

Story Engine Bibliography

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“People don't quit playing because they grow old.
They grow old because they quit playing.”

- Oliver Wendell Holmes

PlaySpace™, Inc.

402 East Gutierrez Street
Santa Barbara, Ca 93101
Phone: (805) 570-8100
Fax: (805) 456-0192
kstein@playspace.com
www.playspace.com

(1997). Folk Psychology as a Theory, Stanford Encyclopedia of Philosophy.

(2003). Violent video games are training kids to kill, HeraldNet.com. **2003**.

(2003). Technologies for Interactive Digital Storytelling and Entertainment (TIDSE) blog, Flickwerk.wordwrap.de.

Barger, J. Understanding human behavior via stories.

Broersen, J. D., Mehdi; Huang, Zhisheng; van der Torre, Leendert (2001). The BOID Architecture. Amsterdam, Division of Mathematics and Computer Science, Vrije Universiteit Amsterdam.

In this paper we introduce the so-called Beliefs-Obligations-Intentions-Desires or BOID architecture. It contains feedback loops to consider all effects of actions before committing to them, and mechanisms to resolve conflicts between the outputs of its four components. Agent types such as realistic or social agents correspond to specific types of conflict resolution embedded in the BOID architecture.

Broersen, J. D., Mehdi; Huang, Zhisheng; van der Torre, Leendert (2002). Trust and Commitment in Dynamic Logic. Amsterdam, Utrecht, Vrije Universiteit Amsterdam, Utrecht University. **2002**.

Trust and commitment have been identified as crucial concepts in electronic commerce applications. In this paper we are interested in the relation between these social concepts. We introduce a dynamic logic in which violations of stronger commitments result in a higher loss of trustworthiness than violations of weaker ones. We illustrate how the logic can be used to analyze some aspects of a well known example of trust within reason.

Brooks, K. M. (1997). Programming Narrative.

With the introduction of the computer, narrative experiences can be found in new media applications as diverse as MUDs, arcade games and 3D immersive environments - and new applications are being created all the time. The form these narrative experiences take are as diverse as their mediums: from the experiential stories of MUDs to the intricate branching plot paths of adventure games. But like with the introduction of television after decades of radio, a new medium calls for a new aesthetic, a new method of writing for that medium. good functional models are needed to help define this aesthetic and specialized tools required to help build the work. The writing tool described in this paper, Agent Stories, is software currently under development for visually designing non-linear cinematic stories for new digital media.

Brooks, K. M. (1999). Metalinear Cinematic Narrative: Theory, Process and Tool. Program in Media Arts and Sciences, School of Architecture and Planning. Boston, MIT.

Media entertainment technology is evolving rapidly. From radio to broadcast television to cable television, from motion picture film to the promise of digital video disks, as the media evolves, so do the stories told over these media. We already

share many more stories and more types of stories from many more sources than we did a decade ago. This is due in part to the development of computer technology, the globalization of computer networks, and the emerging new medium which is an amalgam of television and the internet. The storyteller will need to invent new creative processes and work with new tools which support this new medium, this new narrative form.

This thesis proposes the name Metalinear Narrative for the new narrative form. The metalinear narrative is a collection of small related story pieces designed to be arranged in many different ways, to tell many different linear stories from different points of view, with the aid of a story engine.

Agent Stories is the software tool developed as part of this research for designing and presenting metalinear cinematic narratives. Agent Stories is comprised of a set of environments for authoring pieces of stories, authoring the relationships between the many story pieces, and for designing an abstract narrative structure for sequencing those pieces. Agent Stories also provides a set of software agents called story agents, which act as the drivers of the story engine.

My thesis is that a writing tool which offers the author knowledgeable feedback about narrative construction and context during the creative process is essential to the task of creating metalinear narratives of significant dimension.

Burghouts, G. J. o. d. A., R.; Deylen, D.; Poel, M.; Nijholt, A. (2003). An Action Selection Architecture for an Emotional Agent. Enschede, The Netherlands, Department of Computer Science, University of Twente.

An information-processing architecture models the conceptual link between human emotion, cognition and behavior, and defines the information and emotion processes as they occur in cognition. The emotion process allows for emotional behavior (based on a set of primary and secondary emotions) and is modelled in a distributive and intuitive fashion.

A prototype environment is set up to validate the architecture. This environment is populated with agents that are endowed with capabilities to experience emotions and behave purely cognitively as well as emotionally. The validation showed that simple believable emotional behavior can be generated by the architecture. Furthermore, the evaluation of the prototype led to the conclusion that the architecture is computationally feasible.

Burt, A. (1998). Modelling Motivational Behaviour in Intelligent Agents in Virtual Worlds. Saarbrücken, Germany, German Centre for Artificial Intelligence.

