NPCs in computer games. In certain games, player can even give (formalized) orders to NPCs using a head set with a microphone. Additionally,

the improvement of the graphic surface of NPC's faces (figure 4), allow for more convincing mimic, a feature which is very important for lifelike face-to-face-interaction.



Figure 4. Cutouts of screenshots with NPCs from Maniac Mansion (Lucasfilm, 1987), Tomb Raider II (Core, 1997), Broken Sword III - The Sleeping Dragon (Revolution, 2003), Half-Life 2 (Valve, 2004).

Moreover, of course, good storytelling, that frames the interaction with NPCs, can support the creation of parasocial phenomena, which, in turn support the involvement in the story: parasocial emotions have a motivational function. They can lead to hopes and fears concerning the future destiny of the positive characters (the avatar and friendly NPCs), hopes for a bad outcome of the story in respect to the villains, and to curiosity about the outcome of a storyline in general. In opposition to traditional media, these emotions do not just motivate the player to keep on watching, reading, etc. They stimulate the motivation to perform certain actions or tasks in the game world in order to take care of the destiny of the avatar and friendly NPCs, or to frustrate the villain's plans (in one phrase: they can trigger virtual extrinsic motivation). According to a thorough qualitative empirical study of Lazzaro (2004), these feelings typical include euphoria, fiero (an Italian expression for the feeling of triumph after overpowering an enemy), sympathy and depressiveness, depending on the consequences of

an action in respect to the hero or his friends. In respect to the villains, they include schadenfreude (a German expression for the feeling of satisfaction when an enemy gets in serious trouble) or counter empathy.

In addition, according to the mechanisms of the storyline, one of the consequences of the player's actions is the emergence of a new story situation, which again provides a chance for the gamer to influence the character's destiny and the whole process repeats itself. Figure 5 illustrates this series of reception, emotion towards characters, action in a story situation, emotions and the creation of a new story situation.

