REFRAMING INTERACTIVE DIGITAL NARRATIVE: TOWARD AN INCLUSIVE OPEN-ENDED ITERATIVE PROCESS FOR RESEARCH AND PRACTICE

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Reframing Interactive Digital Narrative:
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It is a waste of energy and resources to make applications that merely imitate media that exist in other forms, such as print, television, and film.

Pamela Jennings, 1996

To my Parents

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

SUMMARY

In more than two decades of research and practical experiments in interactive digital narrative (IDN), much insight about the relationship of narrative and digital media has been gained and many successful experiments have been undertaken, as a survey of the field illustrates. However, current approaches also limit the scope of experimentation and constrain theory in interactive narrative forms original to digital media.

After reviewing the "interactivisation" of legacy theory (neo-Aristotelian poetics for interactive drama, poststructuralism for hyperfiction, 20th century narratology for interactive fiction and as a general theory for IDN), the thesis introduces a theoretical framework that changes the focus from the product-centered view of legacy media towards system and the process of instantiation. The terms protostory describing the overall space of potential narratives in an IDN system, narrative design for the concrete assemblage of elements and narrative vectors as substructures that enable authorial control are introduced to supersede legacy terms like story and plot.

On the practical side, the thesis identifies limitations of existing approaches (e.g. legacy metaphors like the timeline, and authoring tools that support only particular traditions) To overcome these limitations a software toolset built on the principles of robustness, modularity, and extensibility is introduced and some early results are evaluated. Finally, the thesis proposes an inclusive, open-ended iterative process as a structure for future IDN research in which practical implementations and research co-exist in a tightly coupled mutual relationship that allows changes on one side to be integrated on the other.

CHAPTER 1

INTRODUCTION

Interactive digital narrative has been envisioned by many academic researchers as well as practitioners in the field of digital media since the introduction of the first interactive fiction *Adventure* in 1976. The numerous artifacts developed since have been described as representing different traditions such as (literary) Hyperfiction, Interactive Fiction, Interactive Drama, Interactive Cinema, and Narrative Games. While these traditions differ in their particular theoretical and practical approaches, they share a common objective of creating narratives that change in accordance with user input. Consequently, the perspective taken here understands the different interactive narrative traditions as parts of a shared effort – the development of expressive narrative forms in digital formats that turn the recipient of older forms into a participant with the goal of facilitating a different and potentially better understanding of our complex world and a new way to share our experiences with others. In order to convey this perspective of a shared space I will use Interactive Digital Narrative (or short IDN) throughout this thesis as an umbrella term for the diverse theoretical perspectives and the numerous digital artifacts that constitute the common effort.

This first chapter introduces the motivation for this thesis by presenting a short overview of the history of IDN and an analysis of the current state of the field. Subsequently, five aspects (fragmentation, interactivisation, obsolescence, the division between research and practice, and a missing overarching structure for IDN research) are outlined that will be the focus of this thesis. Finally, the contributions of the thesis are named and a roadmap of the thesis is provided.

1.1 A Multitude of Traditions

Over the course of the last thirty years, many ideas have been offered about how IDN could be realized. On the academic side, extensive research was undertaken both by individual researchers and entire groups such as in the Oz Project at Carnegie Mellon University, or at the Interactive Cinema Group at the MIT Media Lab. Additionally, practitioners from outside the academic community, for example the development team at Infocom, and the game designer Chris Crawford, have worked on practical experiments and offered visions for IDN. These groups and individuals have worked on the problem of interactive digital narrative from different backgrounds and consequently applied different strategies. Overall, visions and experiments in IDN are based on the traditions of four main fields: literary studies and practice, film studies and practice, computer science, and game design.

Interactive Fiction (IF) represents the first attempt at IDN, which came out of computer science research into parsers, computer programs that process textual input. Early examples of IF works include the text adventures *Adventure* (Crowther, 1976)[1] and *Zork I* (Blank & Lebling, 1980), but the tradition can be traced back even further to the famous computer program *Eliza* (1966), Joseph Weizenbaum's simulation of a Rogerian therapist which Janet Murray identifies as the first example of IDN (see Murray, 1997). Nick Montfort, in his survey of the field, *Twisty Little Passages* (2003a) defines

[1] But it should be noted that *Adventure* was originally created by a single programmer without affiliations to research, see Montfort 2003a, p.10.

Interactive Fictions as works that “display text [on the computer screen], accept textual responses, and then display additional text in reaction”(p. vii). Conceptually, he describes the “jigsaw puzzle” (p. 3)[2] as the central mechanism of IF, which serves to “control the revelation of the narrative” (p. 3) but is also a part of an “interactive process that generates narrative” (p. 3). For Montfort, the pleasure of IF lies in uncovering the “locked away” (p. 3) secret, a notion he links to Roland Barthes, who compares the reading of literature to the erotic pleasure of a revealing striptease (see Barthes, 1973).

Starting in the 1980s, Hyperfiction represents a second line of tradition in IDN. Hyperfiction is based on the idea of hypertext, first expressed as a means to organize large amounts of information by Vannevar Bush (see Bush, 1945). This form of IDN comes out of a literary tradition and is also sometimes called “literary hypertext” (Bolter, 2001, p. xii) in order to also include non-fiction works. Hyperfiction connects short pieces of text (“lexias”) by means of hyperlinks. The links are pre-defined by the author and form a structure for the hypertext. George Landow argues in his book *Hypertext: The Convergence of Contemporary Critical Theory and Technology* that hypertext enables a paradigm shift:

> [...] we must abandon conceptual systems founded upon ideas of center, margin, hierarchy, and linearity and replace them with ones of multilinearity, nodes, links, and networks. (Landow, 1992, p. 2)

For Landow, a professor of English literature, the direction of this shift is towards poststructuralism in the tradition of French philosophers Roland Barthes and Michael Foucault in their proclamation of the disappearance of the author (see Barthes, 1977, Foucault 1977), and their understanding of a “text in terms of networks and links”

[2] Later, Montfort substitutes “riddle” for “jigsaw puzzle”.

(Landow, 1992, p. 3). The author Robert Coover, one of the founders of the Electronic Literature Organization (ELO), echoes these sentiments when he argues for an end of the "tyranny of the line" (Coover, 1992) by providing "multiple paths between text segments" with the aim to allowing a "plurality of discourses over definitive utterance" (Coover, 1992). Additionally, Coover sees a shift in the relationship between author and reader: "Hypertext reader and writer are said to become co-learners or co-writers" (Coover, 1992). In the same way Jay Bolter argues that the reader of a hypertext is "required at every turn to reflect on the experience of reading" (Bolter, 1991, p. 170).

Interactive cinema is represented by the Interactive Cinema Group at MIT, which had its roots in documentary filmmaking, especially the *cinema verité* movement, which combined naturalistic depiction with provocative stances regarding the subject matter. The group's director, Glorianna Davenport, was a trained documentary filmmaker. The group's initial direction came from earlier experiments with interactive video like the *Aspen Movie Map* (see Clay, 1978), *New Orleans in Transition* (Davenport, 1987) and *Elastic Charles* (Davenport & Brondmo, 1989). These works combined video clips with a graphical interface for navigation to explore a virtual world on the computer screen. Later experiments added sensors to allow interaction with hands, feet, or even the full body. Glorianna Davenport understood interactive cinema as a new artistic discipline, free "[…] from the constraints of the inherently linear celluloid base," a "meta-cinema" that "explodes the myth of the heroic" and would help to "share multi-point of view stories" and thus help its viewers to "engage in sociable interchange between all people" (Davenport, 2002).

Interactive drama was a direction for IDN first introduced by Brenda Laurel in her PhD thesis (Laurel, 1986) and subsequent book (Laurel, 1991) and continued in the computer-sciences based OZ project at Carnegie Mellon University, which added a strong focus on characters and advanced artificial intelligence (AI) methods. The stated goal of the OZ project was to create "highly interactive worlds" populated by "dynamic and complex characters" (Kelso, Weyhrauch, & Bates, 1993). The researchers involved were particularly interested in believable agents (see Bates, 1994, Sengers, 1998, Mateas, 1997) with the aim to create highly engaging Interactive Drama.

Celebrated game designer Chris Crawford left a successful career as a video game designer to work on IDN because he perceived the video game industry as having come to a standstill (see ludosophist, 2007). At the same time, he saw IDN as an area for innovation and artistic expression. Crawford describes his idea of IDN as an experience that "meanders through a dramatic universe of possibilities" (Crawford, 2004, p. 12), which he contrasts with a "linear story" (p. 12) that "'runs on rails' from start to finish in the most powerful and expeditious manner possible" (p. 12). For Crawford IDN is a means to overcome limitations in video games. His work is therefore grounded in the tradition of video games and earlier tabletop game forms, especially the complex rule systems in role playing games (RPGs), for example Tactical Studies Rules' *Dungeons & Dragons* (1974), and its predecessors like Guidon Games' *Chainmail* (1971). Crawford is also influenced by simulations like *Sim City* (Wright, 1989), which contribute to his concept of storyworlds in which many interdependent processes exist.

The European research project Inscape, a collaboration between several European research institutes, universities, and software companies, represents an attempt to integrate diverse traditions. This project aims to produce a suite of software tools that allows the creation of many different types of interactive experiences and thus has no standard form of representation (see Kafno, 2007). As a consequence of this perspective, the Inscape consortium does not attempt to provide a comprehensive definition of IDN.

1.2 Disappointment and Discontinuity

Despite these and many other efforts, neither interactive drama nor interactive cinema nor any other form of interactive narrative such as Hyperfiction have so far been able to fulfill the high expectations its proponents, such as George Landow (1992) and Robert Coover (1992) had for them. Regarding literary Hyperfiction, Jay Bolter expresses his disappointment in 1996:

> It seemed at first that the computer would confirm and extend the tradition of written communication and give us a new kind of prose. […] But the dominant effect of computer technologies will be to provide forms of representation that have more in common with film and television than with written communication. (Bolter, 1996)

Bolter concedes that hypertext fictions such as *Afternoon* (Joyce, 1991) and *Victory Garden* (Moulthrop, 1992) have only won “small audiences” (Bolter, 1996) and even goes on to speculate that “there will never be a substantial audience for verbal fiction and nonfiction in the new medium.” (Bolter, 1996)

There has not been such an explicit statement from the Interactive Cinema Group at the MIT Media Lab. But we can take the fact that the group ceased to exist in 2004 and the researchers participating in it founded a new group called Media Fabrics as an indicator of the failure to turn the original vision into reality. The development is even more drastic given that Glorianna Davenport, the group’s leader, was only a short time from retirement. The vision for Media Fabrics is much less defined in comparison to the original goals for interactive cinema:

> […] a semi-intelligent organism where lines of communication, threads of meaning, chains of causality, and streams of consciousness converge and intertwine to form a rich tapestry of creative story potentials, meaningful real-time dialogues, social interactions, and personal or communal art- and story-making. (Media Fabrics, n. d.)

Nick Montfort, himself an IF author and a major proponent of the form, states that the “commercial heyday of interactive fiction is clearly over” (Montfort, 2003a, p. 2) and goes on to call IF “supposedly defunct” (p. 3). While Montfort hopes for a resurrection of the form and powerful future works with “more appealing possibilities for the interactor” (p. 5), he cautions that presently IF works are relegated to a small circle of interested individuals, making the main reason to create IF works today a desire to “amuse the initiated.” (p. 229)

For interactive drama, only a single completed one exists today. Mateas and Stern’s *Façade* (2005b) has won several prizes and logged in excess of 500,000 downloads. *Façade* clearly marks a major achievement that reflects the “3 person years” (Mateas & Stern, 2005a) of work put into the project. However, the self-critical remarks of its creators identify *Façade* as an experiment that is often unable to meet the interactor’s expectations:

> A major challenge we encountered, that we believe *Façade* falls short on, is always clearly communicating the state of the social games to the player. […] We anticipated natural language understanding failures, which in informal evaluations of *Façade* to date, occur ~30% of the time on average. […] the system cannot understand, nor has authored reactions for, many reasonable player utterances. […] The large domain [of a marriage falling apart] often requires mapping millions of potential surface texts to just a few discourse acts, which can feel muddy or overly coarse to the player. (Mateas & Stern, 2005a)

Besides these technical aspects, there are questions regarding the expressive power of the work, specifically, the important aspect of the user's perception and her experience of agency. Over four decades ago, the *Eliza* experiment proved that a wide gap could exist between the programmer's intentions and the user's perception of this matter. These technical and expressive aspects point to the need for follow up works to *Façade* in order to better understand the potential of interactive drama. Unfortunately, while a successor to *Façade* has been officially announced in a press release in 2006[3], no further information has been released and continuation of this project seems to be in doubt.

