

# Psycho-Drama in VR

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## ABSTRACT

In this paper, we describe narrative and ludic structures that support interactive drama in immersive virtual reality.

## Keywords

Interactive Drama, Virtual Reality, Intelligent Agents

## 1. INTRODUCTION

The goal of our group is to produce immersive virtual reality (VR) experiences that engage the user as a central protagonist in compelling interactive dramas. Our dramas are designed for CAVEs or CAVE-like systems -- projection-based, 3-D stereo VR displays with one large screen or multiple screens forming a virtual theater. A tracking system and “wand”, with joystick and programmable buttons, create the interface between the user and the virtual environment (VE) [12]. Immersive VR puts the user inside the virtual world with the other characters rather than outside, viewing the world on a monitor and manipulating an avatar of herself. In a projection-based system this integrated feeling is heightened as the user automatically uses her own real body to judge the physical proximity, scale and size of any virtual object including computer controlled characters.

We believe that the production of VR drama requires the adaptation and extension of existing dramatic tools, structures and methods; and the appropriation of artificial intelligence techniques for the creation of responsive, believable, intelligent agents that act as characters in the story. This paper describes the narrative and ludic structures that support our VR dramas, (we discuss the agents in as far as they as part of these structures for more details of their architecture and implementation see [7]). In particular we focus on the important role emotion plays in interactive narrative [29], specifically detecting and stimulating the user's psychological/emotional state. The first section briefly touches on the relationship between form and content for interactive fiction. The much longer second section discusses the current state of the dramatic structure we follow. This theoretical structure is evolving in a tight relationship with our practice, specifically the production and exhibition of **The Thing Growing** [2] developed by Anstey and Pape, and the production of our work in progress **The Trial The Trail** [6].

## 2. FORM AND CONTENT

The task of interactive fiction research is not only to develop the necessary computer-based structures and operations to serve as production tools; but also to investigate what kind of stories most benefit from an interactive form, and ultimately what kinds of stories can only be experienced in interactive form. We believe that stories that speak to the construction and struggle for psychic identity are especially good candidates. Although it is argued that full-blown computer-based fiction does not yet exist [11], video games offer a rich site of investigation and insight into computer-based interactive experience. Bob Rehak suggests that a vital driver of video games sits in the unconscious. He retells the history of gaming focusing on how the users' psychological needs shaped the development of the avatar, the representation of self in the game. He suggests that the crucial relationship of computer games is between the user and the avatar, and that ritual destruction of the avatar, and rupture of the identification between the self and the avatar are a major element that create satisfaction in games [22].

Immersive VR is another interactive medium which has been successfully used for work in the psychic arena. Alison McMahan, writing about immersion and presence in virtual environments, notes that VR's responsive and immersive potential make it an effective place of treatment for phobias (fear of flying, arachnophobia, claustrophobia and agoraphobia [20]). In her own work she is creating a VR horror story, using bio-metric devices to test the user's involuntary reactions and bending the story to fit those responses. (In a related argument, Rehak notes that certain film genres, sci-fi, action, horror, are most likely to be re-imagined in video games. Stories in these genres have great metaphorical force to dig deep into emotional terrors and phobic reactions, and speak to the creation and destruction of ego.)

An underlying assumption of our own work is that interactive VR is a unique medium for building stories that access the phantasmagorical, the psychological, the construction of self [3]. Feminist theorist and psychoanalyst Jessica Benjamin suggests that during the process of differentiation from the mother, the child's task is not merely to establish that it is separate but that a step of mutual recognition must occur as the child realizes that the other is also a subject [9]. Anstey and Pape's interactive drama **The Thing Growing** was designed to explore this emotional territory. Unfortunately there is no space here to discuss the differences in terms of identity and agency between video game experiences that play with the relationship between the user and her avatar, and experiences in an immersive medium where that split does not exist.

