Persu - An architecture to apply persuasion in Interactive Storytelling

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ABSTRACT

In this paper we describe an architecture to influence a user in an interactive storytelling context that is based on results from the social psychology's area of persuasion. Several important concepts of persuasion, such as how people make decisions, and how we can influence that process are discussed. We describe the several components of the architecture and how we applied them in a small study where we have successfully influenced the players of a story in following a specific path.

Categories and Subject Descriptors

I.2.11 [**Artificial Intelligence**]: Distributed Artificial Intelligence—*Intelligent Agents*

General Terms

Human Factors, Experimentation

Keywords

Digital Interactive Storytelling, Persuasion

1. INTRODUCTION

In Interactive Storytelling (IS) the user plays a special role. Unlike traditional media, in IS the user is given the ability to influence how the story unfolds. This has the advantage of increasing user engagement, as the user is required to have an active role in the story. However, it also creates the opportunity for the user to act in ways that are not seen as ideal by the author of the story.

What most interactive storytelling systems do to deal with situations where the user has the ability to act in such ways that preclude the development of the story in a fashion that satisfies the author's goals (e.g. aesthetic, educational, etc) is to coerce the user to follow a particular course of action or to completely disallow the user's actions that are harming to the story. Often times in ways that are very noticeable by the users, and detract from the suspension of disbelief and from the player's feeling of *Agency* [20].

Agency in IS is a desirable quality that can be described as "the satisfying power to take meaningful action and see the results of our decisions and choices" [20]. It is easy to acknowledge that each time the system intervenes to change (or disallow) the outcome of an user's action that will be perceived negatively in respect to the user's feeling of agency.

An alternative to coercing the user is to try to persuade him into acting in ways that satisfy the author's goals. If a system is able to insert persuasive content in the appropriate instances, it will help create an experience where the user feels more agency while acting in such a way that satisfies the author's goals.

Drawing from the social psychology's area of Persuasion we propose an architecture that is capable of dynamically providing persuasive content at the appropriate times in order to increase the likelihood of a user acting in such a fashion that satisfies a set of author specified goals for the interactive story. In this paper we describe that architecture and its use in study using a web application that implements a "choose your own adventure" story, where we were successfully able to mold the user's experience.

2. RELATED WORK

The main goal of the area of Interactive Storytelling is to find ways of incorporating the user as an active element of the story. Ideally, the user should be able to act in whatever fashion he sees as fit within the boundaries of the story world. However, if we would take this literally, this would allow the user to engage in behaviors that are meaningless and that add nothing to the purpose of the story. This conflicting dichotomy between user freedom and story coherence is often described as the *boundary problem* [17].

The several existing IS architectures approach this problem in different ways. For example, in Mimesis [30] [31], a story is the output of a planner that takes both into account the user and the characters' actions. Each time the user deviates from the plan the system tries to accommodate the user's action by creating an alternative plan that still conveys the author-intended story while incorporating the new action. If that is not possible the system intervenes by changing the incompatible effect of the action [29] (an example of this would be to make the user miss every time he would try to shoot an important character in the story).

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This procedure was named *mediation* of user's actions.

Later, the Mediation procedure was enhanced by actively searching where the user could break the story in order to adapt the story plan in such a way that precludes those situations [15].

In Façade [18] [19] the story is composed of a set of beats that specify the behaviors of the agents and also how they should react to the user during the beat. User's actions are mapped to one of several possible *discourse acts* where each represents a class of possible user actions (e.g. agree, disagree, thank, etc). If the beat does not contain a mapping for a particular discourse act, or if the user's action does not map to any discourse act, it is ignored.

In FearNot! [9] the user interacts by giving advices to one of the characters. The story in FearNot! is represented through a collection of episodes, where in each the content displayed emerges [1] through the interactions between the characters. In between episodes the user can interact with one of the characters by providing advices on how to cope with previous events. The advices influence the behavior of the character which in turn will affect the development of the story. If the user writes something the character does not understand or can not oblige to, it will just ignore the user's request and ask for an alternative.