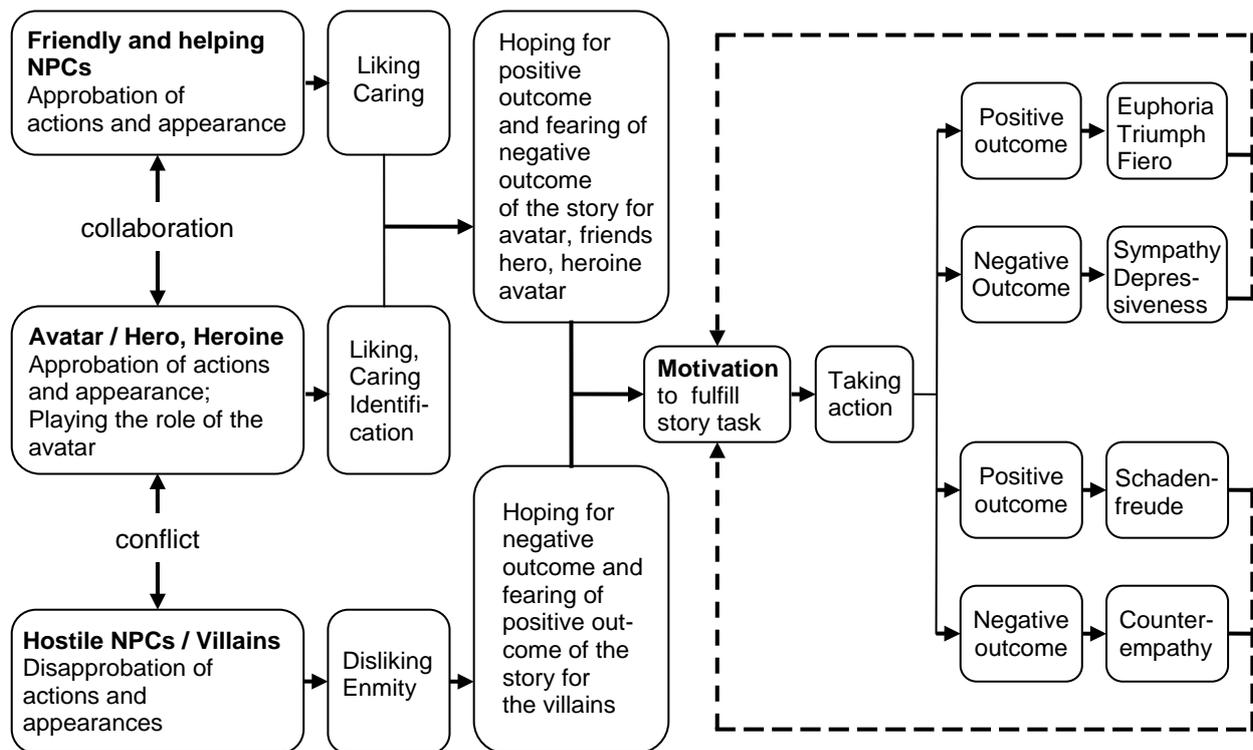


Figure 5. Reception of an interactive story and its influence on motivation to perform a task.

Rewards and Hierarchies in Task-Oriented Stories in Computer Games

Creating a story-based game that immerses the player in such a loop of story situations and tasks is a sophisticated challenge. It is not just sufficient to trigger a desire in a player to influence the fate of characters. In addition (and in accordance to the theses on the link between motivation and cognition described above), the player (a) must know what he is supposed to do in a situation, (b) he must have the expectation that certain tasks will lead to satisfying results and consequences, and (c) he must have the expectation that he is able to perform a task in an adequate way; that is, his cognitions on game play self-efficacy (Bandura, 1977) must be sufficiently high.

Thus, the story and every single situation in a digital learning game must be designed in a way that allows the player to acquire and create this knowledge and these expectations. How do computer games try to achieve this goal? They do so by

- defining one or a few simple main objectives for the whole game,
- dividing these objectives into hundreds or thousands of single sub objectives or tasks,
- making sure that the player can link these tasks to motivating expectations concerning desired results and consequences,
- assuring that the player encounters enough little tasks on his way to reach his final objective and has frequently experiences of success and achievement.

For example, take the beginning of the role-playing game Gothic 2 (Piranha Bytes, 2002). The setting is a fantasy world, populated by humans, orcs, mages and monsters. At the beginning, an introduction chapter imposes the task on the hero to kill several dragons that threaten the island Khorinis, where the story takes place. This is the main goal on the main story level and it structures

the story arch for the whole game. To fight these dragons, the hero has to get a certain amulet (task 1 on the first sublevel). To get this amulet, he has to talk to the governor in the town Khorinis (task 1.1 on the second sublevel). To be able to talk to the governor, the player has to become a member of the town's militia (task 1.1.1 on the third sublevel) and so on. From a psychological perspective, this narrative task structure is similar to a classic cybernetic concept to describe human action plans by means of elementary action elements proposed by Miller, Galanter, and Pribram (1960).

The example makes it obvious that on the lowest levels of tasks, a typical computer game is comprised of thousands of segments that consist of a sequence with the following elements: 'story situation - action - result - consequence - new story situation.' Concerning the problem of how to link motivating expectations to these single segments, it is important to notice that usually there are not just rewarding consequences in the long run ('Killing all dragons at the end of the story', or 'Getting an amulet after several hours of game play') but also a lot of rewarding on-the-spot consequences. Although there is no sound empirical study on this, it is possible to estimate that the time gap between rewarding consequences on the lowest level of story telling is rather small and can be measured in seconds or a few minutes, depending on the genre at hand.

In addition, these small rewards are enriched by the addition of intermediate bigger rewards (cf. rewards after a successful 'big fight'). This concept of intermediate rewards for actions refers to the idea of programmed learning and Skinner's concepts of "on-the-spot consequences" and "reinforcement plans" (Skinner, 1954; Skinner, 1958). In simplified terms, Skinner states that

behavior which always has positive on-the-spot-rewarding consequences, will occur more frequently in the future. In addition "stretching the ratio" of the given rewards will lead to behavior, which lasts longer, even if every single instance of that behavior is not rewarded. Although the behavioristic learning theory behind these assumptions is problematic, the code of practice based on it is very common for computer games, and it leads to the metaphor of digital games as modern variations of the old 'Skinner box.' Just as a pigeon in such a box gets a food pill after it has pushed a certain button, the player gets helpful tools (e.g., amour, heath packs, etc.), parasocial and story rewards (praise from NPCs, etc.), access to new and exiting areas of the game world, etc., after having performed a certain game task successfully.

Simultaneously, this demonstrates that storytelling is linked to the motivational design of a digital game on various levels. On the micro level, there are hundreds or thousands of short 'story situation - action - result - consequence - new story situation' sequences, glued together by a specific setting and their relation to more complex story tasks on higher levels up to one, or a view main tasks of the macro level of the game.