However, if we do assume that interactive media allows users to explore their own psyche some questions still remain. First: Are people interested in playing with the formation and reformation of their identity? Obviously yes; many critics of new media have analyzed the relationship between cyberspace,

and the construction of fluid and multiple personalities [28]. More importantly: How can we structure the user's engagement in psychological dramas or fiction? In the remainder of this paper we describe the process followed by our collaboration in our search for answers to this question.

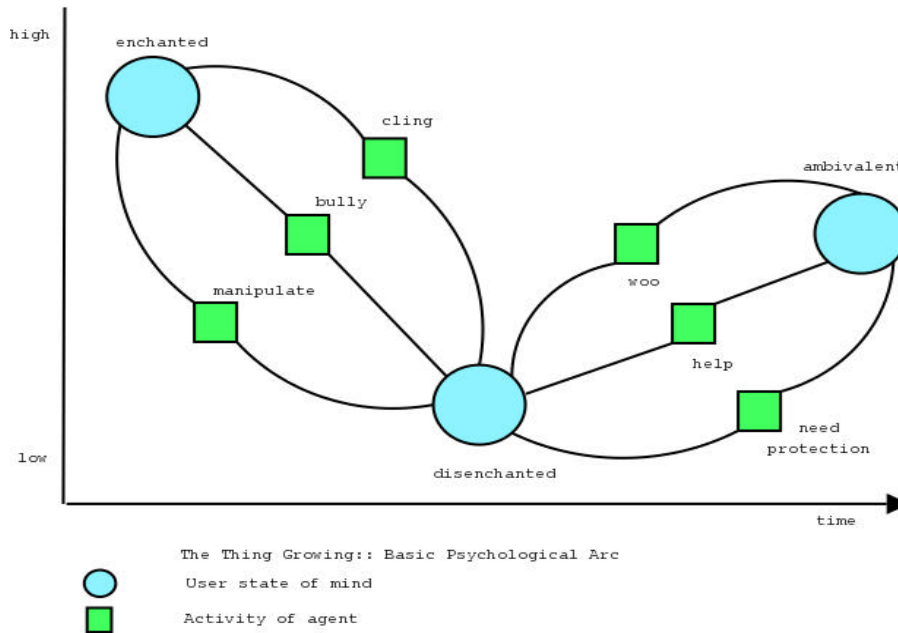


Figure 1: The Thing Growing Psychological Arc

### 3. STRUCTURING PSYCHO-DRAMA

We build our VR dramas using a two part structure; a psychological substrate where we explicitly determine the emotional states we want to evoke in the user; and an implementation level with three elements - an interactive script, a smart set, and intelligent agents - that turns the psychological plot into a dramatically evolving series of conundrums that the user is faced with. As a play depends on the interrelationship of script, set design, and actors to communicate, so meaning assembles around the user through the co-dependent working of the three responsive elements - the interactive script, smart set, and intelligent agents.

The strategy of using a psychological substrate as the underlying driver for drama has a substantial proponent in Alfred Hitchcock. He explicitly prioritized the psychological, basing his scripts around an emotionally fraught theme. He made famous the concept of the MacGuffin, a plot pretext that supplies a narrative framework of cause, effect and continuing choice to illustrate his characters' psychological development (or unraveling!). [27]. In our case, the implementation level with its three elements make up our "interactive McGuffin."

Our process of translating a psychological substrate into an interactive McGuffin is influenced by dramatic performances by the Impact Theatre Cooperative in the 80s [10]. In one

scenario the cast ganged up on one member insistently mimicking her every word and gesture - the scene generated much tension and dis-ease, and recalled the innocence and savagery with which children act out issues of power, control and identity. The interactive MacGuffin in our dramas tend to contain similar elements that are modeled on childish exaggerations of behavior and are designed to engage at a level beneath that of polite adult intercourse.