Research developed in Mark Cavazza's group [7] allows the user to interact with the characters by manipulating resources in the story world or by using natural language to alter the characters' behaviors by proving relevant information.

These approaches focus on integrating the user as an active element in the story and on ways to deal with user actions that interfere with the development of the story as they happen. The only exception is *Mimesis* pro-active mediation [15] where the story plan is altered to preclude situations where harming actions can occur.

Alternative approaches have been tested successfully and show that it is possible to influence the user's actions in an interactive story. For example, in [27] it is shown that the notion of scarcity can be successfully applied to increase the likelihood of the user following a particular path in an interactive story. In [10], an expert source [23] manipulation was used to increase the likelihood of the user choosing a particular option in a choose your own adventure style story. A notable difference in approach of these solutions is that the system acts before the user performs the action, whereas on most traditional IS systems the system only acts after the user has taken steps towards performing an action that is not ideal in the context of the story envisioned by the author. Therefore, an approach that tries to influence the user can be seen as complementary to traditional approaches used to deal with improper user action, since, even when the influence attempts have no effect, conventional methods to deal with the user's actions can still be applied.

3. PERSUASION AND INTERACTIVE STORYTELLING, HOW CAN IT WORK?

Persuasion is the area of social psychology that deals with attitude change, where attitude in this context is referred to as "general evaluations that are capable of guiding behavioral, affective and cognitive processes" [23] [11].

Some of the processes used in the area of persuasion could be useful when shaping the user experience through an interactive story. By using those processes the system should be able to increase the likelihood of the user having a run through the story that satisfies author-defined entertainment, educational or even aesthetic goals. With the added advantage that if the system fails to persuade the user, it can still apply more invasive methods to guarantee that the user does not break the story (e.g. not allowing him to perform an harmful action).

3.1 Affecting behavior through attitude-change

Research has shown that people employ different cognitive processes when forming attitudes [23]. Those processes can be described using a spectrum that ranges from a state of high elaboration, where an individual carefully scrutinizes the elements that are important to form the attitude, to a state where there is no careful consideration of the persuasive message (e.g. visual, written, etc) and relies only on cues(take for example the effect that a brand has, often the brand itself is sufficient to create a positive attitude towards a product).

Cognitively, when exposed to a persuasive message, individuals who deeply scrutinize the message generate more issue-relevant cognitive responses in the form of supportive or unsupportive arguments towards the advocacy contained in the message [12] [6]. On the other hand, if the amount of scrutiny is low, the cognitive responses generated tend to be low in number and not directly related to the message [21]. Usually, persuasive messages that generate predominantly positive cognitive responses, and therefore tend to increase the favorableness of the attitude towards the advocacy are referred to as *Strong Messages*, whereas messages that generate predominantly negative cognitive responses and therefore produce negative attitudes are referred to as *Weak messages* [23] (the process by which messages are evaluated to determine their effect, a priori, is named though-listing [6]).

The factors that determine which cognitive process is used are the *motivation* and the *ability* to process the message [23] [21]. If we are motivated we are more likely to engage in cognitive effort to really assess the persuasive message. We also need to have the ability to do so, if we can not truly understand the persuasive message we are unable to create issue-relevant cognitive responses. If we lack either motivation or ability we are typically vulnerable to cues in the message, for example: is the source of the message an expert? [10] [28].

To clarify this, imagine the examples taken from the persuasion literature that use an increase in personal involvement/responsibility to create a situation where the motivation to process the message is high. In [21] by using a persuasive message advocating the decrease in coed visitation hours in an university and just by stating that the new policy would apply to them, researchers were able to achieve different responses in terms of attitude in students. Students that felt affected by the new policy had less positive attitudes than the students that were led to believe they would be unaffected. Also, the number of cognitive responses generated (arguments in favor or against) were significantly higher for the group where personal involvement was increased.

When lacking motivation or ability to process the message we are vulnerable to cues [23]. For example, in [24], attitudes were made more favorable by decreasing personal involvement and leading the subjects to believe that the source of the message was an expert. In the same conditions, when subjects were led to believe that the message was from an

inexpert source, the attitudes were negative for the same exact message, confirming that in low elaboration conditions message scrutiny is not determinant of the resulting attitude.

