

“I’m sure I made the right choice!” - Towards an Architecture to Influence Player’s Behaviors in Interactive Stories

Rui Figueiredo and Ana Paiva
rui.figueiredo@gaips.inesc-id.pt, ana.paiva@inesc-id.pt

INESC-ID, Instituto Superior Técnico, Universidade Técnica de Lisboa, Av. Prof.
Cavaco Silva - Taguspark, 2744-016 Porto Salvo, Portugal

Abstract. In this paper we present an architecture for Interactive Storytelling systems that dynamically selects persuasive manipulations to increase the likelihood of the users experiencing the story as intended by an author. We also describe a study using a text-based interactive storytelling system where the architecture was applied.

Keywords: Interactive Storytelling, Persuasion, Interactive Narrative

1 Introduction

In every interactive storytelling system the user is an active element in the development of the story. And as such will experience *Agency* [9], if he can feel that his actions have consequences on how the plot unfolds. Unfortunately, it is very difficult for an author to create content to accommodate every possible user action, especially because if the user was truly able to wander freely in a virtual story world, most of his actions might not be related to the story. This fine balance between user interactivity and story coherence is often described as the *boundary problem* [7].

Ideally the user should have freedom, however only in the confines of what is reasonable in the context of the story that is taking place in the virtual story world. Several approaches have been taken to deal with this problem. Most of them explicitly limit what the user can perform or use coercive techniques to guarantee the development of the story [8] [13] [6] [1] [3].

However, would it not be nice if we could author an interactive story and then describe which parts were important, so that the system could make those more likely to be experienced by the users? Especially if the system could do so in real time without using coercive techniques that make the user feel trapped and without real choice.

There is research that supports the idea that we can use results from the area of persuasion to achieve that goal. In some circumstances people display the same patterns of behavior between themselves and between a computer [10, 5](e.g. reciprocating towards a computer program). So, it should be possible to use the concepts from the area of persuasion in social psychology to elicit these

circumstances where the system is able to increase the likelihood of the user acting in ways that are seen as desirable to the author.

In this paper we describe an architecture, which we have named *Persu*, that is able to take an encoding of what are desirable experiences and translate it into non-coercive interventions during an interactive story, and as such, increase the likelihood of the user having a particular desirable experience.

2 Using persuasion to influence choices

The area of persuasion in social psychology is directed to the creation of stimuli (e.g. visual, textual, etc) that are able to affect an individual's behavior [11]. This is usually done by creating messages that are able to change an individual's attitude towards a particular subject. Additionally to the creation of persuasive messages that produce attitude change, and consequently might lead to changes in behavior [4], there are other manipulations that have been proven successful in influencing behavior and which rely on more instinctual features, and which have even been used in an interactive storytelling context [12]. For example, reciprocity, which can be described as the sense of obligation to return a favor every time someone does us one. It has been shown to manifest itself in human-computer interactions [5].

Commitment is also a popular technique, and the one we decided to test in the study we describe in this paper. The idea behind making people commit is that it leads to a self-reflection which changes the perception of the true merits that were at stake at the time of the commitment. For example, at the race tracks, people feel much more confident that their horse will win after they have placed their bet in it [2].

3 Persu - An architecture to influence player's behaviors in interactive stories

Persu is an architecture for Interactive Storytelling (IS) systems whose goal is to influence the user in order to shape his/her experience. The experience of the user is guided by a policy, defined by an author, that encodes desirable attributes for the experience. *Persu* is composed of four modules (Figure 1): the Story Facilitator agent, the persuasive context, the persuasive manipulations' container and the realization engine.

This architecture is intended to be general enough so that it can be integrated with an Interactive Storytelling (IS) system. Yet, for that to be possible the system must verify two requirements. First, it is necessary that the effects of the actions in the virtual world can be determined. This is necessary so that it is possible to compute if an action satisfies or hinders the policy, and have the *Persu* act accordingly in each case. Secondly, it is necessary that the IS system is able to inform *Persu* of when an user's action becomes performable, so that *Persu* can take action before the user actually performs it.