The MAS group at the DFKI is developing architectures for animated agents in virtual worlds. Within the tradition of AI there are many techniques that can be used to model the cognitive abilities of such characters, in particular the ability to learn from the environment and plan actions that lead to a well defined goal. Some have argued, however, that these techniques are too complex [Reilly, 1996], that simpler techniques with a flexible control structure are the key to making characters believable. We argue here that much of the

advantages of intelligent agent architectures can be preserved, if we complement them with resourcebounded, motivational constructs.

Caicedo, A. T., Daniel Virtual Humanoids: Let Them Be Autonomous without Losing Control.

There have been several efforts to build life-like autonomous creatures in virtual worlds, but only few of them have focused their intentions in presenting human-like autonomous creatures. In this paper we discuss the problem of building autonomous virtual humanoids with goal directed behaviors. We present the decision-making as a process compound of: goal achievement planning, dynamic belief management, evolving goals, internal states and confidence levels. As simulating real humans, we applied to our model theories of *Humans' Trust* to be able to interact with the virtual humanoids and direct them in real time.

Castelfranchi, C. D., Frank; Jonker, Catholijn M.; Treur, Jan (1999). Deliverative Normative Agents: Principles and Architectures. Rome, Eindhoven, Amsterdam.

In this paper norms are assumed to be useful in agent societies. It is claimed that not only following norms, but also the possibility of 'intelligent' norm violation can be useful. Principles for agents that are able to behave deliveratively on the basis of explicitly represented norms are identified and an architecture is introduced. Using this agent architecture, norms can be communicated, adopted and used as meta-goals on the agent's own processes. As such they have impact on deliveration about goal generation, goal selection, plan generation and plan selection.

Christian, D. Y., R. Michael Comparing Cognitive and Computational Models of Narrative Structure. Liquid Narrative Group, Technical Report, North Carolina State University.

A growing number of applications seek to incorporate automatically generated narrative structure into interactive virtual environments. In this paper, we evaluate a representation for narrative structure generated by an automatic planning system by 1) mapping the plans that control plot into conceptual graphs used by QUEST, an existing framework for question-answering analysis that includes structures for modeling a reader's narrative comprehension and 2) using methods originally employed by QUEST's developers to determine if the plan structures can serve as effective models of the understanding that human users form after viewing corresponding stories played out within a virtual world. Results from our analysis are encouraging, though additional work is required to expand the plan language to cover a broader class of narrative structure.

Crawford, C. The Art of Computer Game Design.

Crawford, C. (2001). What do Women Want (Yet Again)?, Erazmatazz.com.

Crawford, C. (2003). Chris Crawford on Game Design. Indianapolis, New Riders.

Decker, K. S. 'Cheerfully Naturalizing' the Virtues.

Dimitrakakis, C. (2002). Artificial Intelligence in Interactive Fiction.

Interactive Fiction has traditionally operated under the premise that it is the player that must adapt to the environment provided to him by a game. This article examines the role of Artificial Intelligence in Interactive Fiction, suggests possible Machine Learning techniques for an adaptive environment and outlines problems that arise because of the adaptation process itself.

d'Inverno, M. L., Michael (1996). Understanding Autonomous Interaction. ECAI 96. 12th European Conference on Artificial Intelligence. W. Wahlster, John Wiley & Sons, Ltd.

Autonomy is a necessary part of the design of agents flexible enough to function effectively and efficiently in a sophisticated world. Much work, however, has taken a very restricted view of what is entailed by autonomous interaction; in particular the effects of an interaction have, to some extent, been guaranteed. In this paper, we argue that no facet of interaction can ever be guaranteed, and that if agents are to be autonomous, they must be able to cope with this inherent uncertainty. We propose a model of autonomous interaction in response, which addresses these concerns, and which can be viewed as a process of motivated discovery. This approach has two important aspects: first modelling the motivations of the agent allows a more adequate model of autonomy to be achieved, and also provides a control strategy for the process of interaction; second, the discovery paradigm provides a suitable framework for effective action and reasoning in an uncertain environment.

Douglas, J. G., Jonathan (2001). Adaptive Narrative: How Autonomous Agents, Hollywood, and Multiprocessing Operating Systems Can Live Happily Ever After. Lecture Notes in Computer Science. G. S. O. Balet, P. Torquet. Marina del Ray, CA, Springer-Verlag Heidelberg. **Volume 2197 / 2001**.

Creating dramatic narratives for real-time virtual reality environments is complicated by the lack of temporal distance between the occurrence of an event and its telling in the narrative. This paper describes the application of a multiprocessing operating system architecture to the creation of adaptive narratives, narratives that use autonomous actors or agents to create real-time dramatic experiences for human interactors. We also introduce the notion of dramatic acts and dramatic functions and indicate their use in constructing this real-time drama.

Eladhari, M. (2002). Object Oriented Story Construction in Story Driven Computer Games. K. D. (Supervisor). Stockholm, Department of History of Literature and History of Ideas, Stockholm University: Master's Thesis, Spring 2002.