Chris Crawford's IDN project, begun in 1992 and recently renamed *Storytron*, has been made available in the form of the authoring tool *SWAT* in 2009 (2009a). However, a year later, only a single playable storyworld is publicly available (a remake of Crawford's 1985 game *Balance of Power*, called *Balance of Power: 21st Century* (Crawford, 2009b). The focus of this release seems to be on demonstrating the interaction by forming sentences from pre-defined choices. The graphical representation is rather bare and consists mainly of black-and-white facial animations representing character states. While it remains to be seen if this example is representative for what is possible with Storytron, *Balance of Power:21st Century* falls short in terms of using the expressive graphical potential of digital media, but more importantly fails to demonstrate greater expressive power than games (one of Crawford's initial claims) by re-using an existing game concept. An early reaction by game developer Mike Rubin mirrors this disappointment:

> […] the presentation has the look and feel of a basic story structure and its components, with none of the crucial dressing of language and style that an author

[3] http://proceduralarts.com/pressreleases/pressrelease3.html, retrieved March 2009.

> provides. That is to say, the storygame is plenty of substance without any style. (Rubin, 2008)

The European *Inscape* IDN authoring toolkit project was successful in producing a prototype that enabled the production of diverse forms of IDN. However, as of April 2010, it seems that the project has ended without being able to fulfill the original intent to produce a commercially viable collection of tools for IDN. Even more problematic for future research is the fact that the project's website is not longer available, which makes the tools unavailable as a basis for future research. In this way, the ambitious project has become yet another discontinued attempt in advancing IDN practice.

1.3 New Narrative Possibilities – the Case for IDN

From the perspective of disappointment and discontinuation described in the previous section, the future prospects of IDN as a practice and research discipline seem questionable. Indeed, 24 years after Brenda Laurel's seminal book *Computers as Theatre* (1986), 20 years after the release of the pioneering hypertext authoring tool *Storyspace* (1990), 18 years after George Landow's groundbreaking *Hypertext: The Convergence of Contemporary Critical Theory and Technology* (1992), and 13 years after Janet Murray's visionary *Hamlet on the Holodeck* (1997), it is websites and computer games that dominate the space of digital media, and not interactive digital narratives. Not a single IDN has gained widespread public recognition comparable to a critically acclaimed Hollywood movie, or computer games like *Myst* (Miller, 1993), *The Sims* (Wright, 2000), *Second Life* (2003), and *World of Warcraft* (2004). A status similar to classic works like the novel *Oliver Twist,* the play *Hamlet,* or the movie *Citizen Kane* seems even more elusive.

At the same time, interest in IDN in academia and amongst artists remains high, with many papers published[4], and whole conference series devoted to the topic[5]. As a field of inquiry, IDN is still attractive, precisely because of its unfinished nature. It is an unsolved problem and thus offers researchers many avenues to pursue, such as experiments with new story structures (see Bernstein, 1998), different modes of interaction (see Riedl, Saretto, & Young, 2003), and redefining the status of author and reader/viewer (see Cavazza, Charles, & Mead, 2001).

For the practitioner, there are additional reasons to create interactive narrative works. Traditional narration has limitations and artists have long sought to overcome these boundaries and enhance the space of narrative. A short list of literary examples that challenge existing story structures includes Jorge Luis Borges' 1941 short story *The Garden of the Forking Paths* (1964), James Joyce's novel *Finnegans Wake* (1939), and Uwe Johnson's 1959 *Mutmassungen über Jakob* (transl. *Assumptions About Jakob)* (1983), as well as the experimental texts of the OULIPO Group. Similarly, films such as *Un Chien Andalou* by Luis Buñuel (1929), or Akira Kurosawa's *Rashomon* (Jingo & Kurosawa, 1950) have broken new ground in terms of narrative structure, as have the installations of Toni Dove, and the interactive documentaries by Glorianna Davenport. Even mainstream movie productions such as *Groundhog Day* (Alvert & Ramis, 1993), *Run Lola Run* (Arndt & Tykwer, 1998), *Sliding Doors* (Pollack, Braithwaite, & Howitt,

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[4] A search conducted on the academic search engine Google Scholar on April 27, 2010 for the exact term *interactive narrative* brings up 217 results for the time period beginning 2009. Broader search terms yield thousands of results.

[5] Examples include *Technologies for Interactive Digital Storytelling and Entertainment* (TIDSE), *International Conference on Virtual Storytelling* (ICVS), *Artificial Intelligence and Interactive Digital Entertainment* (AIIDE), *AAAI Intelligent Narrative Technologies Symposium*, *International Conference on Virtual Systems and Multimedia* (VSMM), *Digital Arts and Culture* (DAC), and *International Symposium on Electronic Art* (ISEA).

1998) or more recently *Atonement* (Bevan, Fellner, Webster, & Wright, 2007) and *Vantage Point* (Moritz & Travis, 2008) try to overcome traditional story structures with replay, the presentation of several alternate stories, and multiple perspectives.

My own interest in digital interactive narrative as a practitioner[6] is driven by the search for better representations of contemporary post-modern society. In this vein, I am especially interested in contemporary cultural practices I propose to call *routine extrapolation* and *perpetual assessment*. The former describes an act of routinely querying several sources and extrapolate an opinion as a result, with the goal to produce a more stable perspective. This practice is applied in many areas, for example to daily news media or in personal or professional relations. The later term describes the widespread "trying out" of several possibilities, in the form of professional internships, non-committal relationships, and the practice of returning goods after testing them at home. Narrative in legacy media with a fixed plot is limited in its ability fully reflect these cultural techniques. However, the procedural and participatory powers of digital media provide exciting avenues for narrative to express the seemingly endless amount of perspectives and possibilities for different paths and consequences in contemporary society. The interactive narratives I envision would reflect these sensibilities by offering the interactor multiple perspectives and give her freedom to explore many different narrative paths.

[6] I use uses spatial navigation and real world objects to structure narrative in my project *Pathways into History* (1999/2000), as a means to learn about 19th century German history. The project was presented at the Interactive Storytelling Workshop (a predecessor to the TIDSE conferences), Darmstadt 2000. My IDN work *The Weekend* (2005) uses a journey and a three-act structure to experience the problem of trying to attract and connect with the opposite sex.

As a step towards a more complete realization of the potential of IDN, the remainder of this chapter takes a first broad look at five current issues in IDN: fragmentation, interactivisation, obsolescence, the division between research and practice, and the missing overarching structure for IDN research.

1.4 Fragmentation/Positioning

The multitude of traditions in IDN described earlier in this chapter points out one problem of IDN – fragmentation. The space of IDN encompasses several larger camps representing major traditions like IF, Hyperfiction, and interactive drama. Unfortunately, there is little exchange among the different camps, as researchers associate with particular traditions (e.g. Nick Montfort (2003a) within IF; Michael Mateas (2002), Brian Magerko (2006) within interactive drama; Mark Bernstein (1998), Michel Joyce (1995), George Landow (1992) within Hyperfiction) or attempt to instigate a different tradition (IDN based on African oral narrative – Pamela Jennings (1996a), Fox Harrell (2007)). Both theory and practical experiments are fragmented along these lines, as most authoring tools embody a single approach towards IDN. Examples for such combination are in IF with the authoring tools Inform and TADS), Hyperfiction with StorySpace[7], interactive cinema with the Korsakow System (2010) and in Chris Crawford's Erasmatazz/Storytron (2009a) system, which implements a turn-based approach inspired by score-based role playing games.

[7] http://www.eastgate.com/storyspace/

The current culture is aptly described by Jay Bolter's remark "everybody in this field wants to make his own system"[8] This state of fragmentation complicates exchange across the many divisions as researchers based in one tradition are usually not aware of the foundational frameworks, aesthetics, and goals of any other tradition. For example, the richness of Hyperfiction's complex and labyrinth-like structures might not be evident to researchers in the interactive drama tradition that foregrounds advanced computational methods to generate well-formed plot structures.

Without a better mutual understanding of their respective approaches, researchers cannot position themselves in relation to other approaches. As a result, the nature and extent of differences are obscured, and areas of overlap go unnoticed, instead of being used productively as a basis for shared projects and collective progress. A survey of the main traditions in IDN, from the perspective of a shared field is therefore needed to identify the different strategies and to help position the different approaches.

1.5 Interactivisation

As Jay Bolter observes, any new media form comes with the claim of presenting a better depiction of reality (see Bolter & Grusin, 1999). This is certainly true for interactive digital narrative. However, the comparison between different media formats contained in this perspective, carries with it the danger of understanding new forms of narrative as enhanced versions of existing forms, as having additional features, but not as a form that is fundamentally different in many ways. The term "interactivisation"

[8] Personal communication, October 27, 2008.

describes this tendency to understand interactivity as an "add-on" feature to legacy narrative forms.

One motivation for "interactivisation" is the desire to compete with works created in fully developed, well-understood legacy media. Michael Young's goal description for his *Mimesis* system is an example for this tendency:

> The goal in developing the Mimesis system is to build a system capable of creating structured interaction within virtual worlds that achieve the **same kind** of cognitive and affective responses to interactive stories as that seen in the participants of conventional narrative media. (Young & Riedl, 2003) [my emphasis]

The claim of equivalence is problematic, because IDN has not yet achieved the same level of maturity as "conventional narrative media" such as film. In fact, we should not expect the same kind of response and overall experience, since IDN represents a greater departure from existing media forms than film was from stage drama. While the technology of representation changed from stage drama to film, the roles of author and audience stayed intact, and the story structure remained fixed. In IDN, this is no longer true. The affordances of digital media, such as the ability to generate computed output (procedurality) and to react to a user's action (interactivity/participation) challenge traditional assumptions of narration. Therefore, the resulting narrative form will effect a more radical change in the conventions of storytelling.

Any theory of IDN must address the questions of the specific properties of digital media and the difference from legacy forms. IDN as a qualitatively new form of representation challenges legacy narrative concepts such as story arc, plot, and reader/viewer. Accordingly, Nick Montfort states: "[…] there is no theory to help us understand works in the interactive fiction form directly" (Montfort, 2003a, p. 23) and continues to point out some differences to works in established media:

> A work of IF is not itself a narrative, it is an interactive computer program […] interactive fiction is not a story in the sense of the things that happen in a narrative. […] In everyday speech, […] story also refers to a particular genre, the type of thing people expect to hear when they say in a conversation "so, tell me the story" […] Interactive fiction is not precisely this sort of story, either […] (p. 23)

Montfort's argument illustrates the gap between the features of IDN and the terminology used in legacy narrative theory. Consequently theories based on established conventions in other media are problematic and ultimately unsuitable for understanding IDN. A thorough discussion of the media-specificity of the critical terms and underlying assumptions of legacy narrative theory is necessary to better understand the nature of these differences. This discussion should lead to a theoretical framework that prepares the ground for an adequate theory of IDN.

A second problem regarding IDN and traditional narrative theories is their descriptive nature, since they are based on the analysis of canonized bodies of works. However, IDN, in all its forms does not yet have a canonized body of works. George P Landow remarks "[…] it's too soon to take stock of this new literary form" (2006, p. 265) while discussing reasons for what he considers the missed opportunities of Hyperfiction in *Hypertext 3.0*. A decade earlier, Janet Murray was careful to write about "harbingers" (see Murray, 1997) of a fully developed form. As Landow's remark shows, the same careful wording still applies today. Even though many more IDN related works exist for analysis, establishing a canon of IDN works is not yet possible. Consequently, theories of IDN are *prescriptive* by nature, and not *descriptive*. A *prescriptive* theory must try to outline directions for future developments and cannot rely solely on the analysis of existing works. Additionally, a *prescriptive* theory must closely follow developments in the associated practice and be open to revisions necessitated by changes in the practice.