Storytelling and Parasocial Design in Current Serious Games

Compared with storytelling in computer games, current serious games make little use of sophisticated character design, parasocial effects or a complex storyline as a motivational tool. One reason for this may be the traditional focus on simulations like SimCity (Maxis, 1989) as promising inspirations for the design of serious games design (Dempsey, 1993). Entertaining simulations traditionally comprehend very simple stories ('Be a good mayor and build a prospering city') and

serious simulation games like PeaceMaker (ImpactGames, 2005), a learning game on the Israeli-Palestinian conflict do not add much to this ('Be a good Politian and lead the region to peace'). The game contains media content with emotionally touching visualizations of human tragedies (figure 6), but beside this, it is a social simulation with one-dimensional social actors (the President, the public opinion, the UN, and so on).



Figure 6. Screenshot with emotional media content from PeaceMaker.

The same is true for another serious game on the current Israeli-Palestine conflict: in Global Conflicts: Palestine (Serious Games Interactive, 2007) the learner plays the role of a young journalist who just arrived in Jerusalem to cover the current Israeli-Palestine conflict from different angles. In order to do so, he has to talk to

different persons involved and to write article on occurring events. As in PeaceMaker some scenes of the game are designed in a way to evoke emotional reaction. For example, figure 7 is a part of a screenshot that shows a Palestinian on his knees who was just arrested by Israeli soldiers and who is being interviewed in this position by the player.

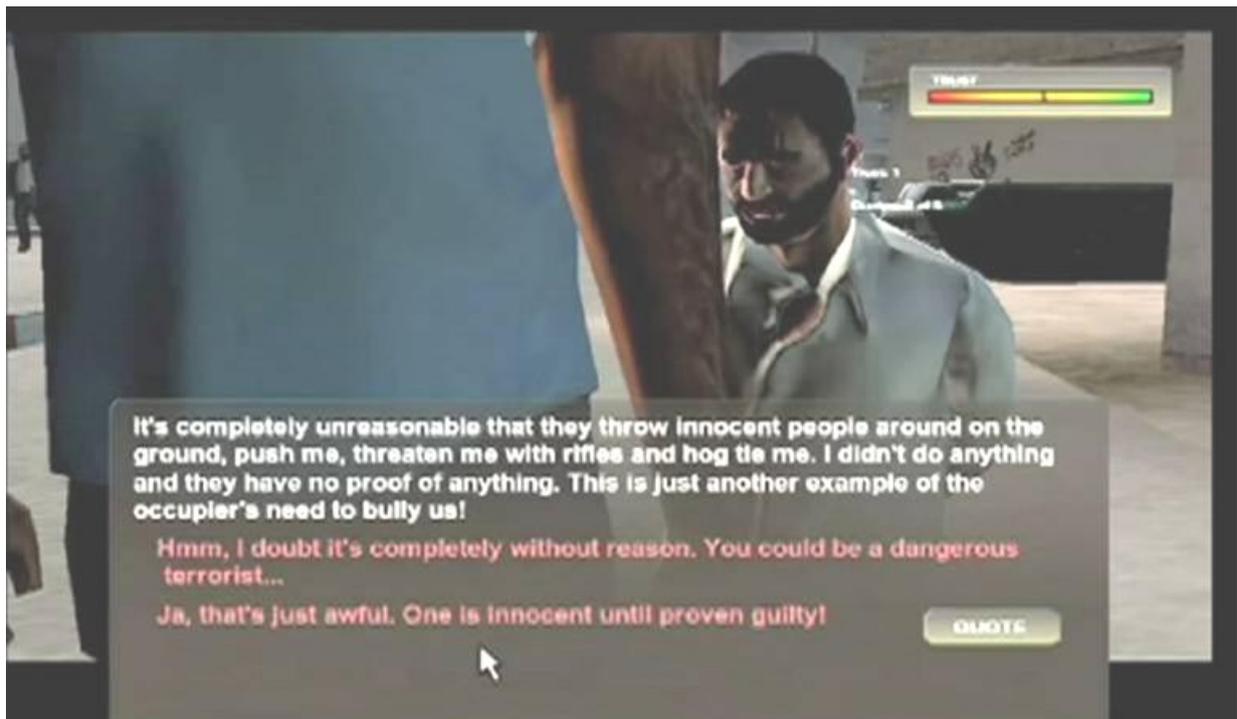


Figure 7. Part of a screenshot from Global Conflicts: Palestine, showing a suspected Palestinian on his knees while the player interviews him.