There are several manipulations that target motivation and ability to process a message. For example, manipulation of personal involvement [21] [22]; the perception of sharing responsibility [13] [16]; message repetition [5] and distraction [25] and also the number of sources linked to a message [14].

When in a situation of low motivation or lack of ability to process a message several cues were successfully used to influence attitudes. For example, source expertise [26], source attractiveness [26], the number of arguments in a message [22], visual prominence [4] and even music [2].

Alternatively, there are also other manipulations that have been proven successful in influencing behavior and that rely on more instinctual features. For example, reciprocity, which can be described as the sense of obligation to return a favor every time someone does us one. There are numerous studies that confirm that reciprocity can be found in humans of all cultures [8] [3]. Calidini, in his book [8] exposes together with reciprocity, five other social dynamics that have been proven to affect behavior. One of them, *Scarcity*, has been used in a study where it was successful in increasing the likelihood of the users choosing a particular path through an interactive story [27].

If we model user actions in terms of their effect on author goals, and if the IS system can determine which actions the user can perform at any given moment, then given an appropriate representation of author goals, it would be able to choose persuasive content that targets the user's actions in order to increase or decrease the likelihood of the user performing them. This is the basis for the architecture that we will describe next and that we used in a simple validation study.

4. PERSU - AN ARCHITECTURE TO PERSUADE

In order to contextualize the architecture first it is necessary to expose some concepts that motivate its components. Central to the architecture is the notion of persuasive manipulation. A persuasive manipulation in the context of the social psychology's area of persuasion is described as a fabricated stimuli that has a predictable effect on the receiver's attitudes. To model a persuasive message computationally, besides the message itself, it is necessary to explicitly model its target and valence. For example, in the context of interactive storytelling the target will typically be a particular action that we want the user to perform (or not to perform), and the valence explicitly states if the message is an advocacy towards or against the performing that particular action.

Also, most persuasive manipulations are only applicable in a particular context, and that information needs to be contained in the description of the manipulation itself. For example, a manipulation that tries 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, is available.

Finally, the policy can be described as a description of the experience a particular user should have while traversing the story. Through the information contained in the policy

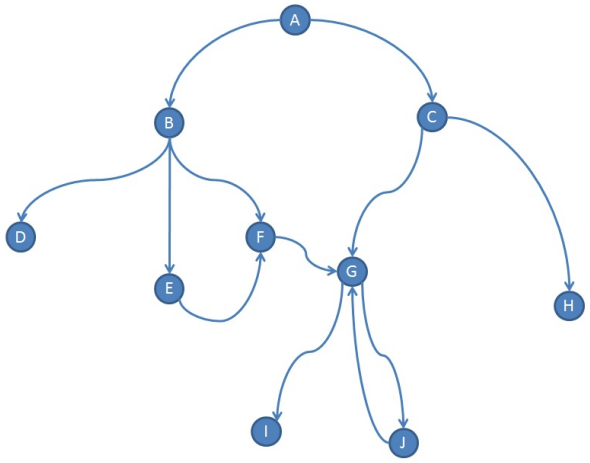

Figure 1: Representation of a Interactive Story

Table 1: Example of annotated actions

ActionID	Effect
AcceptGraceSuggestion	AffinityTowards(Grace) + 1; AffinityTowards(Trip) -1
AcceptTripSuggestion	AffinityTowards(Trip) + 1; AffinityTowards(Grace) -1

it must be possible to infer the most appropriate course of action that the user should take during the interactive story. This should be the information that the agent responsible for monitoring the progress of the user, which we have named *Story Facilitator* agent, uses to choose when and how to influence the user's choices.

The remainder of this section will focus on a formalization of interactive stories and a description of the Context, Manipulation and Policy.