1.6 Obsolescence

Obsolescence is a problem related to the unstable technical nature of computer systems. Software is in constant need of updating, or it will become unusable and obsolete. Both computer hardware and operating system software upgrades and changes make this a necessity. This is not only true for any particular IDN artifact, but also regarding the development environment or authoring system used to create that artifact. Once software becomes obsolete, further enhancements and updates are effectively prohibited. The only solution in this case is a complete re-creation of the project in another programming language or environment. The sheer cost and amount of time necessary of such an effort are often prohibitive by itself.

Kevin Brooks' agent-based story system *Agent Stories* (Brooks, 1999) is a case in point. Brooks developed his system as part of a PhD thesis under Glorianna Davenport at the MIT Media Lab. The system was written in the now defunct visual programming language *Prograph CPX*. It is very questionable if Brooks' system could be made to run on current operating systems without a complete re-write. For all practical purposes, this means his system is lost, and cannot be enhanced further, or even studied. A similar problem arises with for older artifacts. For example, Janet Murray keeps an old laptop computer around just to present her project *Hot Norman,* an interactive version of Alan Ayckbourn's play *The Norman Conquests* (1975), which is based on a obsolete media software technology by IBM. Sarah Cooper's *Reliving Last Night* (2001)*,* a master's project by one of Janet Murray's students has recently been re-created and re-coded in a current programming environment in order to continue research on this interesting work. Considerable time had to be put into this effort, making it a rare undertaking and not viable in many situations.

The reality of this loss of tradition is a considerable obstacle to progress in the field of interactive digital narrative. This leads to discontinuity and an unfortunate and wasteful practice of re-inventing the wheel. Solutions to this problem are needed to invigorate research in and creation of IDN works.

1.7 Research/Practice Divide

In the emergent field of IDN, advances in both research and practice are bound to happen, and are indeed needed. To make this relationship productive and use it as a source for continued development, the relationship needs to be defined in a way that enables autonomy and mutual exchange as well as the ability to integrate advances made on either side. Since IDN as a practice is an emerging art form, a look the development of earlier art forms, for example of 20th century avant garde art movements such as Cubism, DADA, and Surrealism should be helpful, especially if theories exist, which are associated with any of these art movements. An analysis of the relationship between the theory and practice should provide a model that helps to define the relationship between theory and practice in IDN.

1.8 Missing structure for future research

The last two decades of work have made it painfully clear that major advancements and breakthroughs in interactive digital narrative are hard to come by, as exemplified by the 19 years between Brenda Laurel's vision of interactive drama (Laurel, 1986) and the release of the first realized interactive drama *Façade* (Mateas & Stern 2005b). This exceptional and long-winded success is counterbalanced by a large number of disappointments and discontinued projects that are testimony to the complexity of the problem of realizing the overall vision of a powerful new expressive form. It is therefore not efficient to have single practitioners or research groups attempt to tackle the problem. A more promising avenue would be a collective effort. At the same time, it would be naïve to believe that the existing divisions between different approaches could be easily resolved.

What is missing here is a way in which a productive and even competitive relationship between different approaches could be established, while continued development could be secured. An important step in this direction would be the definition of an overall structure for future research that can embrace a multitude of approaches and is open for differences and particular goals. Such a structure could also reduce discontinuation and obsolescence if it would enable the sharing of software pieces and other resources. Other areas of research, for example in the area of video encoding with the MPEG consortium have proven that common standards and interoperability help everybody involved while still allowing individuals to take the deserved credit for their work.

1.9 First: A Change of Perspective

A first step towards any solution of the problem of IDN is a change of perspective. While it is understandable that proponents of the field aspire to create artifacts with the same emotional impact and mass appeal as a major Hollywood movie or a classic novel, this aspiration can obscure the many necessary steps in the development of a new form. It is too early to expect such works and to ask for them now only creates expectations that will be frustrated for some time to come. Instead of trying to compete with Dickens, Welles, or Shakespeare, current interactive narrative works should be seen and analyzed as evolutionary steps towards a new form of human expression. This change of perspective liberates the field by removing the burden of unnecessary competition and prepares the ground for bold experiments.

1.10 Contributions

The overview of IDN presented so far describes a puzzling discrepancy between plentiful visions, strong experiments and high interest in the field on the one hand and disappointment and discontinuity on the other hand. While much has been achieved, this split condition of IDN is an indication of underlying conflicts and problems in the field. In order to move IDN research and practice forward, reasons for this state of affairs need to be identified and analyzed. This analysis is the project of this thesis, followed by a proposal how the current problems can be overcome and what shape future IDN research and practice should take. More exactly, the thesis provides strategies that answer to the problems outlined in the preceding sections (fragmentation, interactivisation, obsolescence, the division between research and practice, and a missing overarching structure for IDN research).

Towards that end, the contributions of this thesis are fivefold. First, the thesis reframes interactive digital narrative as an inclusive field of inquiry that encompasses many theorists and practitioners rooted in diverse traditions. This change of perspective carries along an understanding that different traditions in IDN can work together productively by studying other traditions and their respective methods and by collaboration across traditional boundaries.

Secondly, the thesis introduces a theoretical framework for IDN that is independent of legacy narrative theory and takes into account the affordances and experiential qualities of digital media. This framework changes the focus from product to system and process and introduces new terminology (protostory, narrative design, and narrative vectors) instead of story and plot that adequately describes the equivalent structures in IDN.

Thirdly, the thesis outlines a practical framework with a focus on authoring tools that avoids obsolescence and reduces the influence of legacy metaphors. One part of this contribution is a practical implementation that has been in continuous development for several years and that is offered here as a possible basis for future development.

Fourth, a model for the relationship between theory and practice in IDN is proposed based on the relationship between manifestos and art practice in the 20^{th} century avant garde art movements of Surrealism and Futurism.

Lastly, the thesis proposes an inclusive, open-ended iterative process as a structure for future IDN research in which practical implementations and research co-exist in a tightly coupled mutual relationship that allows changes on one side to be integrated on the other.

1.11 Thesis Roadmap

The thesis sets out from the perspective of the five problems of fragmentation, interactivisation, obsolescence, the relationship between research and practice, and a missing overarching structure for IDN research. In chapter 2 a historical overview demonstrates the diversity of the field by pointing out differences in motivation, goals, and means. By understanding the diverse traditions as parts of the field of IDN, similarities and difference in narrative strategies are identified.

In chapter 3, legacy theories of narrative are analyzed as limiting factors for the development of IDN as an independent form of narrative. Consequently, a new theoretical framework is proposed, starting with a definition of IDN. Then, differences between legacy narrative and IDN are identified, which change the focus of investigation away from the product-centered view of legacy media towards system and the participatory process.

In chapter 4, the focus changes to problems of practical approaches towards IDN. Problematic aspects of existing authoring tools are pointed out, in the form of legacy metaphors they incorporate. The World Wide Web is presented as a model to overcome many of the existing limitations. A concrete software toolset that mimics the architecture of the World Wide Web and implements the theoretical framework outlined earlier is introduced along with some early results in the form of IDN works.

Finally, chapter 5 revisits the problems of IDN identified in the first chapter. The fragmentation of the field is answered with a perspective that understands the different traditions as complimentary. A theoretical approach that integrates interactivity and is independent of legacy narrative theory is proposed that supersedes interactivisation. An implementation based on the architecture of the World Wide Web answers the problem of obsolescence. The problem of the research/practice divide is answered with a model of a close mutual relationship based on the example of the art movements of Futurism and Surrealism. Finally, the elements of thesis are brought together as parts of an inclusive, open-ended, and iterative process, which is proposed as a model for future development of IDN.

CHAPTER 2

TRADITIONS IN IDN

The emerging practice of IDN springs form multiple traditions. A survey of the different strands in this fragmented field will expand the understanding of the different perspectives associated with the traditions and their respective design strategies, achievements, and problems. In order to gain a more complete understanding of IDN works, technological, ideological, phenomenological and historic aspects will be analyzed. The improved insight gained from this investigation is intended as a first step towards the proposed structure for future research in IDN, which is indented to integrate diverse approaches and their respective strategies. More concretely, the combination of successful design strategies from different traditions of IDN can serve as a starting point for future experiments.

2.1 An Unintentional Beginning

The beginnings of IDN can be traced to the computer program *Eliza*, created in 1966 by Joseph Weizenbaum at MIT's Project on Mathematics and Computation (renamed to Artificial Intelligence Laboratory in 1970), which emulates a Rogerian therapist and was intended for "[...] the study of natural language communication between man and machine" (Weizenbaum, 1966). *Eliza* attempts to create a human-like reply to a user's textual input by simple parsing and pattern-matching to identify and echo keywords. For example, *Eliza* can reply to a phrase like "I'm depressed much of the time." with "I am sorry to hear you are depressed." (Weizenbaum, 1966). Also, the program asserts that a keyword will belong to a given semantic field. For example, this strategy will identify the word “mother” as belonging to the semantic field “family” and reply to the sentence “Perhaps I could learn to get along with my mother” with “Tell me more about your family”. *Eliza* also applies rules to redirect questions about itself back to the “patient”, for example to the phrase “This is ridiculous” with the question “What do you mean, this is ridiculous?” With these simple rules, *Eliza* is able to sustain prolonged dialogues that at times can be very compelling. Consequently, for Janet Murray *Eliza* is a convincing example how the procedural nature of the computer medium can be used for storytelling by means of writing rules that are “recognizable as an interpretation of the world” (Murray, 1997, p 73).

Beyond simple rules, there are additional strategies that turn *Eliza* into a compelling experience. Weizenbaum carefully chose the scenario of a therapy dialogue to overcome the constraints of his software, namely extremely limited knowledge about the world:

> […] the psychiatric interview is one of the few examples of […] natural language communication in which one of the participating pair is free to assume the pose of knowing almost nothing of the real world. (Weizenbaum, 1966)

This strategy is not only a clever way to overcome technical obstacles, but also an example of Murray’s proposed strategy of “scripting the interactor” (Murray, 1997 p. 79) by casting her in a specific role; in this case that of the patient. As soon as the interactor accepts this role, the space of possible utterances from the interactor is significantly reduced since the interactor becomes part of a specific discourse or domain. The discovery of this powerful mechanic of “role acceptance” allows the creator of an IDN work to concentrate on this particular area. As Weizenbaum observes, the creation of belief in the abilities of the conversational partner, for example as a form of intelligence, is independent from the actual procedural power of the artifact:

> The speaker further defends his impression [of *Eliza*'s intelligence] by attributing to his conversational partner all sorts of background knowledge, insights and reasoning ability. But again, these are the *speaker's* contribution to the conversation. (Weizenbaum, 1966) [his emphasis]

Weizenbaum references Coldriges' principle of the willing suspension disbelieve as an explanation or this process. However, Murray (1997 p. 110) points out, that this process is not passive, but the result of an active process on the part of the interactor (here called "speaker") to create belief that allows her to participate in the conversation. In this way, *Eliza* is similar to literature from the perspective of reader-response theory (Iser, 1978). Iser describes this phenomenon as follows:

> […] we are conscious of literature as a form of make-believe […] However, we don't discard it, although we know it to be an illusion. […] (Iser & van Oort, 1997, p. 1)

For Iser, a literary text comes into effect as a communication between text and reader. He understands this "aesthetics of effect" to be the result of a deeply engrained anthropological need for fiction as an "exploratory instrument" to "grasp what is barred from knowledge" (Iser & van Oort, 1997)

The overall effect is therefore a combination of actively creating belief and the basic human need for narration as a means of explaining and understanding the world.

Weizenbaum quickly became concerned about the effects of his own creation and subsequently devoted his time to warn about the dangers of anthropomorphizing computers when he realized how even his own secretary believed in the intelligent abilities of the software. However, *Eliza* had already taken on a life of its own. Even today, 40 years later, the software is available for nearly all major computing platforms[9]. Additionally, *Eliza* marks the start of a specific genre of software, the chatterbot. Experiments like *Parry* (another early attempt that simulates a paranoid schizophrenic), *Racter* (described as "artificially insane") (see Güzeldere & Franchi, 1995) and later examples like *A.l.i.c.e* (Artificial Linguistic Internet Computer Entity)[10] and its offspring continue the legacy of Weizenbaum's creation. The first two examples foreground dialogs based on particular roles in the form of human psychosis, while the *A.l.i.c.e* represents AI research that attempts to create convincing free-form dialog that is able to master the Turing test of computational intelligence[11].