The most commonly used storytelling method in story driven computer games is using a multilinear hypertextual model. In combination with vast geographical landscapes this generates a high level of complexity between the causal relations governing the possible chronological sequence of story elements. A consequence of this is that the game developers either force the player to experience false choices that from a player perspective seem illogical or in which false causal relations occur.

This thesis presents a story construction methodology for computer games that allows false causal relations in game stories to be minimized or eliminated. The methodology

consists of two main components: object oriented story construction and causal normalization. Causal normalization minimizes or eliminates causal dependencies within story logics and therefore eliminates unintentional forms of causal coupling (causal dependencies). Object oriented story construction involves objects in the game world maintaining autonomous integrity by containing their own stories, functions, conditions, possible developments and counter reactions. Another effect of this, besides minimizing the risk of false causal relations originating from the framework describing mechanisms of the world and the biotope, is that the time planes and the chronotope function in a more consistent and unified way.

For analysis of story driven computer games it is necessary to map the different levels of text and interpretation in the game. It is not possible to disregard the fact that the largest amount of text in a computer game consists of program code. The purpose of this thesis is partly to do such a mapping, and partly to offer perspectives and methods that when applied can create better games. The material which is the basis for the thoughts that are brought forth in this thesis consists of works within the area of narratology, hypertext theory, ludology and computer science. An equally important basis for the work is practical experience of having played and programmed story driven computer games.

The thesis also discusses and presents central terms like games, gaming, gameplay, genre definitions and ludology. In addition to this the communication structure, chronotope and text layers of the story driven computer game are described.

El-Nasr, M. S. H., *Ian Real-time Lighting Design for Interactive Narrative*, Computer Science Dept., Northwestern University.

Lighting design is an important element of scene composition. Designers use lighting to influence viewers' perception by evoking moods, directing their gaze to important areas, and conveying dramatic tension. Lighting is a very time consuming task; designers typically spend hours manipulating lights' colors, positions, and angles to create a lighting design that accommodates dramatic action and tension. Such manual design is inappropriate for interactive narrative, because the spatial and dramatic characteristics of an interactive scene, including dramatic tension, camera location, and character actions, change unpredictably, necessitating continual redesign as the scene progresses. In this paper, we present a lighting design system, called ELE (Expressive Lighting Engine), that automatically, in real-time, adjusts angles, positions, and colors of lights to accommodate the dramatic and spatial characteristics of a scene while conforming to the established style and ensuring visual continuity. ELE uses constraint-based non-linear optimization algorithms to configure lights using cost functions formulated based on traditional film and theatrical lighting design theory.

Elvins, T. T. N., David R.; Kirsh, David (1998). *Worldlets - 3D Thumbnails for Wayfinding in Virtual Environments*. Proceedings of the Conference on Human Factors in Computing Systems CHI'98, La Jolla, CA.

Virtual environment landmarks are essential in wayfinding: they anchor routes through a region and provide memorable destinations to return to later. Current virtual environment browsers provide user interface menus that characterize

available travel destinations via landmark textual descriptions or thumbnail images. Such characterizations lack the depth cues and context needed to reliably recognize 3D landmarks. This paper introduces a new user interface affordance that captures a 3D representation of a virtual environment landmark into a 3D thumbnail, called a *worldlet*. Each worldlet is a miniature virtual world fragment that may be interactively viewed in 3D, enabling a traveler to gain first-person experience with a travel destination. In a pilot study conducted to compare textual, image, and worldlet landmark representations within a wayfinding task, worldlet use significantly reduced the overall travel time and distance traversed, virtually eliminating unnecessary backtracking.

Fairclough, C. R. C., Padraig (2003). A Multiplayer Case Based Story Engine.

This paper describes the development of an expert case-based agent director system which dynamically generates and controls a story, which is played out in a multiplayer networked game world. The system handles multiple users in a game world and directs the non player characters therein to perform for the users parallel storylines, interweaving character roles in each story. The story is told through a 'narrative of actions' and automatically generated dialogue. Much of the storytelling approach is based on the seminal work of Vladimir Propp, to which is applied the AI case based planning paradigm. Initial analysis of the system is based on a review of the system and its output, but future work will involve developing a more objective format for analysis.

Forbus, K. D. E., John O.; Ureel, Leo; Brokowski, Mike; Baher, Julie; Kuehne, Sven E. Distributed Coaching for an Intelligent Learning Environment. Twelfth International Workshop on Qualitative Reasoning (QR98), Cape Cod, Massachusetts.

Several barriers hinder the widespread application of AI-based educational software. School and student machines are often underpowered, keeping software and case libraries updated can be difficult, and customization typically requires AI expertise. The widespread growth of Internet access, combined with appropriate AI technologies, enables the creation of distributed coaches that can help overcome these barriers. We describe a distributed coaching system for a deployed intelligent learning environment in engineering thermodynamics. Part of the coach resides on the student's computer, with the rest residing in a server accessed via email. The on-board coach handles common kinds of contradictions in student's assumptions and makes suggestions about parameter values based on its understanding of the teleology of the student's design, derived via Bayesian reasoning. The email coach provides additional analysis help and uses analogy for design coaching, providing step-by-step advice on how principles in a web-based library can be applied to a student's particular design. The distributed coach is currently undergoing field testing.