#### 3.1 The Psychological Substrate

Our psychological level is an arc representing the ideal emotional route we want the user to travel. Figure 1 shows this arc for our VR drama, **The Thing Growing**. The psychological domain of **The Thing Growing** is differentiating from, yet recognizing the subject-hood of, the other. The plot pretext is a dysfunctional love story which the project simulates between the user and an intelligent agent, the Thing. The Thing is a real-time animated character which speaks to the user. It does not look human, but simulates human-like emotions and gestures. Figure 1 is a simplified version of the arc without details or alternatives. The circular nodes represent the user's state of mind as she reacts to the Thing's activities represented by the squares. The y axis represents the emotional well-being of the user, and the x axis represents time passing. The arc builds a relationship history between the user and the Thing,

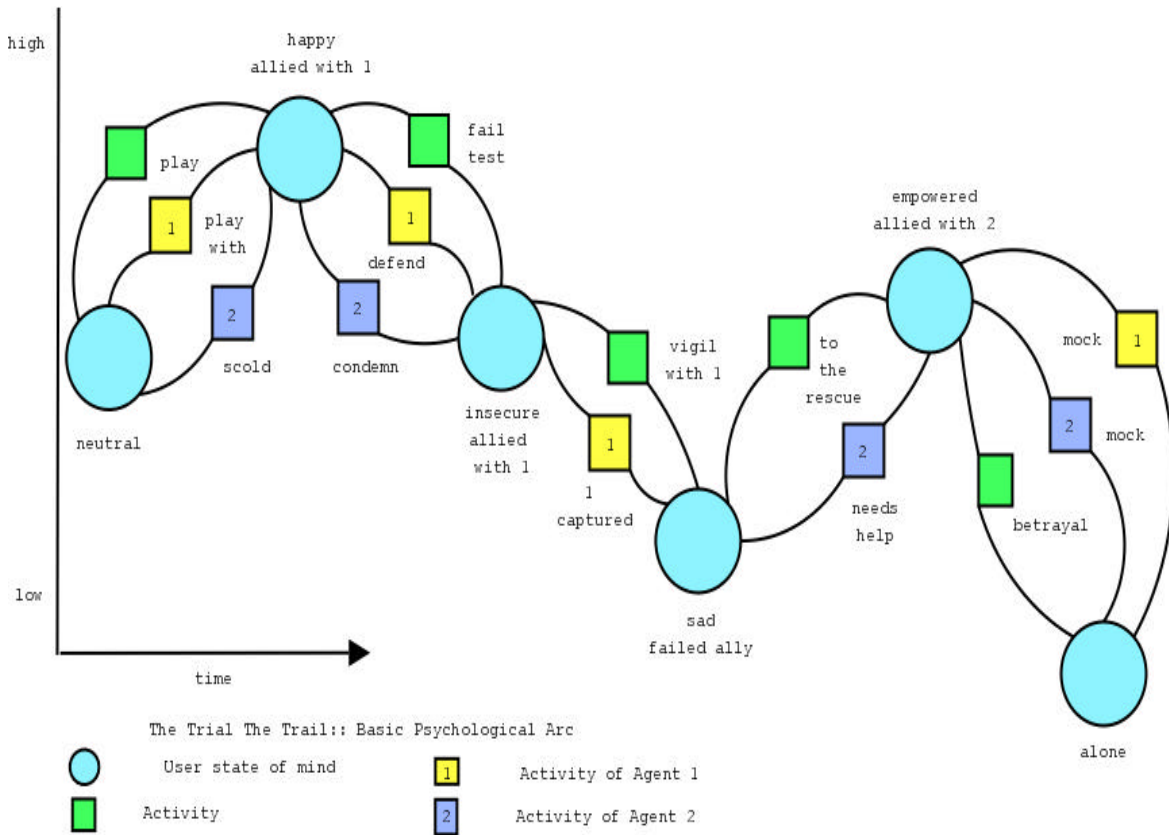
which corresponds to a love story and moves the user from being enchanted by the Thing, through being distrustful and resentful of it, through some reconciliation. At the end we want the user to feel a certain weight of this shared history, and a certain ambiguity of feeling for the Thing, then she is presented with a choice to kill it - or not.