From the perspective of IDN, *Eliza* for the first time displayed the potential of the computer as a powerful medium for narrative. The cause for *Eliza*'s enormous impact on people at the time (see Murray, 1997, p 69/70) however, is also a function of the historical circumstances. Murray's assessment that "Few people would now perceive *Eliza* as a real psychotherapist" (p. 73) gives an important clue. In 1966, the belief in the abilities of AI was still largely unchallenged. Consequently, people interacting with *Eliza* at the time were able to accept the premise of a computer program as an intelligent therapist more easily than we can today. Beyond Weizenbaum's strategies of limiting the discourse, casting the interactor in a role and letting her actively create belief in the situation, it is the expectations of the time, the confidence in AI in the 1960s that created

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[9] The Wikipedia entry on *Eliza* list 13 implementations in different languages and for different plattforms, see http://en.wikipedia.org/w/index.php?title=Colossal_Cave_Adventure&oldid=265996054, retrieved April 10, 2010.

[10] see http://www.alicebot.org/.

[11] A test proposed by the mathematician Alan Turing to assess computational intelligence, see http://en.wikipedia.org/wiki/Turing_test, retrieved April 10, 2010.

the enormous impact of *Eliza*. Weizenbaum became the first successful author of an IDN experience by finding the right balance between procedurality (the rules behind *Eliza*'s answers), agency (allowing natural language input), and scenario/role (therapy session and patient) that played into the belief system of his contemporaries (AI as capable of intelligent conversations). The overall phenomenological experience of any IDN artifact is thus shaped not only by the technical realities and the artistic execution of a story, but also by the user's expectations of the capabilities of the medium and the specific cultural context. The important lesson to learn from *Eliza* is that many aspects need to come together and need to be addressed with the same careful attention by an author of IDN to create a convincing experience that unleashes the potential of IDN.

2.2 Interactive Fiction

As *Eliza* marks the beginning of IDN as an unintended genre, *Adventure* (Crowther, 1976), is the first intentionally created work of Interactive Fiction (IF). In *Adventure*, the participant/interactor explores the space of a large cave by means of typing textual commands. Within this fictional world, an interactor meets magical creatures, encounters obstacles, and picks up tools to help on her journey. In order to progress in the game, an interactor has to solve puzzles, find the right tools, converse with creatures, and use her navigational skills. With this basic framework, *Adventure* marks the start of the genre of text-based adventures. IF's primary strategies are therefore problem solving, combining objects, dialogs, and spatial exploration.

The initial creator, William Crowther, names role-playing games and real-life experiences as influences for his work:

> I had been involved in a non-computer role-playing game called Dungeons and Dragons at the time, and also I had been actively exploring in caves - Mammoth Cave in Kentucky in particular (Quoted in Peterson, 1983)

Crowther's intentions were to create a computer game that was appealing to non-programmers and thus easy to control:

> […] it would be a computer game that would not be intimidating to non-computer people, and that was one of the reasons why I made it so that the player directs the game with natural language input (Peterson, 1983)

One reason for *Adventure's* success was Crowther's occupation at Bolt, Beranek and Newman (BBN), one of the companies responsible for ARPAnet, the predecessor of the Internet. The game got distributed over ARPAnet from BBN's Boston location to a computer in the Stanford Artificial Intelligence Lab (SAIL), where graduate student Don Woods found it and made (with Crowther's permission) several important improvements and expansions, such as a scoring system. This version spread quickly to many other computers on ARPAnet and became a popular success. Many more expanded versions were created, which included additional locations, more puzzles, and randomized responses. However, it was not only the content that changed, but also the technical implementation. *Adventur*e's code base moved from platform-specific to platform-agnostic code. This development made the creation of additional text-based adventures commercially viable during a time of widely diverse computer platforms and operating systems. As a result, interactive fiction became a commercial success during the 1980s. The best selling IFs were produced by Infocom, a company founded in 1979 by students and staff from the Dynamics Modelling Group at the Massachusetts Institute of Technology (MIT).

Infocom's first product *Zork I* (Blank & Lebling, 1980) - an IF which that was originally created at MIT - broke new ground on several levels. Janet Murray points out how the game's programmers applied techniques like object orientation, demons, and states to create a "dynamic fictional universe" (Murray, 1997 p. 78). Object orientation allowed distinct items such as different weapons an interactor would pick up to have common traits. The programmers could then define a pattern like "fight *attacker* with *weapon*" in which both *attacker* and *weapon* are classes that can contain many objects. This greatly simplified coding and allowed more variety and inventiveness in content. Demons are small programs that can run independently in the background. They provided a way to trigger dramatic events based on select variables without having to specify all the circumstances in which they would occur. Infocom's games also featured a text parser based on research at MIT Laboratory for Computer Science that allowed it to react appropriately to complex textual input such as "Put coffin, scepter, and gold into case."

Murray attributes Infocom's success to the "sophisticated computational thinking" that the company's programmers "brought to shaping the range of possible interactions" (Murray, 1997 p. 79). She sees these methods as an application of the strategy to "script the interactor" by using the *Dungeons and Dragons* genre and providing a limited set of actions appropriate for this format and the role the interactor was cast in. In this way the "[…] programmers could focus their inventive power on making the virtual world as responsive as possible" (Murray, 1997 p. 79) and emphasis the participatory quality of the digital medium.

While I agree with this analysis, it does not fully explain the success of some of the later Infocom IF works. In particular, it is difficult to see how the argument about the familiar genre can be applied to *The Hitchhiker's Guide to the Galaxy* (1984). Based on the Science Fiction book of the same name and created in collaboration with its author Douglas Adams, the game claims "anything is possible in *The Hitchhiker's Guide to the Galaxy*, you may soon not even be sure of your own identity!" This seems to be the opposite of an established genre with clear conventions. So why did interactors not get lost in *The Hitchhiker's Guide to the Galaxy*? First of all, the interactor is cast in the role of one of the characters in the book, which many of the prospective buyers of the game had read. But secondly, IF in 1984 had become its own genre with established conventions. Consequently, prospective interactors could be expected to understand the "rules" - that the game was to be played by typing sentences as commands to traverse the virtual space, to find and apply tools, and to solve riddles.

As Nick Montfort remarks, this last point is an important aspect of IF. He describes the puzzle/riddle[12] as the central mechanism of IF, which serves to "control the revelation of the narrative" (Montfort, 2003a, p. 3) but is also a part of an "interactive process that generates narrative" (p. 3). Montfort links this mechanism to Jean Baudrillard's idea that nothing "could be more seductive than the secret" (Baudrillard, 1983, p. 64). For Montfort, the pleasure of IF lies in uncovering the "locked away" (Montfort, 2003a, p. 3) secret of an IF narrative by an effort that "manifests itself as actual writing." (p. 3).

It is interesting to note that Infocom's success has been attributed to three components: "marketing strategy, rich storytelling and feelies" ("Infocom," 2010, para.

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[12] Montfort uses Jigsaw puzzle and riddle interchangeably

7) (see Figure 1). Many of Infocom's IFs contained "feelies" [13], physical objects that were necessary for completing the games. These props were used by Infocom as a form of copy protection, but they also added a physical dimension to the experience in the form of a tangible object. For example, *Zork I* included both a printed history and a map of *The Great Underground Empire.*

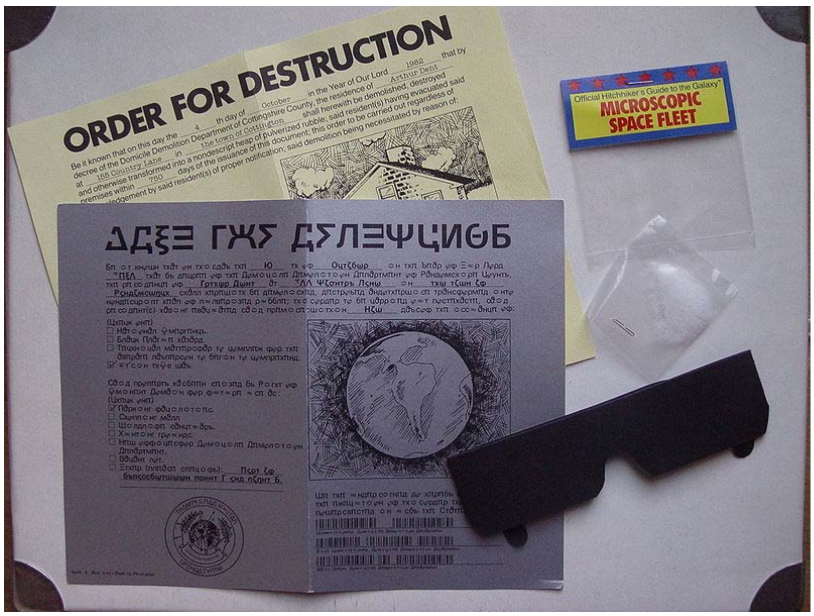

Figure 1. (Alvy 2005) *Feelies* from *The Hitchhiker's Guide to The Galaxy*

Another tangible addition to Infocom's IFs were printed hint books to help interactors with the often difficult puzzles. Called *InvisiClues* they contained a map of the game and hints printed in invisible ink that could be uncovered by using a special marker.

From a phenomenological perspective, *feelies* and *InvisiClues* turn Infocom's IFs into a hybrid experience that is no longer confined to the screen, but bridges the virtual

[13] The term is taken from Aldous Huxley's *Brave New World* (1932). It is used to describe a form of media that includes moving images and sound, but also the sensation of touch.

and the physical worlds. By providing these physical objects, Infocom's designers made the imaginary game world tangible and "more real" for the interactor. Later experiments, for example in pervasive gaming (see Benford, Magerkurth, & Ljungstrand, 2005), directly connected physical objects or actions in the physical world with the virtual side, but the purely mental connection the *feelies* create already function in a similar way as the "belief-creating virtual objects […] that heighten our sense of immersed participation" (Murray, 1997, p 112).

In 1986, Infocom was bought by the computer game company Activision and eventually shut down in 1989. This marks the end of the heyday of commercial IF. While management error clearly played a part in the demise of Infocom, relatively cheap computer systems with greatly enhanced graphics capabilities like the Apple Macintosh, the Atari ST, and the Commodore Amiga re-directed the focus of the computer entertainment industry towards compelling graphics. This technological development altered the cultural context by changing expectations for digital experiences profoundly. Consequently, IFs with added graphics proved to be unsuccessful, since the graphics had no meaningful connection to the experience (see Figure 2).

Figure 2. ("Colossal Cave Adventure," 2010) A graphical version of *Adventure*

Attempts to re-invigorate IF have so far been unable to re-create Infocom's success because user's expectations and technical realities have changed. The freeware IF authoring tool *Inform*[14]*,* is just such an attempt. Created in 1993 by reverse engineering Infocom's programming language and virtual machine, it is still in active development today. While Inform has created a dedicated group of followers, new works are created mostly to "amuse the initiated" (Monfort, 2003, p. 229).

2.3 Hyper Fiction (HF)

In the light of the demise of IF in the later part of the 1980s, it might seem surprising that literary Hyperfiction, another text-based form of IDN, gained prominence at precisely that time. Michael Joyce's *Afternoon, A Story*, first shown in 1987 and published in 1991 was one of the earliest works in this form; other important works were created in the early to mid 1990s. Unlike IF, HF claimed to be a new form of high-brow

[14] http://www.inform-fiction.org

literature. Michael Joyce and Jay Bolter, co-creators (with John B. Smith) of the HF authoring tool *Storyspace* clearly point this out in the first paper describing the new software:

> Interactive fiction has already existed for some time in the form of computerized adventure games. […] Admittedly the text of the current games is simple-minded, but the method of presentation is not. […] This method of presentation can now be applied to serious fiction. (Bolter & Joyce, 1987)

While IF first came out of research labs in computer science, HF works from the beginning were created by authors like Michael Joyce and Douglas Cooper (*Delirium* 1994) who had already published traditional books before picking up HF. Consequently, Hyperfiction works were discussed in the *New York Times Book Review* (Coover, 1992, Miller, 1998) and included in the *Norton Anthology of Literature*[15]. In one of the articles for the *New York Times*, the author Robert Cover famously pronounced that hyperfiction would mean the "end of books" (Coover, 1992). He later helped found the Electronic Literature Organization (ELO) to continue in this tradition by collecting and promoting serious digital literature.