Gordon, E. L., Brian (2003). A Goal Processing Architecture for Game Agents. Nottingham, School of Computer Science and Information Technology, University of Nottingham.

Computer games are becoming increasingly popular as a research platform for agents research and applications. A key problem for game agents is responding in a timely and appropriate way to multiple, often conflicting goals in a complex, dynamic environment. In this paper we propose a novel goal processing architecture for game agents. Building on the teleo-reactive programming framework originally developed in robotics, we introduce the notion of a *resource*, which can be used to gain exclusive access to specific game objects as well as to represent more abstract things such as properties of the agent. We then describe a goal arbitration architecture for teleo-reactive programs with resources. Our architecture allows an agent to respond flexibly to multiple competing goals, and simplifies the development of game agents by facilitating increased code re-use.

Greene, J. H., Jonathan (2002). "How (and where) does moral judgment work?" Trends in Cognitive Sciences 6(17): 517-523.

Moral psychology has long focused on reasoning, but recent evidence suggests that moral judgment is more a matter of emotion and affective intuition than deliberate reasoning. Here we discuss recent findings in psychology and cognitive neuroscience, including several studies that specifically investigate moral judgment. These findings indicate the importance of affect, although they allow that reasoning can play a restricted but significant role in moral judgment. They also point towards a preliminary account of the functional neuroanatomy of moral judgment, according to which many brain areas make important contributions to moral judgment although none is devoted specifically to it.

Hawes, N. (2000). Real-time Goal-Oriented Behaviour for Computer Game Agents. Birmingham, School of Computer Science, University of Birmingham.

To increase the depth and appeal of computer games, the intelligence of the characters they contain needs to be increased. These characters should be played by intelligent agents that are aware of how goals can be achieved and reasoned about. Existing AI methods struggle in the computer game domain because of the real-time response required from the algorithms and restrictive processor availability. This paper discusses the CogAff architecture as the basis for an agent that can display goal orientated behaviour under real-time constraints. To aid performance in real-time domains (e.g. computer games) it is proposed that both the processes encapsulated by the architecture, and the information it must operate on should be structured in a way that encourages a fast yet flexible response from the agent. In addition, anytime algorithms are discussed as a method for planning in real-time.

Hawes, N. (2001). Anytime Planning for Agent Behaviour. Birmingham, School of Computer Science, University of Birmingham.

For an agent to act successfully in a complex and dynamic environment (such as a computer game) it must have a method of generating future behaviour that meets the demands of its environment. One such method is anytime planning. This paper discusses the problems and benefits associated with making a planning system work under the anytime paradigm, and introduces Anytime-UMCP (A-UMCP), an anytime version of the UMCP hierarchical task network (HTN) planner [Erol, 1995]. It

also covers the necessary abilities an agent must have in order to execute plans produced by an anytime hierarchical task network planner.

Hawes, N. (2002). *An Anytime Planning Agent for Computer Game Worlds*. Birmingham, UK, University of Birmingham.

Computer game worlds are dynamic and operate in realtime. Any agent in such a world must utilize techniques that can deal with these environmental factors. Additionally, to advance past the current state-of-the-art, computer game agents must display intelligent goal-oriented behaviour. Traditional planners, whilst fulfilling the need to generate intelligent, goal-orientated behaviour, fail dramatically when placed under the demands of a computer game environment. This paper introduces A-UMCP, an anytime hierarchical task network planner, as a feasible approach to planning in a computer game environment. It is a planner that can produce intelligent agent behaviour whilst being flexible with regard to the time used to produce plans. [what shitty writing]

Hirsh, H. H.-R., Barbara; Stern, Andrew; Murray, Janet H. "Trends & Controversies: Interactive Fiction." IEEE Intelligent Systems.

Hooker, J. N. (1996). *Three Kinds of Ethics*: 21.

Utilitarian, Kantian and Aristotelian ethics are explained. They differ, but because they address different problems, it is possible to see each as contributing to an overall understanding of ethics as integrity.

Kaiser, S. W., T. (1996). *Situated emotional problem solving in interactive computer games*. Proceedings of the VIXth Conference of the International Society for Research on Emotions, ISRE'96 (pp. 276-280). N. H. Frijda. Storrs, CT, ISRE Publications.

Although there has been a recent increase of empirical studies on emotion, laboratory results remain difficult to transpose to spontaneous real emotional experiences. This difficulty is in part due to the artificial separation of intrinsically related psychological processes - such as emotion, cognition, and behavior - in different fields of research. An additional problem lies in the fact that current methods and experimental settings do not necessarily enable to cope with the complexity of human reasoning, feeling and acting. To overcome some of these shortcomings, we propose a more ecological approach, i.e. to analyze these processes simultaneously, in terms of what we call *situated emotional problem solving*, within an interactive computer game setting (a micro world scenario).