A good feature of both games is the use of player roles that are in line with important learning activities in the game. For a journalist, for example, it is natural to talk to persons about political issues, to make up his mind about events and to select different quotes from his interview partners for his articles. This is the player's main task and by doing so (and by discussion with peers about what to quote and why) he may learn something about the conflict and its different interest groups, their problems, fears and goals.

Nevertheless, the main characters in the game are rather one-dimensional or social stereotypes. They look very similar; there is no lip synchronicity, eye movement and so on. Thus, the game has no 'real' story. One reason for this lack of parasocial design and storytelling is that the production of these game features today is still rather costly and serious game projects are usually low budgeted, compared with entertaining game titles. However, this situation will change in the near future due to new and low priced development tools for the creation of parasocial NPC design and a complex storyline. Thus, it is reasonable to think about possible uses of sophisticated storytelling and parasocial design for learning games.

Some Specific Challenges of Storytelling in Serious Games for School Teaching

Serious games design is a broad area. The following ideas will focus on learning games for children and adolescents and school curricular content. Learning games in this area are faced with some serious challenges.

Firstly, school related serious games often have to stress learning tasks that are often not as appealing as purely entertaining gameplay activities like fighting, driving, winning etc. For these games, good storytelling and parasocial design may be an important motivational tool. Unfortunately, these games, designed for children and adolescents, cannot simply copy typical plots that are used by many successful entertaining computer games, because these stories often incorporate violence and lots of, for example, gender stereotypes that may foster violent tendencies in high-risk groups or may be seen as offensive or discriminative.

Secondly, the story in such games should appeal to both boys and girls. Unfortunately, it has been clearly shown that there is a gender difference concerning preferences for entertaining stories and types of computer games in general. For example, 2005 in Germany, the favorite game for adolescent boys was the team-based shooter Counterstrike (a Half-Life modification). For girls it was The Sims (Maxis, 2000), a social simulation (Medienpädagogischer Forschungsverbund Südwest, 2005).



Figure 8. Cutout of a screenshot from Neverwinter Night 2, tutorial with kermis to frame learning situations.

Thirdly, a feature of school curriculum related knowledge is that it is often abstract and separated from everyday situations. Typically, it aims at general knowledge, not, for example, at specific knowledge that can be acquired in an apprenticeship. Thus, it is a challenge to create a storyline with learning situations that do not feel 'schoolish', fit smoothly in the story world and nevertheless include learning content that is also covered by school curricula. An example a framing learning situations by using story telling is the

tutorial of fantasy role-playing game *Neverwinter Nights 2* (Obsidian, 2006). Here the player must learn and perform four basic skills: he has to fight with batons, shoot with a bow, perform some spells, and he has to pilfer something. The game frames these learning situations by incorporating them in a kermis where the protagonist and his friends must win a cup (figure 8).

An Example of a Frame Story for a Serious Game on Optics

Now, to illustrate an attempt to deal with these problems, the frame story of the ELEKTRA Demonstrator is being presented. The purpose of this research game software is to develop and test the educational usage of instructional methods of computer games. Its focus is on learning in high-end 3D environments for 13+ students in optics, mainly via homework learning.

The storytelling in the ELEKTRA demonstrator tries to deal with the first three above mentioned challenges by using a mystic adventure story with magic elements. The main location is Florence; the time is the near future (figure 9, a screenshot from the games intro video). The story is dramatic and hierarchically task-oriented. A young male (George) and female student (Lisa) meet each other and get involved in the struggle between the female's grand-uncle Leo, an old professor of History of Natural Science and director of a natural science edutainment park (called NSEP), a crazy villain scientist (and his myrmidons) and an ancient secret society (the 'Galileans'). Leo is kidnapped at the beginning of the story, and George and Lisa must rescue him and search for an old lost renaissance manuscript, Galileo Galilei's secret diary, which is the story's MacGuffin (as Hitchcock used to call an elusive object that propels the story). During the chase, the couple immerse themselves in the world of the Renaissance and its

scientific achievements, and has to use this knowledge to reach their goals.



Figure 9. Screenshot from the intro of the research game software ELEKTRA.