From the perspective of HF authors, digital media allows them to overcome limitations inherent in the traditional linear forms of the printed book:

> A printed novel presents its episodes in one order, but the computer removes that restriction. Instead of a single string of paragraphs, the author lays out a textual space within which his fiction operates. The reader joins in actively constructing the text by selecting a particular order of episodes at the time of reading. (Bolter & Joyce, 1987)

Michael Joyce describes the appeal of hypertext for him as follows:

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[15] Two HF works were included, Michael Joyce's *Afternoon, A Story* and J. Yellowlees Douglas' *I Have Said Nothing*.

> Hypertext does […] everything that few other things can do as well, that is, satisfy my longings for shifting form, for multiplicity, possibility, surface pleasures – language does this as well. (Joyce, 2000)

Hyperfiction is a portmanteau word derived from *Hypertext* and *Fiction*. The term *Hypertext* was originally created by Ted Nelson for structures within his *Xanadu*[16] system, a universal repository of texts, connected by links, and open to authorship by anyone interested. Ted Nelson described his vision in the 1974 book *Computer Lib/Dream Machines* (1987) and the publication *Literary Machines* (1981). *Xanadu* not only predated the World Wide Web by many years, but also included concepts not realized even by the current Web 2.0 such as automatic integration of updated documents with non-breaking links, and mechanisms to protect intellectual copyright and allow contributors to be paid once their creations were accessed. Consequently, the *Xanadu* website proclaims:

> Today's popular software simulates paper. The World Wide Web (another imitation of paper) trivializes our original hypertext model with one-way ever-breaking links and no management of version or contents. (Xanadu, 2009)

While Nelson introduced many important concepts and terms, such as hypertext, hyperlinks, and hypermedia, he was far less successful in creating a working version of *Xanadu*. Started in 1960, the projects over-long gestation period made it seem to be the "[…] longest-running vaporware story in the history of the computer industry." (Wolf 1995) It took until 1998 for a partial implementation to be released, and until 2007 for a fully working version to be available to the public. While it is doubtful that this implementation will change the course of information exchange as originally envisioned

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[16] The name *Xanadu* is taken from Samuel Taylor Coleridge's poem *Kubla Khan, or, A Vision in a Dream: A Fragment*. There, *Xanadu* is a mythic, imagined space of abundance.

by Nelson, the impact of his ideas on HF is profound. Stuart Moulthrop, author of the HF work *Victory Garden* (1992), and one of the early proponents of the form, directly references Nelson, and likens *Xanadu* to French philosopher Roland Barthes's concept for a social writing space (see Barthes, 1979). Jay Bolter argues along the same poststructuralist lines when he describes Hypertext as disrupting "traditional views of the author as authority and of literature as an expression of mimesis" (Bolter, 2001, p. 170)

While Moulthrop wants to leverage the interactive aspect of the computer medium, he falls short in applying the computer's procedural power as the two predominant qualities of hypertext according to Moulthrop are *nodes* and *links.* In his view, links are the only dynamic feature, acting as filters for the retrieval of referenced text. The space of possible creative actions is limited to connections amongst nodes:

> A hypertext is a complex network of textual elements. It consists of units or "nodes," which may be analogous to pages, paragraphs, sections, or volumes. Nodes are connected by "links," which act like dynamic footnotes that automatically retrieve the material to which they refer. Because it is no longer book-bounded, hypertextual discourse may be modified at will as reader/writers forge new links within and among documents. (Moulthrop, 1991, para. 5)

Moulthrop sees the main difference between hypertexts and the printed book as being in the active role of the user, or more exactly in the interaction possible with links in the system. Rober Coover sees the reader to become a "co-writer" in the process:

> Hypertext reader and writer are said to become co-learners or co-writers, as it were, fellow-travelers in the mapping and remapping of textual (and visual, kinetic and aural) components. (Coover, 1992)

Moulthrop details the experiential side of interaction with a hyperfiction work as a process of recognizing the opportunities and limitations afforded by the creator:

> The text gestures toward openness - "what options can you imagine?" - but then it forecloses: some options are available but not others (Moulthrop, 1991, para. 21)

Moulthrop understands the early 1990s as “post-literacy” (para. 25), a time when textual culture has been overtaken by the electronic culture of the “idiot box”(para. 25). In his view, hypertext has the potential to end the dominance of TV: “Hypertext means the end of the death of literature.” (para. 25). But for a realized *Xandadu* system to be successful, Moulthrop asserts, it needs to fulfill yet another condition: it must allow the use of the full range of media types available in the computer medium: “voice, music, animated graphics, and video along with alphabetic script” (para. 25). However his position here is conflicted about digital media and print culture, as shown in his contempt for TV and virtual reality (“strictly a post-print phenomenon”) and his longing to re-instate typographic literary:

> “Xanadu and similar projects could invite large numbers of people to become reacquainted with the cultural power of *typographic* literacy.”(para. 30) [my emphasis]

2.3.1 HF: Successful Design Strategies and Critique

In terms of the actual implementation, HF relies mostly on the two principles of segmentation and linking. An author creates a HF work by writing screen-sized segments, or *lexias,* and connecting them with links. From the very first version the prevalent HF authoring software Storyspace (see Figure 3) also allowed the creation of conditional links that only become available after certain conditions are met, such as visiting specific links first (see Bolter & Joyce, 1987).

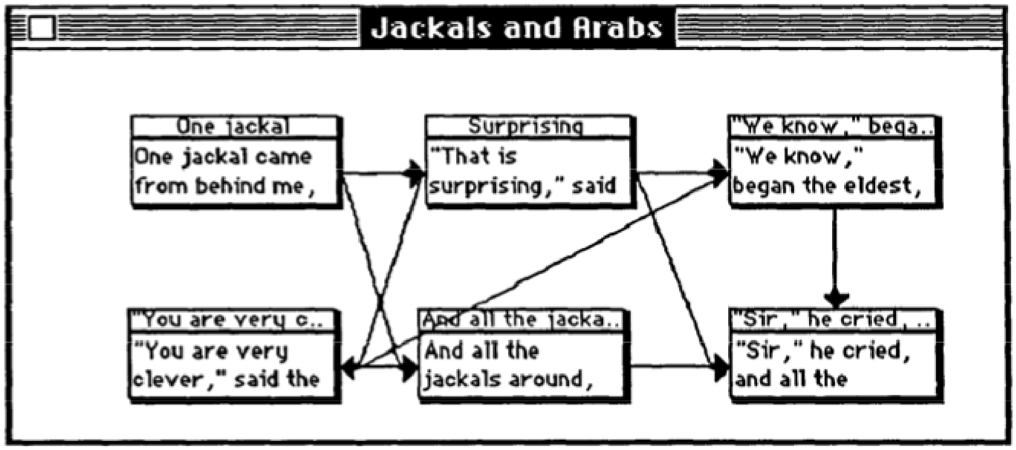

Figure 3. (Bolter & Joyce, 1987, p. 44) Structural view in Storyspace

An interactor traverses the story by selecting links and unveiling new lexias, or returning to the ones already visited. Such repeated visits are one design strategy in HF, which hypertext theorist Mark Bernstein terms *multivalence*. The concept here is that the meaning of particular lexias changes upon revisiting, because the interactor has gained additional insight or a different perspective from her reading of other lexias. The success of this strategy depends on the complexity and depth of the particular narrative and on the perspective-changing power of particular events or the accumulation of additional information. In Michael Joyce's *Afternoon, A Story* (1991) multivalence is successful, as the interactor slowly gains a better understanding of the unreliable narrator's narrative by traversing more than 500 lexias connected by over 900 links regarding the live-changing event of witnessing a car accident, the protagonist's failure to provide help, and his consequential psychosis. In Stuart Moulthrop's Gulf War HF, *Victory Garden* (1992), the protagonist, who is a soldier in the US Army, is killed in a rocket attack in one particular traversal of the work. This event profoundly changes the meaning of particular lexias when visited again.

Another design strategy in HF is in the equivalence between content and structure. for example, a fragmented narrative like *Afternoon* is presented in fragmented pieces, and the associative connections as links. In Shelly Jackson's *Patchwork Girl* (1995)*,* the protagonist herself is literary patched together herself from body parts of deceased women. This character sets the stage for a fragmented narrative exploring the main character as well as the lives of the donors. The structural equivalence can also be with graphical representation of particular events, as Janet Murray observes with regard to *Victory Garden*:

> The interactor's navigation of a virtual space has been shaped into a dramatic enactment of the plot. […] we collide into a lexia that shatters like a bomb site (Murray, 1997, p. 83)

Unfortunately, many times, the experience of HF is not the pleasure of unveiling new story content, but confusion about which route would be most interesting and what link is the "right" one to follow. This is by design, as Murray reminds us: "To the postmodernist writer, confusion is not a bug, but a feature" (p. 58). Murray's perspective is supported by Bolter and Joyce's initially design of Storyspace, which hid the structure diagram of a HF work from the interactor:

> Because the reader does not see the diagrammed structure of the text, he is left to gain an intuitive sense of the structure by reading the episodes themselves. He might have to read the tale many times to understand a structure that changes, in a controlled fashion, with each reading. (Bolter & Joyce, 1987, p. 47/48)

The reader of Hyperfiction as envisioned by Bolter and Joyce is no longer the passive consumer of a finished work, she is instead given the task of finding meaning by trying to re-construct the opaque structure of a HF work. The full experience of Hypertext Fiction requires many readings, an undertaking Bolter and Joyce compare to solving a complicated mathematical problem:

> […] a reader is like a mathematician who attempts to envision a four-dimensional object by looking at several projections in three dimensions: each projection is a snapshot, and all the snapshots must be synthesized to win a sense of the whole, if indeed such a sense is possible. (p. 49)

Ultimately, HF as a movement is driven by poststructuralist principles of deconstruction and opposition to domination of the author and the tyranny of the line. These ideas constitute an ideological position that makes HF vulnerable to polemic critique such as the following in the *New York Times Book Review* by Salon magazine senior editor Laura Miller:

> The theory of hyperfiction insists that readers ought to be, and long to be, liberated from two mainstays of the traditional novel: linear narrative and the author. […] In reality, the common reader most likely will be surprised to be told that structured storytelling […] is actually a form of oppression, rather than the source of delight it has always seemed in the past. (Miller, 1998)

Besides such a polemic rebuttal, a conflict exists between the claims made by HF proponents and the technical and structural reality of HF works. It is difficult to reconcile claims of the interactor's freedom of choice and his role as a "co-writer" (Coover, 1992) with a fixed structure created by pre-determined hyperlinks. After all, the interactor can only click on the links provided by the author, as the author and critic Jürgen Fauth observes:

> For the author, the sacrifice of choice is not really a sacrifice at all-- he is still in control over all the text and the links. However, he is responsible for constructing the black box, the hyperstructure that will generate a multitude of stories at the reader's discretion. (Fauth, 1995)

At best, the interactor in HF becomes what we might call a "post selector" - somebody who can piece together story segments or follow paths after they have been created by an author. In the worst case, the interactor becomes frustrated, trying to deduce meaning from disjointed lexias coming out of an impenetrable and incomprehensible “black box.” This is not an accident, but a consequence of the ideology behind HF, as Janet Murray observes: “In trying to create texts that do not ‘privilege’ any one order of reading […] the postmodernists are privileging confusion itself” (Murray, 1997, p. 133). Murray puts some blame for this problem on the technical limitations of the “navigational software” that was used to create many HF works. Without any means to mark visited links nor any capabilities to allow bookmarking and directly jumping back she sees HF reader software as inferior to even the earliest web browsers. In contrast, Fauth observes a structural problem with links in HF:

> “[…] the reader can never be sure if her click will influence plot, perspective, time, character, or any other element or combination of elements in the story. (Fauth, 1995)