Kaiser, S. W., T.; Schmidt, S. (1998). Emotional episodes, facial expressions, and reported feelings in human-computer interactions. Xth Conference of the International Society for Research on Emotions, Würzburg, ISRE Publications.

Karni, E. S., Zvi (2000). *Intensity of the Sense of Fairness: Measurement and Behavioral Characterization*.

The analysis of the behavioral and social implications of the intensity of moral sentiments requires that these emotions be quantified. In this paper we quantify the intensity of individual sense of fairness in the context of the model of Karni and

Safra (2000). That model depicts self-interest seeking individuals endowed with intrinsic sense of fairness, who must choose among alternative random allocation procedures to determine who, among a group of eligible individuals, will be given ownership of an indivisible good. For such individuals we develop measures of the intensity of their sense of fairness and explore their behavioral characterization.

Kaukoranta, T. S., Jouni (2003). Role of Pattern Recognition in Computer Games. Turku, Finland, Dept. of IT and Turku Centre for Computer Science (TUCS), University of Turku. We discuss pattern recognition in the context of computer game [sic]. The purpose of pattern recognition is to extract relevant information from the game world. This high level information is needed by a decision-making system, which is responsible for producing actions to the game world. We delineate where pattern recognition can be applied in computer games, what are its roles, and what is expected from it. We discuss how pattern recognition can be utilized in different levels of detail, and how the relation between the synthetic player and the human player affects to the requirements for pattern recognition.

Kirchsteiger, G. R., Luca; Rustichini, Aldo (2000). Your Morals Are Your Moods, Center for Economic Research.

We test the effect of players' moods on their behavior in a gift-exchange game. In the first stage of the game, player 1 chooses a transfer to player 2. In the second stage, player 2 chooses an effort level. Higher effort is more costly for player 2, but it increases player 1's payoff. We say that player 2 reciprocates if effort is increasing in the transfer received. Player 2 is generous if an effort is incurred even when no transfer is received. Subjects play this game in two different moods. To induce a 'bad mood', subjects in the role of player 2 watched a sad movie before playing the game; to induce a 'good mood,' they watched a funny movie.

Mood induction was effective: subjects who saw the funny movie reported a significantly better mood than those who saw the sad movie. These two moods lead to significant differences in Player 2's behavior. We find that a bad mood implies more reciprocity while a good mood implies more generosity. Since high transfers are relatively more common, player 1 makes more money when second movers are in a bad mood.

Marsella, S. C. (2000). "Sympathy for the Agent: Controlling an agent's nonverbal repertoire: An extended abstract."

Marshall, P. R., Yvonne; Scaife, Mike Puppet: playing and learning in a virtual world. Brighton, Univ. of Sussex.

When a child is engaged in improvisational play, representations of the activity are transient. Thus, to reflect on or change what has been done requires great effort of memory. This paper argues that by recording aspects of children's activity while they are engaged in improvisational play, virtual environments can provide powerful tools to support children's reflection about aspects of narrative. A virtual environment called PUPPET is introduced, which aims to allow children to engage in playful interaction with autonomous agents, while recording characters for the characters in the world. An evaluation of the PUPPET system suggests that

children found the environment to be a motivating and engaging one. Furthermore, recording and editing dialogue for the characters in the world was found to be successful in eliciting reflective thought and discussion between the children.

Mathieson, K. (2000). *Information Tools for Ethical Living: A Research Framework*. Rochester, NY, School of Business Administration, Oakland University.

Information technology helps people in many ways, but it doesn't help them answer important questions like: What do I do with my life? How should I act? How should I treat others? Perhaps IT can help ordinary people create and live a personal moral philosophy. This paper offers a framework for research on this possibility. Ethical choice is viewed as guided imagination, and moral development as improving values, imaginative capacity, and emotional response. Specific suggestions for using IT in moral exploration are provided.

Meadows, M. S. (2003). *Pause & Effect: The Art of Interactive Narrative*. Indianapolis, New Riders.

Murray, K. Narrative Partitioning: The ins and outs of identity construction. *Rethinking Psychology: Volume 1 - Conceptual Foundations*. J. H. Smith, R.; van Langenhove, Luk.

Nijholt, A. *Embodied Agents: A New Impetus to Humor Research*. Enschede, Netherlands, University of Twente.

In this paper we survey the role of humor in human-to-human interaction with the aim to see whether it is useful for embodied conversational agents to integrate humor capabilities in their internal model of intelligence, emotions and interaction (verbal and nonverbal) capabilities. For that reason we shortly survey the current state of the art of research in embodied conversational agents, affective computing and verbal and nonverbal interaction. We adhere to the 'Computers Are Social Actors' paradigm to assume that human conversational partners of embodied conversational agents assign human properties to these agents, including humor appreciation.

Nitsche, M. "Spatial structuring, cinematic mediation, and evocative narrative elements in the design of RT 3D VE: The Common Tales Project." *Digital Creativity* 15(1): 53-58.