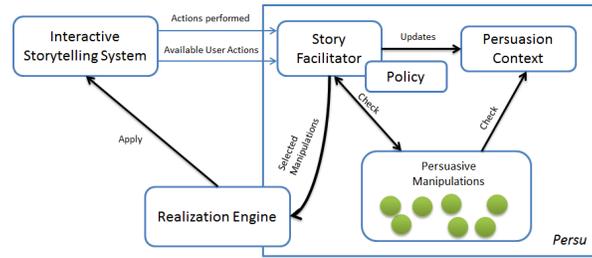


Fig. 1. Persu Architecture schema

Whenever an action is performed the IS system should inform the *Story Facilitator* (SF) agent. This agent contains the logic necessary to update all the persuasion system’s modules and to decide when and how to influence the user’s choices. This process is guided by the policy, which is comprised of goals defined by the author. These goals contain a description of the virtual world that can be satisfied by the user’s actions.

As soon as the SF agent is informed of an action that is performed in the virtual world, it updates the persuasion context with a description of that action’s effects. The persuasion context contains the information necessary for the SF agent to decide if a particular manipulation can be applied. For example, a manipulation whose goal is to persuade the user using an expert source has to be applied in a situation where a character that can be seen as an expert has entered the scene.

The persuasive manipulations are composed by a set of parameters that the SF agent can use to decide when to apply them. A manipulation contains a target, which defines a set of actions that it can affect (e.g. harming a particular character), a valence which states if the manipulation is in favor or in opposition to the actions it targets, and a set of preconditions that are matched against the persuasion context so that the SF agent can decide if the manipulation is applicable.

Finally, there is the *Realization Engine* which is a container for the realizations of the manipulations. Because we want to use *Persu* in different environments, both text-based as well as non-text based (e.g. 2D or 3D) IS systems we have developed the concept of a realization of a manipulation, which is an implementation specific way of achieving a manipulation in the particular IS system that is being used.

4 Study

To perform the study we developed a simple interactive text-based application where the user is presented with a description of the events that occur in a fictional environment followed by a set of options the describe his character’s actions. The user progresses through the story by choosing an option that will lead to another part of the story, eventually reaching an ending.

To integrate this simple interactive storytelling system with *Persu* we annotated each part of the story with the characters' actions and their effects, and we also annotated the user's actions with their effects. Each time the user performs an action (by choosing one of the available options), the effects of that action are sent to the *StoryFacilitator* agent together with the effects of the characters' actions contained in the part of the story that follows the user's choice, and also the set of actions (options) that the user can perform in this new part of the story.

We wanted to test if it would be possible, using our architecture, to introduce a situation in a story where the user would be led to committing into helping (or not) a group of characters. So that later on in the story we could introduce another situation where we could explore the consistency with the initial commitment. The rationale for making the user commit and then present him a related situation where he can choose to be consistent with the early commitment is that there is evidence [2] that people tend to be consistent in these situations.

In the story the user is an adventurer that has to save a village from a tyrant. And to do so, he must enter a dungeon where he encounters another group of adventurers. Later on in the story, depending on how the user plays he can become a prisoner and be saved by the adventurers who then go as a group to face the tyrant, or he can escape being made a prisoner and kill the tyrant on his own.

To test the architecture we created a policy that included the goal of the user becoming a prisoner (arbitrary desired experience by the author) and that the user should be committed into helping (or not) the adventurers. When the user encounters the adventurers at the beginning of the story one of their available options is to ask the user for help (although this is not an action that the user can perform we can make a manipulation in *Persu* to target it, since conceptually there is no difference between an action performed by the user or by the characters). Later in the story there is a situation where the user re-encounters the adventurers, which will ask the user for one of his items. If the user accepts, the lack of that item will eventually lead him to become a prisoner, whereas if he rejects he will be able to complete the story without becoming trapped.

We created a manipulation that targets the action of the adventurers asking the user for help. That manipulation will be chosen because it targets an action that satisfies the policy goal of making the user commit. The (text) realization for the manipulation involves a description of the adventurers asking the user for help and the options for the user to accept or reject.

The other manipulation we created targets the action of the user giving the item to the adventurers. The manipulation will be chosen when the user is in a situation where he can perform the action, because it has the effect of the user becoming a prisoner, which satisfies one of the policy goals. The realization of this manipulation changes the way the adventurers approach the user (i.e. a reference is made regarding the user previously helping or not the characters). It also changes the story so that, if the user is consistent with his previous choice

he/she will ultimately become a prisoner. This way causing the desired ending to be achieved through the most probable action and without coercing the user to take it.