The unpredictable nature of links together with the “indeterminate structure” of HF “frustrates our desire for narrational agency, for using the act of navigation to unfold a story that flows from our own meaningful choices.” (Murray, 1997, p 133) The paradox of HF is that the very techniques that were meant to liberate readers alienated them. Instead of feeling empowered, interactors quickly lose interest:

> The most adventurous souls I know, people amenable to sampling cryptic performance art […] all shudder at the thought [of interacting with HF], for it’s the very concept of hypertext fiction that strikes readers as dreary and pointless. (Miller, 1998)

One reason for the negative public perception are many early works whose authors put the sole emphasis on the technicality of hypertext and not on the content:

> Many of the hyperstories found online are lacking in content and quality writing because the novelty of hypertext makes all other aesthetic concerns secondary. (Fauth, 1995)

While these concerns can be disregarded as typical for any new form of storytelling, Jürgen Fauth even questions the artistic potential of HF in regards to narrative:

> […] hypertext is burdened with too many problems and no advantages. Theoretically, the hyperstructure could be pieced together so elegantly and perfectly as to always produce a satisfying linear story […] However, it is not clear what would be gained even by such a "perfect" hypertext version over its linear counterpart. […] it seems to be an artistic dead end as far as narrative is concerned. (Fauth, 1995)

Janet Murray identifies another problem with HF in the notion of authorship by the interactor. She calls this idea a “misleading assertion” (Murray, 1997, p.152) caused by failing to understand the procedural nature of authorship in digital media. The degree of freedom experienced by interactors within digital stories is always limited by the rules and conditions set by the author/programmer of any given work: “All of the interactor’s possible performances will have been called into being by the originating author.” (p. 153) While this does not preclude interactors from creating their own “particular performance” (p. 153) within the framework of a specific work, the nature of this authorship is “derivative” (p. 153), she argues and must be clearly distinguished form the “originating authorship of the system itself.” (p. 153)

Overall, the history of HF serves as a warning against premature claims of expressive power and an overly ideological approach towards IDN. Furthermore, the consequences of technical choices in an IDN software must be carefully evaluated. Better link management capabilities in the reader application together with a clear distinction between different kinds of links (affecting plot, affecting character etc.) might have helped HF to gain a wider audience.

Leaving the problematic claims for shared authorship and the end of the linear narrative aside, what HF really has been able to bring about is new structures for narrative. The creation of these complex structures might be HF's most important contribution to the field of IDN. In particular Janet Murray recognizes the *Rhizome* as a dominant form, a "digital labyrinth" that has "no end point and no way out" (Murray, 1997, p. 132). Mark Bernstein (1998) provides a good overview of additional structures, amongst them the *cycle*, the *counterpoint* with two alternating voices, the *mirrorworld* with contrasting perspectives, the riddle-like *tangle*, the decision-tree like *sieve*, the simultaneous *montage*, and combinations of these forms.

2.4 Interactive Cinema

Like the term *IDN*, *Interactive Cinema* is an umbrella term for works and experiments combining digital video and interactivity. This includes works referred to as Interactive Cinema, Interactive Video, Interactive Film, interactive video art installations, and full motion video games.

The history of Interactive Cinema dates back to the 1967 experiment *Kinoautomat* (translation: automatic cinema machine) created by Radúz Çinçera for the Czechoslovakian pavilion at the Montreal World Fair. The movie *One Man And His World* was shown in a specially designed presentation room where each seat was equipped with two buttons that allowed audience members to express a choice. At several points in during the presentation, the movie was stopped and two actors came on stage to ask the audience the make a decision. Depending on the answer, the receptionist exchanged the lens cap between two synchronized film projectors (see Naimark, 1998).

The resulting structure did always fold back to the same decision points and thus actually only offered one story, as Naimark observes:

> The branching structure wasn't tree-like, doubling the number of scenes needed at each choice, but rather always remained only two. They did this by carefully crafting a story such that no matter which of the two options were chosen, it would end up back at the same next choice. [...] The artfulness, ultimately, was not in the interaction but in the illusion of interaction. (p. 29)

This observation reflects a general problem of Interactive Cinema. Movie production is costly even for non-interactive film and the added cost of producing additional footage to accommodate choices can become prohibitive. The media scholar and practitioner Birk Weiberg also points out a different problem in the need for specially outfitted movie theaters:

> Already for economic reasons, this model seems rather unsuitable, since it not only increases the amount of final footage required, but also limits distribution to specially equipped cinemas. (Weiberg, 2002)

The *Kinoautomat* required a human intermediary to execute the audience's choices. Direct interaction between an interactor and a cinematic experience was not possible until later. In the late 1970s, several electronics companies[17] introduced laser disc systems to store and playback video. Unlike video systems based on tape technology, laser discs allowed random access to every point in a video. This capability, combined with an interface that allowed a computer to control the playback of a video disc enabled fully interactive cinematic experiences. The Architecture Machine Group at MIT created some of the earliest demonstration projects for interactive movies including the *Aspen Moviemap* (1978), which is also considered to be the first hypermedia video disc. The *Aspen Moviemap* enabled an interactor to virtually explore the town of Aspen

[17] MCA/Phillips, Pioneer, and RCA.

in Colorado, USA by using a touch screen interface to control a running video of a drive through the town (see Figure 4).

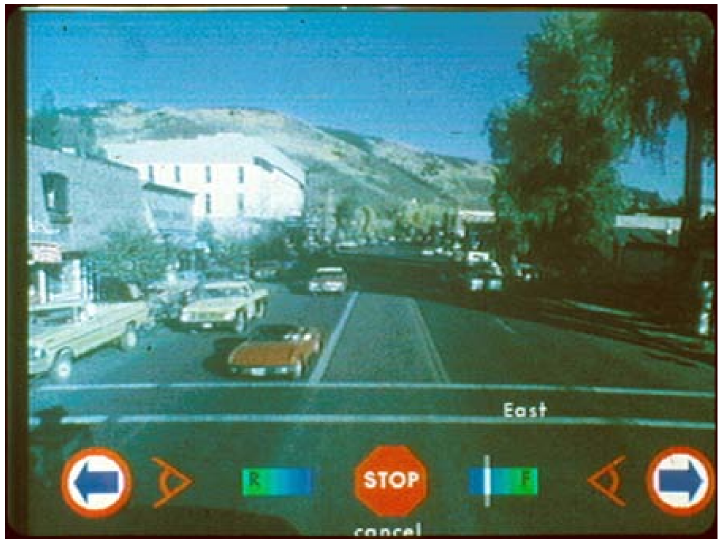

Figure 4. (Naimark, n. d.) Interface of the Aspen Moviemap

The interactor was able to take turns into side streets and stop. In addition to navigating the video, the *Aspen Moviemap* allowed an interactor to click on the facades of houses along the way to access additional material such as interior shots, historical images, menus of restaurants, and video interviews with inhabitants of the houses. In this fashion, the project enabled a virtual visit, which the developers called “surrogate travel” (see Clay, 1978).

The *Aspen Moviemap* was made possible by a massive collaborative effort between a team of researchers and technicians in different fields. A camera system with a special gyroscopic mount was designed to take four shots in every direction every 10 feet while driving. The single frames were grouped together and transferred to a video disc. Metadata such as direction and location for every frame was put in a database. A computer program was written to connect the video disc players and the touch screen menu and also to access the database to provide information regarding the current location. Lastly, the menu overlay and the video from the disc players had to be mixed on a display. Consequently, the *Aspen Moviemap* required significantly more resources and more diverse expertise than IF or HF works.

After the *Aspen Moviemap*, diverse applications of combining video and interactivity were explored. A 1989 paper by Wendy E. Mackay and Glorianna Davenport mentions the fields of Interactive Documentaries, Learning Environments, User Interface Research, and Multimedia Communication (see Mackay & Davenport, 1989). As this thesis is concerned with narrative content I will concentrate on Interactive Documentaries. Davenport is a pioneer in this area with her work *A City in Transition: New Orleans 1983-86* (Davenport, 1987). The interactive version of the documentary was designed to be a study tool for students in urban planning who would learn about different aspects of a massive urban development effort on a strip of New Orlean's Mississippi river embankment in connection with the 1984 world fair. Davenport wanted to create an "augmented information environment" (Davenport, 1987) that combines filmed documentary and additional information in order to facilitate a better understanding of the complex aspects of urban planning:

> This "hyper-media" environment permits students easy access to surround information, such as maps, personal dossiers, reports, site histories or pertinent legislation, which informed decisions made by our subjects. (Davenport, 1987)

The project makes use of multiple windows, and provides video, proxy icons and textual search in mouse-driven graphical user interface (GUI) and does not prescribe any particular structure or path to take, Davenport notes, which potentially makes each viewing unique:

> […] this is not a branched structure but a sort of free form, associative information resource, and therefore the likelihood of two paths being the same is minimal. (Davenport, 1987)

This approach sets IC apart from HF with predefined, fixed links between lexias. The focus is not on exhausting the material by means of many readings but on understanding the goals and hidden agendas of the people involved in a complex multi-year project:

> The additive aspect of this kind of information allows students to make valuable and pragmatic observations of their own. […] over the course of the entire movie it becomes clear that a single individual may wear different hats at different times, and, as a result, hidden agendas will frequently become apparent (Davenport, 1987)

To this end the project provided a rich source of information that should allow interactors to come to their own conclusions regarding the development project and the people in charge of it, as well as the citizens of New Orleans affected by it:

> Ultimately, the responsibility of determining the merit, ethics, and professional expertise of the characters and their actions rests with the student or researcher. (Davenport, 1987)

New Orleans in Transition enabled self-driven exploration by several possible modes of presentation and interaction with the given material thanks to a customized GUI:

> At the beginning of any session, a student or researcher will choose from a menu of options, which include linear viewing, a predetermined edit (by a professor, researcher, or student), browse, or query. […] Once familiar with the story, or if a viewer is researching a particular issue in a larger context, he/she can build queries by mousing a sequence of icons or typing a series of key words. (Davenport, 1987)

What Davenport describes here can be understood as a layered system of authorship. The totality of the available material has been selected by the initial creator of the work. These selections consist of identifying major story lines, characters, and sub-plots, Davenport observes:

> In the final videodisc version, well over 40 characters are highlighted; and major story-lines, such as the Jax Brewery development, the Louisiana World Exposition, and the Riverfront Development Plan prepared by Edaw, Inc. have multiple sub-plots which intertwine. (Davenport, 1987)

Interactors can then create their own edits and make them available to others, potentially generating versions, which would provide widely differing perspectives on the topic.

Overall, we can understand *Orleans in Transition* as a multimedia database providing access to narrative video and other multimedia content. Davenport sees the project as study tool, a “model for interactive delivery in education” (Davenport, 1987) with applications in many different fields of study, provided it can grow:

> Important aspects of the database […] are provisions which link it to other databases and which allow it to be expanded, not just by an individual viewer for himself or herself, but permanently. (Davenport, 1987)

2.5 Full Motion Video Games

Interactive documentaries and virtual travel were not the only applications of early interactive video. Several years before the *New Orleans* project, the arcade game *Dragon’s Lair* (1983) pioneered a genre in computer games that is referred to as either Full Motion Video (FMV) or Interactive Movies. [18] This version of IC paired full-motion video with computer game controls. Again, video came from a laserdisc player controlled

[18] An exhaustive list of Interactive Movie titles can be found at http://www.interactivemovies.org/

by a computer program. *Dragon's Lair* came in a custom full size game arcade cabinet, which included the computer board, the screen, and the laserdisc player. An interactor controlled the game with buttons and a joystick. She was cast in the role of a sword-fighting hero who had to win many fights and gather items to finally free a princess from a dragon. The story featured no branching points; rather, a fight would either end successfully and allow the interactor to continue, or would result in the loss of a life. ("Dargon's Lair," 2010) The interactor had the illusion of controlling the main character, as the joystick movements triggered the display of different video clips. The game was very successful at the time, mainly because of its vastly superior graphics in comparison to the standard of the day. While other arcade games displayed pixilated sprites or primitive outlined vector graphics, *Dragon's Lair* featured full-screen smooth animations created by the studio of former Disney animator Don Bluth (see Figure 5).