The practice-based research project Common Tales investigates and formulates methods of spatial structuring, cinematic mediation, and evocative narrative elements in the design of a meaningful Real-Time 3-Dimensional Virtual Environment. A collaboration between the Digital Studios (University of Cambridge), the National Film and Television School (NFTS), and Sony Computer Entertainment Europe (SCEE), it combines the know-how of the industry partner (SCEE) with academic expertise (Digital Studios) and practical knowledge of film-making (NFTS). The unique inputs into the project of the three partners combined to provide and shape insights and outcomes impossible for any of the three individually to have produced, and provided a sound template for collaborative research.

Nitsche, M. T., Maureen (2003). *Stories in Space: The Concept of the Story Map*,

University of Cambridge.

While 3D space has become almost ubiquitous in computer games that apply narrative techniques, theoretical frameworks and practical experiments about the use of virtual space are underdeveloped compared to the number of works that deal with literary textual pieces such as MUDs. Offering one element to fill this gap, the notion of a Story Map is introduced in this paper. The interactor's experience of space and of the events in a Real-Time 3-Dimensional Virtual Environment (RT 3D VE) form a constant discourse and Story Maps are seen as a form of the interactor's comprehension of this discourse. The *Common Tales* research project exemplifies the development of this theory and its narrative qualities.

Petrovic-Lazarevic, S. C., Ken; Abraham, Ajith (2001). Neuro-Fuzzy Support of Knowledge Management in Social Regulation, Monash University, Australia.

The aim of the paper is to demonstrate the neuro-fuzzy support of knowledge management in social regulation. Knowledge, defined as human capability of making data and information useful for decision making processes, could be understood for social regulation purposes as explicit and tacit. Explicit knowledge relates to the community culture indicating how things work in the community based on social policies and procedures. Tacit knowledge is ethics and norms of the community. The former could be codified, stored and transferable in order to support decision making, while the latter being based on personal knowledge, experience and judgments is difficult to codify and store. However, since the tacit knowledge is expressed mainly through linguistic information, it can be stored and, therefore, support the knowledge management in social regulation through the application of fuzzy and neuro-fuzzy logic. Fuzzy logic modeling holds that human values inform the operation of the fuzzy logic by which the outcomes of interactions between interdependent members of any community are determined. With the system simulation where high precision is not required and parameters can be easily estimated for measurement, the fuzzy control model can be applied to estimating the appropriateness of self-organisation of the community. The model incorporates observed behavioral patterns seeking to explain their effects.

The neuro-fuzzy approach is based on the integration of artificial neural networks and fuzzy inference systems. Neural network learning algorithms are used to fine tune the parameters of fuzzy inference system. Consequently, the neuro-fuzzy technique provides an ability to handle imprecision and uncertainty from data and to refine them by a learning algorithm. Applied in social regulation the neuro-fuzzy model creates fuzzy rules, which are easy to comprehend because of its linguistic terms and the structure of if-then rules.

Neuro-fuzzy models implementing Takagi-Sugeno Kang if-then rules and Mamdani type fuzzy inference systems are tested with tobacco smoking enforcement efforts. The obtained results demonstrate the relevance of each model to knowledge management in social regulation.

Phillips, M. A. H., Chris (2001). *Dramatica: A New Theory of Story*, Screenplay Systems Incorporated.

Pinhanez, C. S. B., Aaron F. (2003). *Interval Scripts: A Programming Paradigm for*

Interactive Environments and Agents. Personal Ubiquitous Computing, Springer-Verlag London. **2003**.

In this paper we present *interval scripts*, a new paradigm for the programming of interactive environments and computer characters. In this paradigm, actions and states of the users and the system computational agents are associated with temporal intervals. Programming is accomplished by establishing temporal relationships as constraints between the intervals. Unlike previous temporal constraint-based programming languages, we employ a strong temporal algebra based in Allen's interval algebra with the ability to express mutually exclusive intervals to define complex temporal structures. To avoid the typical computational complexity of strong temporal algebras we propose a method, *PNF propagation*, that projects the network implicit in the program into a simpler, 3-valued (*past, now, future*) network where constraint propagation can be conservatively approximated in linear time. The interval scripts paradigm is the basis of *ISL*, or *Interval Scripts Language*, that was used to build three large-scale, computer-vision-based interactive installations with complex interactive dramatic structures. The success in implementing these projects provides evidence that the interval scripts paradigm is a powerful and expressive programming method for interactive environments.

Prendinger, H. D., Sylvain; Ishizuka, Mitsura (2002). *Scripting the Bodies and Minds of Life-like Characters*. Tokyo, University of Tokyo.

In this paper, two systems will be described. First, we present an architecture for emotion-based agents, called SCREAM, that allows to encode affect-related processes for an animate character. Content authors may design the mental make-up of the agent by declaring a variety of parameters relevant to affective communication and obtain quantified emotional reactions. Second, we report on MPML, an XML-style markup language that facilitates the control and coordination of animated characters in web-based environments. Both systems are integrated such that the 'bodies' and 'minds' of life-like characters can be easily controlled.