In the control version the manipulations are not applied and therefore, the adventurers do not approach the user to create a situation where the user has to commit. Later on in the story, when the user is approached by the adventurers once again, if he chooses to help the characters by giving the item he/she eventually becomes a prisoner, and if he/she chooses not to do so the alternative ending is achieved.

4.1 Results

We conducted a between subjects experiment with 15 participants with mean age 23. The subjects were divided in a control group (6 male, 1 female) that played a version with no manipulations and a test group (4 male, 4 female) that played a version with manipulations. The system recorded each of their particular choices and the time they spent on each of them. Both versions ran on a web based choose your own adventure application (Figure 2), one with *Persu* enabled and one without *Persu*.

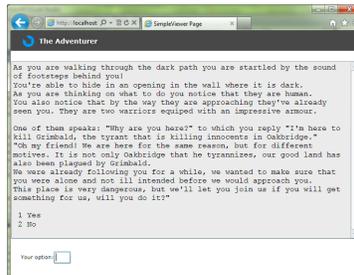


Fig. 2. Web version of a choose your own adventure story

In the control version 3 subjects (~50%) decided to help the characters (which led to the preferred ending), 3 decided not to help (~50%), and one did not finish the story.

In the version that used the Persu architecture with the commitment manipulation, 5 subjects decided to help the characters and were then consistent with that choice at the end (~83%), one decided to help the characters and later was not consistent with this choice (~17%) and 2 did not play the story until the end.

Although limited, the results are encouraging. The preferred ending was chosen by all individuals except one in the manipulated version in contrast with the control version where half chose each of the endings.

5 Conclusions

In this paper we have described the *Persu* architecture, and some of its supporting concepts from the area of Persuasion. The architecture allows an author to define a policy which will allow the system to dynamically select the right manipulations and apply them at the appropriate times in order to non-coercively increase the likelihood of the the user acting in way that satisfies the policy.

We describe a study where we implemented a text-based interactive story that feeds the characters and user's actions into our persuasion architecture (simulating a multi-agent environment) which in turn responds with the appropriate manipulations that are realized through a text realization engine.

Acknowledgements

This work was partially supported by a scholarship (SFRH / BD / 31362 / 2006) granted by the Fundação para a Ciência e a Tecnologia (FCT). The authors are solely responsible for the content of this publication. It does not represent the opinion of FCT, which is not responsible for any use that might be made of data appearing therein.

References

1. Cavazza, M., Martin, O., Charles, F., Marichal, X., Mead, S.: Interacting with virtual characters in interactive storytelling. In: IEEE/ACM ISMAR (2003)
2. Cialdini, R.B.: Influence: Science and Practice. Allyn & Bacon, 5th edn. (2001)
3. Figueiredo, R., Brisson, A., Aylett, R., Paiva, A.: Emergent stories facilitated - an architecture to generate stories using intelligent synthetic characters. In: ICIDS. Springer (2008)
4. Fishbein, M., Ajzen, I.: Acceptance, yielding, and impact: Cognitive processes in persuasion. Cognitive responses in persuasion (1981)
5. Fogg, B.J.: Charismatic computers: creating more likable and persuasive interactive technologies by leveraging principles from social psychology. Ph.D. thesis (1998)
6. Harris, J., Young, R.M.: Proactive mediation in plan-based narrative environments. IEEE Transactions on Computational Intelligence and AI in Games (2010)
7. Magerko, B.: Evaluating preemptive story direction in the interactive drama architecture. Journal of Game Development (2007)
8. Mateas, M., Stern, A.: Façade: An experiment in building a fully-realized interactive drama. In: Game Developers Conference (2003)
9. Murray, J.: Hamlet on the Holodeck - The Future of Narrative in Cyberspace. MIT Press (1997)
10. Nass, C., Fogg, B., Moon, Y.: Can computers be teammates? International Journal of Human Computer Studies 45(6), 669–678 (Dec 1996)
11. Petty, R., Cacioppo, J.: The elaboration likelihood model of persuasion. Advances in experimental social psychology 19, 123205 (1986)
12. Roberts, D., Furst, M., Dorn, B., Isbell, C.: Using influence and persuasion to shape player experiences. In: ACM SIGGRAPH Symposium on Video Games (2009)
13. Young, M., Riedl, M.: Integrating plan-based behavior generation with game environments. In: ACE. p. 370 (2005)