In *The Thing Growing* we wanted to make the user's feelings as intense as possible so that they felt themselves engaged and present in a relationship of sorts. Therefore the psychological arc, and the MacGuffin that implemented it, were designed to plunge the user into unfamiliar territory, to contain abrupt reversals of feeling, high and low points, expectations and disappointments, and NOT to give her time to analyze her feelings until she had pulled the trigger (or not). We made some assumptions about the user's probable emotional reactions to the Thing. We assumed that if it simulated emotion, the user would react to it emotionally. We assumed that many users would react to power-playing patterns that are common in relationships, and often fall into action-reaction pairs, or sequences of action-reaction pairs. Figure 2 catalogs a few of these pairs, the more co-dependent readers will be able to supply many more.

Agent	User
<b>I love you</b>	<b>I love you</b>
<b>I cling to you</b>	<b>I flee</b>
<b>I abandon you</b>	<b>I cling to you</b>
<b>I cajole</b>	<b>I comply</b>
<b>I demand</b>	<b>I deny</b>

**Figure 2: Action Reaction Pairs**

For example, when we wanted to move the user from a state of being enchanted by the Thing to being disenchanted, first the Thing announced it was in love with the user, flattered her, and showered her with compliments, then it started being demanding and clinging. We observed that the users' smiles sagged as the Thing changed. We do not pretend that users became as invested in the Thing as it pretended to be in them, but they were evidently moved by its manipulative machinations [5].



**Figure 3: The Trial The Trail Psychological Arc**

Our immersive VR display system adds to the psychological charge and effectiveness of our work. In the real world we are affected psychologically by the physical presence of others. If someone is too close it can be intimidating or annoying. These same feelings register in immersive VR. Since we are tracking the user's head and hands, it is also possible for the VR agents to mimic or reflect back gestures that the user makes. Patterns of behavior are conveyed in body language and in mutual body language. That our system can simulate some aspects of this strengthens the psychological level of our work.

Part of the psychological arc of our work in progress **The Trial The Trail** is shown in Figure 3. The psychological domain of this work is the handling of uncertainty and the nature of trust, with respect to other people and to life itself. **The Trial The Trail** has three main characters including the user. The introduction of a third major character allows us to investigate behavior triggered by triangular relationships, much of which involves two characters ganging up against one, changing allegiances, betrayals. The psychological arc for **The Trial The Trail** is more complicated, circular nodes represent the user's state of mind and her alliances with the agents in the drama, empty boxes indicate general activity that is occurring, numbered boxes represent activity of particular agents. The basic structure of moving the user from emotional state to emotional state is the same, however the structure as a whole is made more complex by the separate simulation and stimulation activities of the two agents. The agents play good cop and bad cop, agent 1 sides with the user, while agent 2 gives her a hard time. A reversal is effected when agent 1 is captured and agent 2 needs the user's help to rescue her. A second reversal reveals that both agents are setting the user up and making fun of her. A complication not represented in this diagram, but which will be discussed in the section on the interactive script, is that we want to structure breathing spaces into this story, where the user has time to reflect on her emotional progress.

### 3.2 The Interactive MacGuffin

The interactive MacGuffin framework supports the “evolution” of the user's state of mind, following the main psychological arc and building alternative responses for the user who deviates. Part of this work is done by a regular MacGuffin; the storyline that provides plot pretexts and narrative rationales and divides the drama into the acts and scenes that move the plot forward as intensely as possible. But we also need a structure that gathers information about the user and folds that back into the evolving narrative so that it becomes responsive. This structure explicitly attempts to move the user from one emotional state to another along the psychological arc. The structure must have a context that will evoke the first state and some form of stimulation to move the user to the second state. We must also be able to test whether she has reached the second state. Our interactive drama consists of a related and unrolling series of these emotional tests which we will call “dramatic snares” or simply “snares”.