Price, S. R., Y.; Scaife, M.; Stanton, D.; Neale, H. Using 'Tangibles' to Promote Novel Forms of Playful Learning.

Tangibles, in the form of physical artefacts that are electronically augmented and enhanced to trigger various digital events to happen, have the potential for providing innovative ways for children to play and learn, through novel forms of interacting and discovering. They offer, too, the scope for bringing playfulness back into learning. To this end, we designed an adventure gamem, where pairs of children have to discover as much as they can about a virtual imaginary creature called the Snark, through collaboratively interacting with a suite of tangibles. Underlying the design of the tangibles is a variety of transforms, which the children have to understand and reflect upon in order to make the Snark come alive and show itself in a variety of morphological and synaesthesia forms. The paper also reports on the findings of a study of the Snark game and discusses what it means to be engrossed in playful learning.

Rao, A. S. G., Michael P. (1995). *BDI Agents: From Theory to Practice*. Proceedings of the First International Conference on Multi-Agent Systems (ICMAS-95). San Francisco.

The study of computational agents capable of rational behaviour has received a great deal of attention in recent years. Theoretical formalizations of such agents and their implementations have proceeded in parallel with little or no connection between them. This paper explores a particular type of rational agent, a Belief-Desire-Intention (BDI) agent. The primary aim of this paper is to integrate (a) the theoretical foundations of BDI agents from both a quantitative decision-theoretic perspective and a symbolic reasoning perspective; (b) the implementations of BDI agents from an ideal theoretical perspective and a more practical perspective; and (c) the building of large-scale applications based on BDI agents. In particular, an air-traffic management application will be described from both a theoretical and an implementation perspective.

Riedl, M. O. (2002). Actor Conference: Character-focused Narrative Planning, Liquid Narrative Group.

The ability to generate narrative can be applied to entertainment and education applications to the benefit of both. In this paper, I informally evaluate several narrative generation systems. Automated narrative generation systems can be classified as character-centric and author-centric techniques. Character-centric systems tend to develop narratives with strong character believability but weak coherent plot lines. Author-centric systems tend to develop narratives with strong plot coherence but weak character believability. I then describe an alternative narrative generation system, the Actor Conference, which benefits from both techniques. The Actor Conference system uses a blackboard architecture to coordinate the efforts of many autonomous agents, each representing a single character in the story world, to generate a single, coherent narrative plan.

Rejeski, D. (2002). Gaming Our Way to a Better Future. Developer's Corner, The Adrenaline Vault.

Riedl, M. S., C.J.; Young, R. Michael (2003 (?)). Managing interaction between users and agents in a multi-agent storytelling environment, Liquid Narrative Group.

This paper describes an approach for managing the interaction of human users with computer-controlled agents in an interactive narrative-oriented virtual environment. In these kinds of systems, the freedom of the user to perform whatever action she desires must be balanced with the preservation of the storyline used to control the system's characters. We describe a technique, narrative mediation, that exploits a plan-based model of narrative structure to manage and respond to users' actions inside a virtual world. We define two general classes of response to situations where users execute actions that interfere with story structure: accommodation and intervention. Finally, we specify an architecture that uses these definitions to monitor and automatically characterize user actions, and to compute

Rousseau, D. H.-R., Barbara (1997). A Social-Psychological Model for Synthetic Actors. Knowledge Systems Laboratory, Report no. KSL 97-07. Stanford, Dept. of Computer Science, Stanford University.

In the Virtual Theater project, we provide synthetic actors that portray fictive characters by improvising their behavior in a multimedia environment. Actors are either autonomous or avatars directed by users. Their improvisation is based on

the directions they receive and the context. Directions can take different forms: high-level scenarios, user commands, and personality changes in the character portrayed. In this paper, we look at this last form of direction. We propose a social-psychological model, in which we can define personality traits that depend on the values of moods and attitudes. We show how such a model can be exploited by synthetic actors to produce performances that are theatrically interesting, believable, and diverse. An application, the Cybercafé, is used to test those features.

Salen, K. Z. E. (2003). Rules of Play: Game Design Fundamentals. Boston, MIT Press.

Scheutz, M. S., Aaron; Logan, Brian Emotional States and Realistic Agent Behavior. Birmingham & Nottingham, Univ. of Birmingham; Univ. of Nottingham.

In this paper we discuss some of the relations between cognition and emotion as exemplified by a particular type of agent architecture, the *CogAff* agent architecture. We outline a strategy for analysing cognitive and emotional states as architecture-dependent. We demonstrate this architecture-based research strategy with an example of a simulated multi-agent environment, where agents with different architectures have to compete for survival and show that simple affective states can be surprisingly effective in agent control under certain conditions. We conclude by proposing that such investigations will not only help us improve computer entertainments, but that explorations of alternative architectures in the context of computer games may also lead to important new insights in the attempt to understand natural intelligence and evolutionary trajectories.