4.1 Interactive Story

A story in an interactive storytelling (IS) system can be described as a sequence of scenes where the user can act in a way that influences the unfolding of the story. If we abstract away all other information every IS system can be described as a graph such as the one in Figure 1 where each node represents a particular scene, and each arc an action that the user can perform and that changes the story world in such a way that it progresses to a different scene (another situation where the user can perform other meaningful actions).

In order for it to be possible to define an influence policy that describes which actions are better or worse in terms of user experience, the actions in the story world need to be annotated in terms of their effect. For example, taking the example of *Façade* [19], imagine that the author defined a policy where the user should end the game with a great affinity for Grace (one of the characters in *Façade*). So that the system can choose the right persuasive manipulations from the pool of available manipulations, the available actions and their respective effects must be specified, so that the system can choose to present content that increases the likelihood of the user performing actions that increase the affinity of the user towards Grace (Table 1).

Table 2: Attributes of a Manipulation

ManipulationID	Expert Source In Dark Passageway
Type	Expert Source
Valence	Positive
Target	Selection of Path to the Armory
Preconditions	Expert Source Character Available User in Dark Passageway

4.2 Context

Every example of persuasive manipulations in the persuasion literature describes argumentation that is context dependent [23]. Imagine for example that we want our system to be able to take advantage of a situation where the character the user controls owes a favor to another character in the story (i.e. reciprocity [8]).

For this to be possible the system has to keep track of relevant events that make up the persuasion context. In this simple example, the persuasion context has to contain the description that one of the characters has performed a favor to the user, in order for a reciprocity manipulation to be activated. The role of the context is to store relevant events that later can be used to check the appropriateness of the application of manipulations.

4.3 Persuasive Manipulations

As defined by the policy there are situations during the story where, if a manipulation is available, it should be used by the Story Facilitator (SF) agent to increase the likelihood of the user choosing the action that reflects what the author thinks is best for that particular user and story as encoded in the policy.

So that the SF agent knows which manipulations to choose it needs, at any given time, to know which are the actions available to the user and what is their effect on the relevant story variables. Additionally, each manipulation needs to be annotated with which action it targets as well as its valence (in support or in opposition of). Referring to the example taken from [10] where the user is in a situation where he has several options, one of them is to follow a path to an armory. The system tries to influence the user in choosing that path by presenting it using an expert source manipulation (Table 2). For that choice to be possible the user has to be in a particular location and there has to be a character that the user is likely to perceive as an expert, available to be inserted in the story.

Or as another example, imagine that we wanted to represent a strong message manipulation that advocated that the player in *Façade* [19] should do something to please the character named Grace, that manipulation could be represented as in Table 3.

As illustrated by the example manipulations above, the SF agent uses the information contained in the representation of the manipulation to check if it is applicable, by checking if its preconditions are coherent with the current context, and if the actions they target satisfy the author goals encoded in the policy, in this case that the user goes through the "path to the armory" (Table 2) or that the player's affinity towards a particular character increases when it is already superior to the affinity towards another particular character (Table 3).

Table 3: Attributes of a Manipulation

ManipulationID	StrongMessage Compliment Grace
Type	Strong Message
Valence	Positive
Target	Actions that increase affinity towards Grace
Preconditions	Affinity towards Grace greater than 5 & Affinity towards Trip less than Grace

4.3.1 Realizations

Because we want to use our system in different environments (e.g. text-based as well as in 3D visual systems) we have developed the concept of Realization of a manipulation. Imagine for example an adventure where the user is in a situation where a character has done him a favor and now is asking for a favor which, if the user accepts, will influence how the story will unfold. If the story is being played in a textual version, when the Story Facilitator agent selects to perform the *Reciprocity* manipulation this will be concretized by displaying a textual description of the request of the character to the user. However, if the story is being played in a 3D multi-agent system, the same manipulation will be achieved by the taking control of one of the characters by the Story Facilitator and by making it perform the request.