Figure 4 shows the parts of the snare. Following the storyline we have chosen, we use the virtual environment (the smart set and the intelligent agents) to build a narrative context. The narrative context provides a set-up that quickly puts the user into a recognizable situation and contains implicit or explicit suggestions/instructions for some activity. The user acts, and the system detects the actions. The narrative context in conjunction with the detection creates implications for a

particular action, such as how, whether or not, the user is performing the suggested activity. We use these implications to interpret the user's state of mind, and this information is fed back to influence the narrative that follows. It is important to note that snares can be of varying lengths, they can be assembled into sequences, and they can be nested. In a sense they work very like the acts, scenes, sequences and beats that are typically used to construct drama in plays and films [19] - although as we will demonstrate later they may not always exactly coincide with the dramatic, act and scene, structure of the storyline. The snare structure is similar to Mateas and Stern's discussion of beats as the architectural unit used by their drama manager [18]. Our emphasis is more exclusively on the details of how the user's emotional state may be stimulated and detected. Our work in progress **The Trial The Trail** can be understood as one extended snare, containing within it smaller snares. Each snare is implemented by the interactive script, the smart set, and the intelligent agents. In the following sections we use **The Trial The Trail** to illustrate the snare structure, and then to discuss how these three elements work in the construction of both the snare and the storyline.

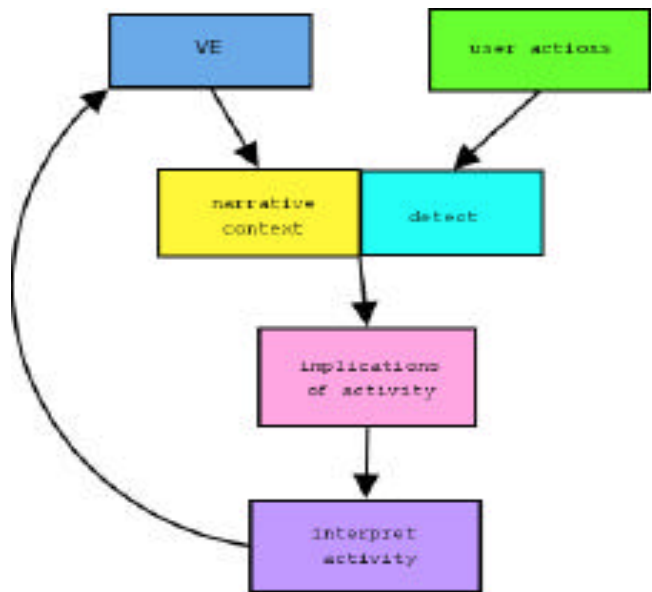


Figure 4: The Snare

#### 3.2.1 The Snare

**The Trial The Trail** is a quest narrative, the user is given two companions, the actor-agents Filopat and Patofil and told that at the end of her experience she will get her heart's desire. Our first illustration is of a snare that that is the equivalent of a short scene. The narrative context of this snare is a task that the user is set by her companions. They bring the user to a reed-bed where cat-like creatures are playing, and tell her to collect the crowns they are wearing. They show her she must creep up on a creature, crooning softly, then stroke it gently as she takes the crown. This is the activity. Our tracking system allows us to detect whether the user is near the creatures, and the speed and direction of her hand. Implications can be drawn from the tracking information about whether the user is stroking or hitting the creatures. Within the scene this

information is used directly to program the cat creatures' responses – stroking leads them to surrender their crowns, hitting makes them dodge away. We can also imply from the user's position in the world whether she is trying to engage in the activity at all. There are several resulting interpretations about the user's state of mind that we can make. First, does the user obey the agents and try to carry out the activity? We interpret this as compliance. Second how does she treat the cat creatures, is she gentle or aggressive with them? Interpreting the user as compliant or disobedient, gentle or aggressive can be used in the set up of future snares.