This plot obviously does not try to reinvent the wheel, but is inspired by narrative elements that are currently in vogue (cf. the novels of Dan Brown) and the successful adventure game series Broken Sword.

The plot, with its links to the Renaissance and Galileo Galilei, provides the opportunity to integrate content that is linked to the learning topic (optics) in a smooth way. There are two reasons for choosing a young male and female student as the protagonists and avatars of the story. Firstly, pupils in junior high school have the tendency to want to be young adults. Thus, young adults as avatars may foster the identification of the learners with the main characters. Secondly, choosing male and female protagonists provides the opportunity to raise an issue that is of particular interest for adolescents: romantic relationships.



Figure 10. Screenshot from the French version of the research game software ELEKTRA. NPC Galileo, a pedagogical agent, with experimental equipment on optics in the background.

The main characters of the plot are surrounded by several NPCs that fulfill different functions for the story and the learning tasks, especially as virtual pedagogical agents (for this term, cf. Gunz & Haake, 2005; cf. figure 10, the ‘ghost of Galileo’, a pedagogical agent, in the ELEKTRA demonstrator). The NPCs provide missions and learning tasks to the player, reward him, and give him learning hints, learning tools and so on. It is sensible to distribute the function of a pedagogical agent between several and multidimensional characters in order to avoid that one character is being interpreted as a kind of stealth ‘school teacher’ which may destroy the immersion in the story world.

The integration of the story into the game is not limited to the games starting point. On the contrary, learning situations and story situations in the game take turns in the game and a focus of the game design is the smooth link between these two game aspects. It is foreseeable that only an interdisciplinary approach to this linking - involving a close collaboration between pedagogues and professional creative writers and performers (using character bibles, production with voice actors and so on) will lead to sufficient result.

Impact on Practice and Research

Motivation in state-of-the-art computer games today is not only based on winning against the machine or on competition or survival etc., but on taken part in a heroes or heroines story. Sophisticated and motivating stories present a hero, who has a meaningful goal, a personal background and a multidimensional character, he has to overcome various obstacles and to suffer backlashes in order to reach his goal (typical obstacles are other persons, nature, and the hero himself, his weaknesses). Incorporated in the ongoing story are parasocial situations that include emotions and actions that usually occur only in real social interactions. All this motivates the player to perform certain tasks that are incorporated in the story and promote it.

If designers of serious games want to use this motivational method, they must learn how to tell interactive stories that appeal to their specific target learners and allow the integration of meaningful learning activities without destroying the motivation created by the story. This is a creative challenge that calls for an interdisciplinary research on digital storytelling and learning. At present, there are just attempts in this area. Several perspectives are obvious:

Firstly, research on successful storytelling in respect to specific learner groups is necessary. For example, starting points for this can be practitioner's guidelines for storytelling for children and thorough analysis of storytelling and parasocial design in specific computer games. Secondly, empirical research (both qualitative and quantitative), concerning the effects of different ways of parasocial design and storytelling on motivation in general and on learning in particular. This must include ways of implementation of serious games in realistic educational institutions and professional training must be developed and evaluated.

Thirdly, multiplayer online games are of growing importance in the area of digital gaming. Similarly, group learning via Internet or LAN will probably be of growing importance for serious gaming as well. Thus, storytelling that offers the participation of various players is of particular interest for educational research on interactive learning stories.

All of these research efforts should take into account not only storytelling in itself but the connection of storytelling methods and other instructional design methods for serious games in general. The objective of all of these efforts in the long run should be the development of effective adaptive storytelling rules for specific learning goals and learning content in reference to specific traits of learners - boys and girls, single learners and group learners, children, adolescents and adults, competitive or cooperative players and so on.

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Key Terms

- Motivation: psychological processes that refer to the initiation, intensity and persistence of behavior
- Parasocial (media) effects: emotions, actions and relationships that are caused by the illusion of a direct (usually face-to-face) social interaction between a media user and a media character, e.g. a TV host or a NPC
- Parasocial game design: game design that aims at the triggering of parasocial effects
- Parasocial learning: learning that is strongly influenced by parasocial effects
- Story: a sequence of events that centers on a hero (a person or a group) who overcomes obstacles in order to reach a goal; typical obstacles are other persons, nature, and the hero itself (his weaknesses)
- Virtual extrinsic motivation: a motivation to perform an action because of its high valued consequences in a fictional (game) world

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