Another benefit of having explicit realizations for the manipulations is that we can state explicitly how they should be combined. Using once more the example from [10] where an expert source manipulation was used, there are several natural language challenges to overcome before achieving a system that can automatically combine the manipulation with the story text automatically. The text that comprises the manipulation has to be inserted in a very particular part of the text of the story:

> ...Inside there's a man who is whispering "come here!" He says that you should go to the armory where there are magical items that can help you. He then describes you the path from there to the armory. As he finishes describing the path you hear footsteps from the passageway and before you know it he is gone. You wait silently until you cannot hear the footsteps anymore. While you wait you ponder on what the man has told you.

And the version with the manipulation is:

> ...Inside there's a man who is whispering "come here!" You go to him and he says he's from Oakbridge and that he was an adventurer like you, he says he's been trapped inside for a very long time, more than he can remember. He says that you should go to the armory where there are magical items that can help you...

Furthermore, the application of this manipulation in an interactive storytelling system where the story is told by virtual characters is different, involving not textual manipulation but instead the choice of the right character (the one that can be used as an expert source).

Table 4: Expert Source Realization for text-based IS System

ManipulationIDs	Expert Source In Dark Passageway
Implementation Details	**Insert**: "You go to him and he says he's from Oakbridge and that he was an adventurer like you, he says he's been trapped inside for a very long time, more than he can remember." **After**: "Inside there's a man who is whispering "come here!"

Table 5: Expert Source Realization for a multi-agent system

ManipulationIDs	Expert Source In DarkPassageway
Implementation Details	**Insert Character**: TravelerFromOakbridge **Make Character Say**: "I'm was an adventurer like you. I've been trapped here for a very long time."

Therefore we define the concept of Realization of persuasive manipulations to be a implementation designed specifically for the system where it is being applied, for example in the case of the text-based adventure interactive storytelling system used in [10] it could be represented by the description in Table 4 and for a multi-agent based system that tells the same story by the description in Table 5.

4.4 Policy

Central to the notion of providing a user with an ideal interactive experience is the ability for an author to specify it. For that to be possible there needs to be enough information in the system so that the consequences of the user's actions can be computed. Furthermore, the author has to have the ability to specify which actions contribute and which actions hinder the ideal experience.

The policy is then the specification of what the author thinks is the ideal interactive experience for the user, and it should be specified using information regarding the user and also regarding the consequences of the user's actions while playing the interactive story. Conceptually we decided to model this by requiring the author to include information about the effects of the user's actions and also to create a set of goals that relate to the effects of the actions the user decides to perform. Those goals allow the system to select the right persuasive manipulations based on the available actions the user has in each particular part of the story.

Imagine the story of *Façade* [19] where the user plays the role of a friend of a troubled couple (Grace and Trip). As the story develops a conflict emerges between Grace and Trip and one of the measures the system keeps track of is the affinity of the user towards the two characters. Inevitably, as the story progresses the user tends to take the side of one of the characters.

Table 6: Example of a Policy with the encoding of actions and manipulations

Actions	
-AcceptGraceSuggestion	AffinityTowards(Grace) + 1; AffinityTowards(Trip) - 1
-AcceptTripSuggestion	AffinityTowards(Trip) + 1; AffinityTowards(Grace) - 1
Manipulations	
-ManipulationID	StrongDrinkStrongMessage
-Type	Strong Message
-Valence	Positive
-Target	Trip's Drink Suggestion
-Preconditions	Trip & Grace have suggested drinks
-ManipulationID	StrongDrinkWeakMessage
-Type	Weak Message
-Valence	Positive
-Target	Trip's Drink Suggestion
-Preconditions	Trip & Grace have suggested drinks
-ManipulationID	SofterDrinkStrongMessage
-Type	Strong Message
-Valence	Positive
-Target	Grace's Drink Suggestion
-Preconditions	Trip & Grace have suggested drinks
-ManipulationID	SofterDrinkWeakMessage
-Type	Weak Message
-Valence	Positive
-Target	Grace's Drink Suggestion
-Preconditions	Trip & Grace have suggested drinks
Policy	
-If GenderUser(male)	Increase affinity towards Trip
-If GenderUser(female)	Increase affinity towards Grace