Our second illustration shows more clearly how a snare can stimulate specific changes in the user's state of mind. This is a three part snare sequence. Part one is the snare described above, where the user is taught how to accomplish the crown gathering activity by her companions, and left to do it. We detect whether she is successful or unsuccessful, gentle or rough. Part one becomes the narrative context for part two where one of the cat creatures suddenly exhibits surprising behavior, clinging to the user and weeping if she tries to get away. We detect how the user treats this clinging creature -

does she beat it, does she stay with it? This result is used in the third and final part of the snare where the companions comment on the user's actions. At the start of this sequence the user should be fairly happy. In part one she is moved to a sense of accomplishment and superiority over the dumb creatures who she is essentially tricking into giving up their crowns. This is followed by the reversal in part two where we aim to elicit feelings of guilt, discomfort, annoyance. Then in part three, the user overhears the companions judging her actions. If, for example, she pulled abruptly away from the clinging and wailing creature, Filopat will condemn her cruelty; if she is unable to get away from it, he will laugh at her wimpiness. Patofil will defend her. To sum up, the psychological movement of this snare is from happy to 1. empowerment and superiority, to 2. discomfort and a sense of failure, to 3. feeling judged and defensive. This snare, also fits into the overall emotional scheme of the drama and is the point where the user feels a strengthening alliance to Patofil (agent1 in figure 3).



**Figure 5: Storyboard image of the stage in The Trial The Trail with Patofil, Filopat and the user as green figure**

### 3.2.2 The Interactive Script

The interactive script is a blueprint for the dramatic arc (and its alternatives) that implements the psychological arc. It contains the storylines for the entire interactive drama and for the individual snares, linked sequence of snares, and nested snares that comprise the drama. For example, the overall

storyline of **The Trial The Trail**, is a warped quest narrative owing inspiration to Tarkovsky's *Stalker*, Alice Through the Looking Glass, Monty Python and the Holy Grail, Don Quixote. The stages in the quest are linked sequences of snares such as the one described above. The storyline for the first snare in that sequence is the challenge of gathering crowns

from cat creatures. The interactive script must be designed to conceal the starkness of the snares that the user is being urged into, give reason for the constraints that the snare is composed of, and motivate the user [16].

It is also the work of the interactive script to assemble the necessary snares into dramatic sequences with schematics for alternative ways of maneuvering the user through them. This means detailing the possible implications of the user's activities given the narrative context; making interpretations about the user's state of mind; and weaving them back into the psychological trajectory. We assume a great deal of iterative user testing so that the final drama will anticipate what most users will do and have a response for them. So it is very much the case that the interactive script evolves during production.

We are still working on the best way of representing the interactive script, but at present it exists as a storyboard divided into acts and scenes which sets out the ideal path through a dramatic arc; and as detailed scene descriptions. Generally speaking the snare structure follows the division of acts and scenes. Specific scenes are nested inside acts, and both scenes and acts would be implemented as snares. However, it is also possible for snares to start in one act and end in the next.

We mentioned above that we want to structure breathing spaces into **The Trial The Trail** to give the user time to consider the implications of her actions in the environment. We now discuss these breathing spaces as they show how the requirements of the psychological level affect the storyline and dramatic structure of the interactive MacGuffin. In this discussion we also demonstrate a snare that passes beyond an act boundary.

Our first, rough, implementation and user-testing of **The Trial The Trail**, showed that it was too literally a quest adventure; it did not stimulate the psychological questions (handling uncertainty, placing trust) we were interested in [1]. We needed a more ironic and questioning take on quests, goals versus journeys, the real desirability of attaining one's heart's desire, to come through. The tests led us to restructure the storyline of the interactive MacGuffin to contain an explicitly theatrical metaphor which acts as a transition between stages of the quest, and creates a series of entre-actes.

In the VE this translates into two major elements, a curtained stage where the companions explain each part of the quest, and, as the curtain rises and stage flats fly out of sight, an endless vista of the fantasy landscape where the quest itself takes place. The stage, and the banter of the companions when they are on the stage, refer to the over-genial charm of music halls, English pantomimes, game shows (in this game show, the user gets her heart's desire.) The artifice and theatricality of the endeavor are forefronted, in order to answer the cynic's presumption that she will not get her heart's desire. By contrast, when the curtains are raised the user moves into a fairy-tale landscape in which wishes may come true. This space displaces the stage, yet it hints at interior space. Here Freud and Dali meet Alice in Wonderland. The user is offered the chance to move between immersion in the task at hand, giving full rein to the feelings that brings up, and observation of herself.