Siebra, S. d. A. R., Geber L. Athena: An User-Centered Adaptive Interface. Recife, Brazil, Universidade Federal de Pernambuco.

Silva, D. R. S., Clauriton A.; Valadares, Jeferson L.; Almeida, Alessandro L.; Frery, Alejandro C.; Falcao, Jorge da Rocha; Ramalho, Geber L. (2001). A Synthetic Actor Model for Long-Term Computer Games. Recife, Brasil, Centro de Informatica e Departamento de Psicologia, Universidade Federal de Pernambuco.

Virtual Reality and Artificial Intelligence provide suitable techniques to improve computer games quality. While the former offers mechanisms to model environment and characters physical features, the latter provides models and tools for building characters, namely *Synthetic Actors* or *Believable Agents*, which can exhibit intelligent social behavior and express personality and emotions. The current architecture proposals for Synthetic Actors do not fully meet the requirements for long-term games development. In long-term games, such as strategy and adventure ones, it is necessary to guarantee both personality stability and reactive emotional responses, which may be contradictory. In this work, we propose a new Synthetic Actor model that tightly connects emotions and social attitudes to personality, providing a long-term coherent behavior. This model has been applied to two games presented here as case studies.

Smith, H. The Future of Game Design: Moving Beyond Deus Ex and Other Dated Paradigms. Future of Design, International Game Developers Association.

As an art form, immersive games are in a transitional state, currently positioned on the cusp of something almost unrecognizably different. Future games will employ deeper simulation in order to achieve far greater levels of interaction and complexity, while simultaneously simplifying the learning curve for new players. Most game environments of the past have been based on crude abstractions of reality, limiting player expression and requiring users to learn a completely new vernacular in order to play. The games of the future will rely heavily on much more complex, high fidelity world representations that will allow for more emergent behavior and unforeseen player interactions. Taken together, these next-generation design paradigms are not simply improvements over older models, but represent a fundamentally different approach to simulating real-world physics, handling artificial intelligence and interface usability.

Using the award winning and critically acclaimed game Deus Ex as an experimental foundation for discussion of these new design paradigms, come explore the theories that will bring about the renaissance of the next-generation of interactive exploration. [what a crock of egotistical shit]

Stock, O. Password Swordfish: Verbal Humour in the Interface.

Humour will be a necessity in future interfaces, especially in the area at the crossroads of entertainment and education, the so called edutainment. Some considerations on the state of the art in natural language processing and on computational humour prospects are presented, as well as some ideas for the introduction of certain types of computational humour in seductive interfaces. In doing that, reference is made to some of the sparkling exchanges of the Marx Brothers.

Sullivan, J. G. Aristotle on Ethics.

Theune, M. F., Sander; Nijholt, Anton; Heylen, Dirk The Virtual Storyteller: Story Creation by Intelligent Agents. Enschede, Netherlands, University of Twente.

The Virtual Storyteller is a framework for story creation by co-operating intelligent agents. In this framework, a collection of agents is responsible for the creation of different story levels: plot, narrative, and presentation. In the Virtual Storyteller, plots are automatically created based on the actions of autonomous characters whose plot creation is only constrained by general plot requirements. This approach lacks the disadvantages of pure character-based plot development, where the characters are fully autonomous, and of scripted approaches, where the plot content is pre-defined and the characters have no autonomy at all.

Thomason, R. H. (2000). Desires and Defaults: A Framework for Planned with Inferred Goals. Ann Arbor, AI Laboratory, University of Michigan.

This paper develops a formalism designed to integrate reasoning about desire with planning. The resulting logic, BDP, is capable of modeling a wide range of common-sense practical arguments, and can serve as a more general and flexible model for agent architectures.

Winn, W. (2001). "Reviewer's Corner Teaching Virtues: Building Character Across the

Curriculum." Journal of School Improvement **2**(2).

Young, R. M. Creating Interactive Narrative Structures: The Potential for AI Approaches. Raleigh, NC, Liquid Narrative Group, Dept. of Computer Science, North Carolina State University.

This paper poses a number of questions that center on the relationship between narrative in an interactive environment and the representations and reasoning processes that AJI researchers might bring to bear to create and maintain such narrative experiences.

Zhou, X. C., Cristina Inferring User Goals from Personality and Behavior in a Causal Model of User Affect. Vancouver, Univ. of British Columbia.

We present a probabilistic model, based on Dynamic Decision Networks, to assess user affect from possible causes of emotional arousal. The model relies on the OCC cognitive theory of emotions and is designed to assess student affect during the interaction with an educational game. A key element of applying the OCC theory to assess user affect is knowledge of user goals. Thus, in this paper we focus on describing how our model infers these goals from user personality traits and interaction behavior. In particular, we illustrate how we iteratively defined the structure and parameters for this part of the model by using both empirical data collected through Wizard of Oz experiments and relevant psychological findings.