A very simple goal for a policy that is useful as an example, is that the user should try to empathize with the character that matches his/her gender. Imagine the scene where Grace and Trip offer the player a drink. In this scene Trip makes a suggestion for a drink (a Whiskey or a Martini) and Grace tries to counter argue by suggesting a "simpler drink like Chardonnay". Our response as players will influence our affinity towards Trip or Grace as we accept one or the other's suggestions. Although in *Façade* there is no attempt to influence the player's choice in any way, we could try to do so by creating strong and weak messages advocating either choice (for the sake of simplicity imagine that it is possible to create compelling messages for either case). The system could then choose the strong message advocating the "strong" drinks and a weak message that recommended the softer drinks if the user's gender is male and vice-versa otherwise. Table 6 exemplifies the actions, manipulations and policy needed to achieve this scenario.

In sum, the architecture can be viewed as the representation in Figure 2 where the IS system informs the SF agent of which actions are being performed in the story world (both character actions and user actions) and which actions the user can perform at any given point. The SF agent uses this information to update the Persuasion Context and check, according to the Policy if there are any available manip-

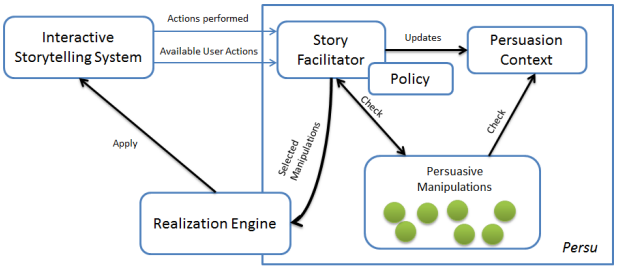

Figure 2: Persu Architecture schema

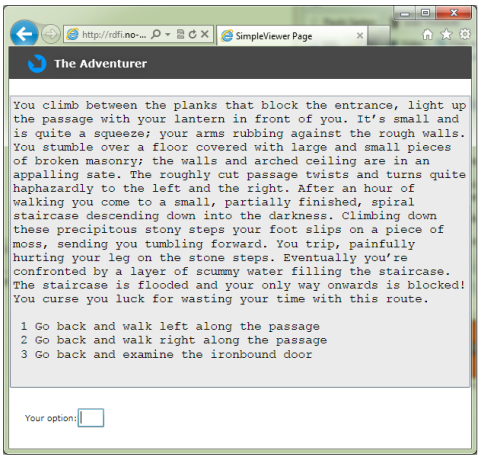

Figure 3: Web version of a choose your own adventure story

ulations that advocate user actions that contribute to the policy or, in the case where there are some user actions that hinder the policy goals, if there are any available manipulations that advocate against them. The SF agent then passes those manipulations to the realization engine that contains implementation specific information on how to realize them in the particular IS system that is being used.

5. STUDY

To assess the applicability of this approach we created a version of a Choose Your Own Adventure that runs in a browser(Figure 3). It depicts a story of an adventurer in the medieval era, whose goal is to save the people of a village from a tyrant. As in the choose your own adventure books, the story is divided in blocks of text, where each presents the user with several options. Each option has a number that identifies the block of text that it leads to. The user advances in the story by making a choice in a block of text until he/she eventually reaches a point that represents a goal state.

To use this simple interactive storytelling system with our architecture we annotated the user's actions (his choices in each part of the story) with their effects. We also linked each block of text with character actions that were fed into the persuasion module. Each time the user makes a choice the IS system informs the persuasion module of the user's new available actions (options), and if any manipulation is available it is fed to the Realization engine, that in this particular case replaces the text that is presented to the user.

For this particular experience we decided to use a *Reciprocity* manipulation [8]. To achieve this we defined a policy that stated that the user should help a particular character in the story. There is a point in the story where the user is attacked, and that block of text is linked with the character action *Attack(User)*. We added a *Reciprocity* manipulation there with the precondition of the user being attacked and that is realized by having a character named *Jonas* enter the scene and save the user. In the original story the user is able handle the adversaries without problems:

> ...You accidentally step on a puddle making a little too much noise... The guards hear you and they charge violently in your direction. You draw your sword and in the blink of an eye dispatch them both without making too much fuss. They were no match for your trusty blade...