In the snare sequence in our example described above the first two parts of the snare take place in the fantasy landscape as one of the challenges in the quest. The challenge is ended by the curtained stage reassembling around the user, signaling the end of the act and the beginning of the entre-acte. The third part of the snare takes place in the entre-acte as the two agents, hidden behind the curtain, discuss the user.

### 3.2.3 The Smart Set

The smart set consists of the visual mise-en-scene, various responsive elements in the virtual environment, and the mechanics that carry the narrative forward. The connotations of the visuals, the effectiveness of the responsive elements, and the deftness of the control mechanisms are important in implementing the snare structure. Our smart set is built using the VR authoring framework Ygdrasil [21] which is based on the OpenGL Performer scene-graph, and provides a framework for extension; application-specific modules (plug-ins) may be added to define behaviors for objects or characters. A text file system is used to translate the interactive script into the actualized virtual environment (the smart set and the intelligent agents): all the models, sounds, their locations and behaviors are described in the text file along with messages to be passed between objects in response to events.

The smart set visually establishes the narrative context for each snare. As in any set design, this does not only mean providing visual elements, but providing elements that metaphorically strengthen the ambiance of a particular moment. In the first illustration of a snare described above the action takes place in a bed of reeds. The reeds are responsive, they flatten as the user, agents, or cat-creatures move through them. They connote games of hide and seek, outdoor fun, an activity the user will want to take part in. Responsive elements of the smart set can also be used in the snare steps that stimulate the user to act, and detect how the user has acted. For example, the cat creatures combine autonomous behavior with



### 3.2.4 *The Actor Agents*

The basics of the snare structure came out of our work on the Thing agent, in **The Thing Growing** [4]. In that piece the Thing established a narrative context that included a suggested activity for the user, monitored the user's response with respect to that activity, and fashioned its own response based on the implications of the user's detected actions. Even within that production the snare structure started to overlap the agent proper. Especially when other agents or smart set elements were added it was clear that the agent implemented a larger dramatic structure rather than being identical with it. Splitting the working of the snare from the working of the agent was an important step in our thinking, however below we shall see that there are strong connections between the two. Another step was to abandon the very ad hoc construction of the Thing, in favor of a systematic agent architecture which could produce more flexible and generic actor-agents.

The agents we are creating for **The Trial The Trail** follow the GLAIR [8, 14, 15, 23] agent architecture. Their higher mental functions are built using the SNePS knowledge representation and reasoning system [24, 25, 126], and their embodiment and the virtual world they inhabit are built using Ygdrasil, SNePs and Ygdrasil are connected via sockets. The cat creatures described above might also be called agents, but we do not anticipate them needing the reasoning power of the SNePs mind, so they are implemented entirely in Ygdrasil. Previous GLAIR cognitive agents all had the following capabilities: natural-language input, recognizing a fragment of English, based on a grammar written by the research group; a repertoire of primitive acts and sensory abilities; a knowledge-base of background information, domain knowledge, and acting plans; reasoning to answer natural-language questions, to decide what to do and when; and natural language output.

Our agents have goals and plans based on the interactive script which forms their knowledge base. Their plans often correspond to the stages of the snare. First they help establish the narrative context, second they work with the user on the activity and detect the user's actions. Third, they reason about the user's actions and respond with the next part of the plan or divert into a contingency plan. They have primitive and composite acts; speeches, animations, and movements about the world and with respect to the user. They have senses, detecting the user's presence relative to themselves and other relevant objects, detecting the user's actions and that of other objects in the world. They also have a self-perception that lets them know what they have just said. Currently they do not output natural language or take voice input from the user. Previous GLAIR agents used text input for natural language input and output, however that would not work in our immersive VR set-up. Since current voice-generating software does not do a good job of rendering emotional qualities of the voice, we pre-record phrases for each character creating a

library of lines large and flexible enough so there is a response for every eventuality, and which includes redundant phrases so the character is never stuck repeating the same thing. Our research plan does include making use of voice input from the user, however, we are only at the very beginning of that research and the narrative structures described in this paper do not assume voice input.