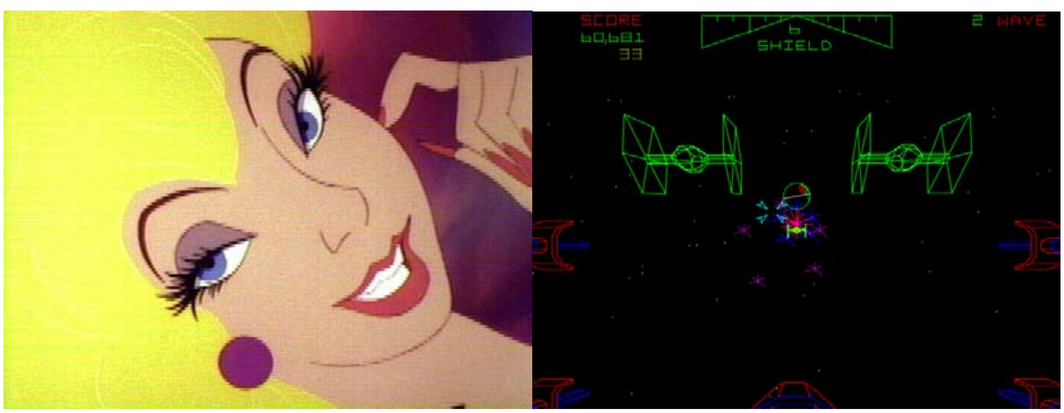

Figure 5. ("Dargon's Lair," 2010) ('Star Wars," 2009) *Dragon's Lair* (left) in comparison to contemporary arcade game (*Star Wars*)

The production costs for the animations alone were reported to be one million dollars ("Dargon's Lair," 2010), a huge budget for a computer game in the 1980s. These outstanding graphics were enough to outweigh crude game controls and a story line with no alternatives. A contemporary article in the magazine *compute!* sums up the appeal:

> Unlike other arcade games, this one projects a movie-quality image. It's like stepping into a cartoon and controlling the characters yourself. (Yakal, 1983)

Dragon's Lair was quickly followed by *Space Ace* (1984) from the same production team. This game used an identical general mechanism, but improved on its predecessor with a vastly expanded storyline, with multiple branch points and selectable skill levels. These two game's success let to the release of similar titles from other companies, including several that avoided the high costs of original animations by re-purposing clips from existing movies. [19] FMV games got another boost in the early 1990s with the introduction of the CD-ROM as a storage medium for personal computers and game consoles. These two developments greatly expanded the amount of storage space games could make use of and made the inclusion of longer sequences of full-motion video feasible. Some games from this period include *The 7th Guest* (1992), *Night Trap* (1992), *Sewer Shark* (1993), *Star Wars: Rebel Assault* (1993), *Voyeur* (1993), *Phantasmagoria* (1995), *Star Trek: Borg* (1996), *The Dark Eye* (1995), *Black Dahlia* (1998) and *The X-Files Game* (1998). Many of these games were expensive productions[20], which used famous Hollywood actors like Dennis Hopper (in *Black Dahlia*), or the stars of the related TV series (for example in the X-Files Game). In the late 1990s, Full-Motion Video games fell out of fashion and have never caught up again. Once the novelty of full motion video wore off, interactors became increasingly aware of

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[19] Two examples fort his strategy are *Cliff Hanger* (1983) and *Bega's Battle* (1983)

[20] For example Night Trap's production cost was reported to be 1.5 million and Sewer Shark's production cost over 3 million (see "The 25 Dumbest Moments in Gaming," 2003)

the limitations of interaction and limited variation in story line in many of the titles. While IF text-based adventure games provided an environment that was responsive to everything an interactor could do, FMV games often limited her to binary choices between two video clips. Once the selection was made by using the in-game mechanics, the interactor was turned into a passive viewer who had to wait patiently for the next choice point. The challenge here is to make the next video clip interesting enough so that the immersion is not broken. This proved to be difficult and resulted in the decline of Interactive Movies as a game genre as observed in an article on "The Rise & Fall of Full Motion Video" for the game enthusiast web site *Sega16* (Horowitz, 2005):

> Pressing a button and watching what happened next simply didn't appeal to the majority of gamers. They expected advancements in technology to immerse them more than ever into their games, not shut them out almost entirely. Most parts were simply trial and error: if you died from moving left, press right next time and move on. (Horowitz, 2005)

Additionally, the limited variations of possible story lines meant that "there wasn't any replay value to be had in many of the games" (Horowitz, 2005). One reason for these limitations was the enormous amount of production time and costs associated with producing many possible variations of video content. The script for the *Phantasmagoria* was 550 pages long ("Phantasmagoira," 2010) four times longer than the average movie script. In order to allow many possible actions of the main character, the actress playing it had to be filmed in all these actions in front of a blue screen, this time-consuming process together with a varied story line resulted in four months of filming just to produce the video content of the game. Roberta Williams, the game's designer identifies another problem with FMV games in the difficulty of balancing immersive story line and interactive options:

> […] most computer game designers who become involved with "Full Motion Video" games become enamored of the "movie aspects" of their game and lose sight of the fact that it's a game and not a movie. I believe […] that I was able to […] stress the "game play" aspects of this project even when it interfered with the "movie-like" aspects of the project...many times at the express disapproval of Phantad's [sic] "director" and/or "actors." (Bellatti, 1999)

What Williams points out here is the difficulty of overcoming established conventions in movie production which seem deeply engrained in directors and actors alike. If movie production for interactive content is indeed different, the differences are still not well understood and new conventions are needed.

Technical limitations on video playback also proved to be a problem for FMV games in the 1990s. Normal PCs, as well as most game consoles, such as the Panasonic's 3DO, Phillips' CD-i, and Sega CD were not able to play back full-screen, full-motion video at 24 frames per second required for smooth presentation[21]. Also, the graphics cards in many of the possible target platforms were limited to displaying 256 colors. As a result many Interactive Movies were visually unappealing with choppy movement and a grainy look caused by a reduced color palette and low-resolution video that was up scaled to fill the screen. Even titles that tried to provide better quality, had to include low-quality options in order to reach a wider audience. In the case of *11th Hour,* this meant a black-and-white quarter resolution version of the original full-size, full color videos. ("Full motion video," 2010)

The genre's ultimate demise came with the advent of more powerful graphics processors in games consoles and standard PCs that enabled full-motion game play in environments rendered on the fly as Horowitz remarks:

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[21] Sony's Playstation (introduced late in 1994) was the first game console to feature a dedicated video chip that enabled smooth full motion playback.

> […] the new technology [of 3D] made the grainy, dark video look downright archaic by comparison. Developers at the time obviously saw what was coming, and they attempted to push the existing hardware as far as possible. […] the press jumped at the inevitable rise of 3D gaming as the next big thing, leaving FMV behind. Gamers knew right away which one they wanted. […] The appearance of Virtua Fighter on the scene in 1993 was the last nail in the coffin for the embattled FMV industry. (Horowitz, 2005)

3D appealed to both game developers and gamers. On the development side, it initially cut costs by eliminating the need for costly video production. For gamers, 3D meant continuous control of an avatar, instead of having to just sit back and watch. As a result, the role of video in games got reduced to short cut scenes and clips used for introduction.

2.6 Interactive Movies

The term Interactive Movie has also become associated with experiments in interactive fiction films for the cinema and TV; the later variant is a form of Interactive TV. In 1991, Oliver Hirschbiegel created *Mörderische Entscheidung* (Murderous Decision) for two German TV stations. This crime story was shown on two TV channels simultaneously, each channel showing the story from the perspective of a different protagonist, one male and one female. The viewer of the production became an interactor by zapping with her remote control. Hirschbiegel applied several techniques to adapt his story for interactivity. For example, he tried to script the interactor to change the channel "by reducing the amount of information given on the other channel." (Weiberg, 2002), but he also made sure that information essential for understanding the story was given on both channels. Lastly, he used the affordance of narrative gaps in the film noir genre to explain some minor missing information:

> Hirschbiegel uses the narrative voids we know from film noir as a general style to give the viewer the feeling that a lack of certain information is not caused by zapping incorrectly (Weiberg, 2002)

An empirical study about the experiment (Kirchmann, 1994) came to the conclusion that the story "worked best when both versions showed the same information from different points of view" (Weiberg, 2002), for example when both protagonists shared the same space and their views were represented similarly.[22]

The Danish experiment *D-Dag* (Kragh-Jacobsen, Levring, Vinterberg,, & von Trier, L, 2000) expanded upon the concept of multi-channel video by showing four different stories on separate channels plus additional channels showing the directors' commentary, for a total of seven channels. The concept for *D-Dag* came from several *Dogme 95* filmmakers and was shot by four camera teams in real time, each following a different actor. With her remote, the TV viewer was to become an interactor who chose her own path through the story. The overall narrative for *D-Dag* was a bank robbery on New Years Eve of the new millenium, with the noise from the fireworks being used to mask the explosion needed to break into the bank. The four movies were shot from 11:05 pm on December 31, 1999 to 0:15 am on January 1, 2000 and ran 70 minutes each. This requirement of real-time made dramatic compression difficult. Also the filmmakers did not address the irritating feeling of not getting all the necessary information by watching the wrong channel at any given time. These problems are exemplified in a viewer's commentary on the Internet Movie Database (IMDB):

> In my opinion the idea was really cool and interesting, but i think that you missed out on the whole story, by only being able to watch one person at a time. It then raises the question if we're getting the whole truth, when we see the world from

[22] Weiberg (2002) quotes an example were the representation differed (the man was depicted to be drunk) as problematic.

> our point of view. A cool statement and a good idea for a movie. But in reality, it was quite boring. (jeppemh, 2000)

According to Valdis Oscarsdottir, the editor of the theatrical release of *D-Dag*, the activity of changing the channel, or “zapping” as an answer to boring content was intended:

> You zap around as you normally do. You start by checking out the first channel, and then you decide to check the next channel. If that isn't interesting, you zap to the third channel. If that doesn't seem interesting you just try the fourth channel. If the fourth channel turns out uninteresting as well, you can go back to the first channel. If you are out of luck and that turns out somewhat boring as well, you can just, zap, zap, zap through all the channels. (quoted in Weiberg, 2002)

The *D-Dag* project essentially cast the interactor in the role of an editor, but without the ability to cut out unwanted parts, the interactor is too restricted. Instead of creating a potentially powerful role in making meaningful cuts between the four different streams, it replaces decisions made out of interest with decisions made out of the negative motivation of boredom. Consequently Weiberg calls the result a “negative aesthetic of boredom” (Weiberg, 2002). He understands the challenge of IC in finding ways to “overcome linear narration and deconstruct the author's authority without forcing the user to assume the responsibility and not always pleasant duty of co-authorship” (Weiberg, 2002) Weiberg here presents a perspective on the aesthetics and design goal of IC, which puts the interactor in a space between the original author – able to change the linear sequence of the story and find her own path within the bounds of the existing material, but not forced to create the story by herself. Much of Glorianna Davenport’s work at the MIT Media Lab reflects this conviction in part by offering a “default play” that required no interaction from a user. After learning about a story in this way, interactors could then go on and explore the interactive aspects of a work. However, the agreement ends here -

Weiberg sees the role for interactivity in Cinema at the “level of representation” by enabling choices between pre-made clips, and in the hands of projectionists or VJs that translate the choices of an audience. In contrast, Davenport seeks to empower movie watchers even more and make them true collaborators. To this end, Davenport put the interactive documentary *Jerome B. Wiesner: A Random Walk through the Twentieth Century* on the World Wide Web[23]. In this experiment, interactors could not only interact with the existing story but also potentially add their own material. Davenport therefore classifies the project as an “extensible documentary”:

> Some stories can only be gathered over time, growing and changing as new materials are added: these extensible (or "evolving") documentaries require the construction of content- and material-handling systems which can accommodate dynamic shifts in the quantity and sequencing of story elements without obscuring narration or presenting discontinuities which would disrupt the viewing experience. (Davenport, 1997)

The Wiesner documentary was realized as a custom Java applet. The underlying structure is a database in which the individual elements are associated with keywords representing four of the classic five W questions: ‘“the "who." "what," "where," and "when"’ (Davenport 1997). Davenport hopes that in the future, computer programs will be able to automatically extract this information. Answering the remaining question “why” is left to the interactor.