And when the system intervenes:

> ...You accidentally step on a puddle making a little too much noise... The guards hear you and they charge violently in your direction. You draw your sword and try to hit the first one, but you miss... the second one manages to grab you! You desperately try to free yourself but the creature is too strong... While you are being held, the first one approaches you laughing... you start to wonder if this is how it will end for you... and while you are about to give up someone attacks the first creature from behind, killing him. After you both dispatched the other creature he introduces himself, his name is Jonas and he is looking for his lost wife that was taken by the tyrant's creatures. You thank him as he decides to leave on his own. He's goal is to find his wife as soon as possible...

When the system intervenes the Persuasion Context is updated with information that states that the user "owes" a favor to the character that helped him.

Later on in the story the character Jonas is being help prisoner and helping him might go against the user's goals, which is to kill the tyrant, however the policy states that the user should help him. We added a *Reciprocity* manipulation to this part which has the precondition of the user owing a favor to Jonas, and we also marked it as targeting the action of saving the prisoner. The version where the persuasion system is not being used outputs the following text:

> ...You follow the Orcs very carefully, keeping a safe distance with care to not lose track of them. You don't want to miss the opportunity to find their master's lair. As you are following them you notice that you have passed through a room that holds a chained man...

And when the persuasion system is on, this particular reciprocity manipulation is realized by adding the text:

> ...You follow the Orcs very carefully, keeping a safe distance with care to not lose track of them. You don't want to miss the opportunity to find their master's lair. As you are following them

you notice that you have passed through a room that holds a chained man. You notice that that chained man is Jonas, the adventurer that helped you before! He looks in bad shape, and you fear that if don't help him now, there won't be another chance...

6. RESULTS

The study involved 25 subjects with mean age 24. The subjects were divided in a control group (11 male, 2 female) that played a version with no manipulations and a test group (11 male, 1 female) that played a version with manipulations. The system recorded each of their particular choices and the time they spent on each of them. The ultimate goal was that the players would help a character in the story even when it was suggested that helping him might not be beneficial for their individual goals.

In the control version 7 subjects selected the option that led the character to help the prisoner (~54%), 4 selected the option where the prisoner was not helped (~31%) and 2 did stoped playing the story before they finished.

In the version that used the architecture and where the reciprocity manipulation was applied, 10 subjects decided to help the prisoner (~83%), one decided not to help the prisoner (~8%) and one did not play the story until the end.

In sum, the results are encouraging. Only one individual from the group that used the system with the persuasion module did not choose the option that satisfied the policy. Informal conversation with the subjects that used the system revealed that they were not aware of the any persuasion attempts, and when asked if their choices were conditioned somehow, both control and intervention groups mentioned only the number of choices as a conditioning factor.

7. CONCLUSIONS AND FUTURE WORK

In this paper we have descried a proposal for an architecture to influence user's choices in interactive stories. Guided by a policy and by using a set of persuasive manipulations, the persuasion system can dynamically choose to apply them in appropriate times in the story, in order to increase the likelihood of the user having the experience the author has encoded in the policy as preferential. We describe a study where we implemented an augmented version of a choose your own adventure that feeds the characters and user's actions into our persuasion architecture which in turn responds with the appropriate manipulations that are realized through a (text) realization engine.

The results of the study are promising, although we are aware of the small number of subjects and of the simplicity of the policy we have chosen to apply. In the future we plan to perform studies with a larger number of participants and with more elaborate policies, that take into account for example characteristics of the user. For example, if the gender of the user is male, then the policy will advocate a different set of behaviors than if the user is female. We also plan to assess if by having the system try to influence the experience that the user has in the interactive story, we do achieve a higher level of user satisfaction.

We also plan to test more elaborate manipulations, for example using *Strong* and *Weak* messages [23] that need to be validated a priori [6] we expect to be able to add greater flexibility to the system in terms of the available options to influence the user. We also plan to evaluate pairings of manipulations, for example strong messages with increase in personal involvement, as this kind of approach has been described as being very effective [28].

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