Our project **The Thing Growing** confirmed for us that human users will be stimulated emotionally by agents simulating emotions. This is vitally important since our endeavor is predicated on moving the user from emotional state to emotional state. Part of an agent's work in helping set up a narrative context is to set an emotional tone which the user may empathize with or react against. This can be done directly by having the agent simulate anger, hysteria, despair. But the user's reaction to the agent's emotion will be colored by her perception of the agent's personality. Thus the user is likely to be worried by the tears of an agent she likes, but may laugh at the tears of an agent she dislikes or distrusts. She may like an agent who has done her a good service, demonstrated affection for her, or holds similar beliefs.

By the time we get to the point in the drama described in our snare example, Patofil and Filopat have established personalities. These are important elements in the interactive MacGuffin as they take up positions relevant to our psychological terrain and reveal their positions in their attitude to the quest and its challenges. So Patofil is reckless and insouciant, believes the journey is more important than the arrival, and is dubious whether the heart's desire exists. Filopat follows rules, adheres to duty and fervently believes in the quest. Patofil stimulates the user to disobey and to be a little cruel. Filopat provokes defiance to authority, yet also urges humanity and caring. The user is encouraged to side with one, then the other. These alliances implicitly include an adherence to the particularly philosophical position of that agent.

The narrative then moves on to embroil the user in possible implications of taking that position. In the last part of the snare sequence Patofil defends the user against Filopat's criticisms and in so doing questions the importance of the quest. In the next act Filopat punishes Patofil by making her stand all-night vigil with the user. These actions are designed to increase the user's feelings of warmth towards and alliance with Patofil. As the act unfolds Patofil's disobedient and careless attitude leads them both, but especially Patofil, into danger. Patofil's peril leads the user into an alliance with the righteous Filopat. Finally it is revealed that the danger is not real, but fabricated by the two agents in cahoots. This revelation is designed to lead the user to distrust both Patofil, Filopat and their philosophies.



Figure 7: Patofil standing all night vigil

#### 4. CONCLUSION

To reiterate we structure our interactive dramas with two levels; a psychological substrate and an interactive MacGuffin. The psychological substrate explicitly details the emotional journey we want the user to take; the interior terrain that we want her to visit, experience and perhaps analyze. The interactive MacGuffin details the plot pretexts, storyline and dramatic structure that will implement the psychological substrate. As importantly it contains a basic structure, designed to do the work of moving the user from one emotional state to another which we are calling a snare.

The snare can be the length of an entire drama, an act, a scene, or a small part of a scene. The snare as we have described it has a narrative context and user acts. The narrative context that sets up one snare can be drawn from the previous snare or the larger context of the drama. The user acts are detected and their implications in light of the context are interpreted and used to further the drama. The snare is implemented by an interactive script, a smart set and intelligent agents. The snare structure is designed to invisibly constrain the user, and to be very responsive to the user's actions at a localized level. However, at the highest level of granularity the overall plot has a limited number of alternatives. This is for two reasons; one to avoid exponential growth of story lines; two to tightly focus the user on the psychological terrain we are interested in. Clearly these dramas are not designed to be experienced multiple times, however we do want to accommodate a wide range of users, and to involve them in a dramatic experience that involves their own psyche, and that has a good balance of responding to their input and surprising them. To that end we iteratively test the dramas adding responsiveness at all levels of granularity.

Our hypotheses about narrative and ludic structures for interactive VR drama are constantly tested against our practice. Our work in progress, **The Trial The Trail** is a proving ground for ideas stimulated by the production and exhibition of **The Thing Growing**. During 2003 we started work on building

actor-agents that married the SNePs AI system and Ygdrasil authoring tool. At the same time we implemented a rough version of **The Trail The Trail** in VR to test our initial storyline. This was a wizard of Oz version where a human took the role of the agents. This test led to a radical restructuring of the interactive script, and radical redesign of the VE. We are currently implementing act three of our current story-board with GLAIR agents.

#### 5. ACKNOWLEDGMENTS

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