The user interface to *A Random Walk through the Twentieth Century* uses two main elements – a concept map and a table of contents of the keywords. For the map, individual stories are represented on a grid, with each tile representing either a time period in Wiesner’s life, major topics in his life (education, disarmament, peace), or people related to Wiesner. When the interactor clicks on a title, the respective video clip

[23] http://ic.media.mit.edu/projects/JBW/JBWJava.html, retrieved March 15, 2009

or piece of text is displayed in a frame to the right. In addition, related tiles are also highlighted. The table of contents, highlights not only the directly associated keywords, but also depicts similarities between content elements by using the AI method of a "spreading activation network."[24] (Davenport, 1997) The interface also contains a link for adding content to the database of stories. Unfortunately, this link is no longer functional at this point (March 2009).

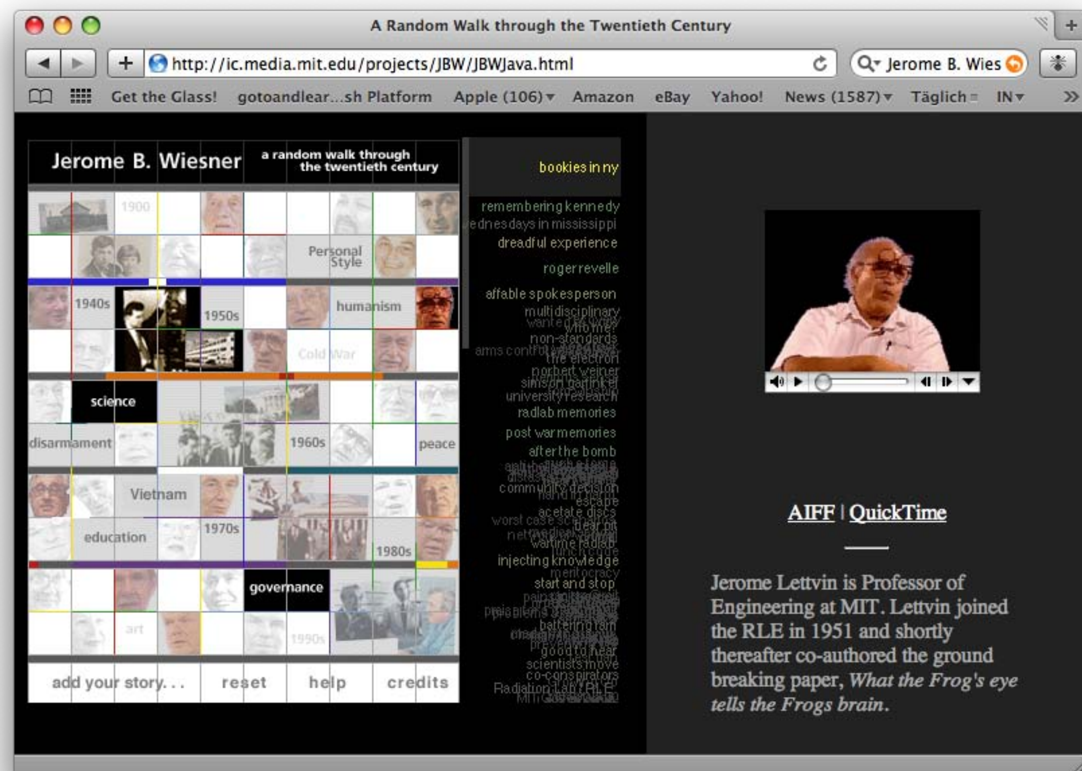

Figure 6. ("Weisener," 2009) The interface for *A Random Walk through the Twentieth Century.*

[24] A method for information retrieval in a neural network.

A Random Walk through the Twentieth Century is significant for two reasons. Firstly, the user interface (see Figure 6) puts pieces of narration that might otherwise appear disconnected into a coherent structure. Secondly, the project moves away from the LaserDiscs and hardware specific application of earlier projects to the open and easily accessible platform of the World Wide Web, significantly increasing the potential audience. While the earlier interactive documentary *Elastic Charles* (1989) about the Charles River in Boston could be distributed only to "100 individuals and corporations who had Macintosh systems with a video card, two monitors and an external videodisk player."(Davenport, 1997), now every user of the World Wide Web could see the work. Publishing this project on the World Wide Web also made it the longest lasting IC project so far. Whereas many other projects are no longer accessible and can no longer be experienced first hand, the technology behind *A Random Walk through the Twentieth Century* has so far stood the test of time.

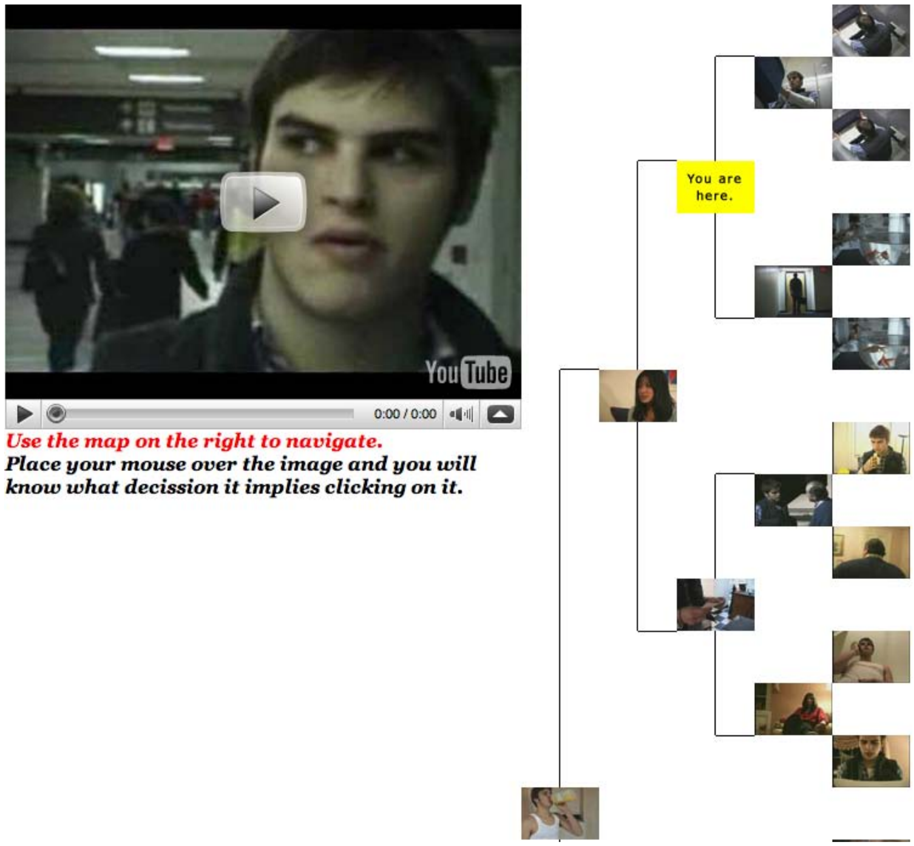

Figure 7. ("17 Life Fables." 2005) The interactor's position in the branching story

17 Life Fables (2005) is an experiment that continues in this tradition by using the Internet video platform YouTube[25] in combination with custom programming. This work presents a branching story in a tree diagram with 16 different endings (see Figure 7). *17 Life Fables* is remarkable not for its story structure, or particular content, but for using the free video hosting service YouTube to deliver an Interactive Movie to an audience. This strategy reduces the cost for publication of an Interactive Movie considerably in comparison to a traditional ways of distribution as a theatrical release, on DVD, or even on a normal website with associated costs for bandwidth. Unfortunately, *17 Life Fables*

[25] http://youtube.com

contains several errors, with links leading to the wrong video, or not working at all, which undermines the possible impact of the experiment.

In 2008, the YouTube platform has started to provide integrated interactive functions for videos hosted by the site. Any user of YouTube can use the editor application integrated in the website to create links between videos. Other online video platforms like Veoh[26] and OverlayTV[27] offer similar functionality. The first application of this functionality on YouTube was an "Interactive Card Trick" (Werneroi, 2008) movie, which allowed the viewer to click on a set of cards held out by a magician to simulate the process of remembering a specific card. Later narrative examples include *Time Machine* (Chadmattandrob, 2008), a simple branching narrative that links back to the beginning once a non-successful ending is reached. *Follow Your Instinct* (SamsungCanadaFilms, 2008), another YouTube IC movie produced as an advertisement for Samsung's Instinct cell phone also applies the same principle of a branching story with a limited number of connected nodes.

The main reason for the video hosting websites to integrate interactive functions is to motivate users to stay on their sites longer. "*Everything boils down to keeping users on our site*" writes Wall Street Journal reporter Christopher Lawton (2009) after the the introduction of the new features quotes a YouTube manager. From a structural perspective this form of IC so far delivers shallow narrative structures and mostly low production quality. Online commentators already compare these videos to the FMVs of the 1990s and predict a similar fate:

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[26] http://www.veoh.com
[27] http://www.overlay.tv/

> […] back in the early 90's, Full Motion Video (FMV) point-and-click adventure games were the rage. […] They had a short successful run, but fizzled out […] once gamers got sick of the B-movie storylines, limited interactivity and linear gameplay. That's where I see these videos going as well. (Singapese, 2009)

The lasting impact of these Interactive Online Movies remains to be seen. In any case, this development broadens access to the tools needed for producing IC by removing the need for specialized authoring software. Since the World Wide Web is also used for publication of the finished interactive video, no additional playback hardware or software is needed, further simplifying IC content delivery. As a result IC production has been invigorated, which could lead to more interesting results in the future.

2.7 Interactive Video Installations

Another variety of IC are interactive video installations. These art pieces combine video with interactivity triggered by actions in the physical world. As an art form it grew out of the older forms of installation art as pioneered by Marcel Duchamps and video art in the tradition of Nam June Paik.

Lynn Herschman's *Lorna* (1984)[28] is one of the earliest artistic works to use interactive technology. Lorna, the protagonist of the piece, never leaves her room, as she has become afraid of the outside world. The interactor is invited to help her overcome that fear and advance the branching narrative:

> Viewers were invited to liberate LORNA from her web of fears by accessing buttons on their remote control unit that corresponded to numbers placed on the items in her room. (Hershman, n. d.)

[28] The exact creation date for the work is not entirely clear. The artist's own website puts the work at both 1979-1983 (see http://www.lynnhershman.com/investigations/voyeurism/lorna/lorna.html) and 1983-1984 (see Project description and timeline at http://www.lynnhershman.com/), retrieved March 10, 2009.

The objects in her room are used to convey information about the protagonist's "past, future and personal conflicts" (Hershman, n. d.). An interactor can also overhear telephone conversations to learn more about her. The narration culminated in three different endings, which can be described as happy, unhappy, and worst: "Lorna shoots her television set, commits suicide, or […] moves to Los Angeles." (Hershman, n. d.)

Another early example for interactive video installation art is the work *EAT* (1989) (Naimark, 1991), collaboratively created by Michael Naimark's Virtual Environments class in 1989 at the San Francisco Art Institute. Naimark had previously worked on the *Aspen Movie Map* at MIT and moved on to teach and create interactive art. In this work, the interactor becomes the guest at a dinner table who is asked by a waiter (played by a real human performer) to order food from a menu. The requested food is then projected on the plate in front of the interactor. She can proceed to "consume" the food by pressing a button labeled "eat" on the table. Intended to be a critique of consumption, the video contained clips of food in various quantities a plate, but also images of destruction. The installation used a videodisc player attached to a video projector as the display and a computer running the Hypercard authoring environment to control the videos.

The transition from non-interactive installation pieces to interactive works was a gradual process, as artists often started using computers as a control device for non-interactive work, before they began to explore the potential of user participation. For example the artist Toni Dove started using computers to synchronize slide shows in her 1990 work *Mesmer: Secret of the Human Frame*. Her first interactive piece *Archeology of a Mother Tongue* (1993) is a "virtual reality murder mystery" (Dove, n.d.) that combines “interactive computer graphics, laserdisc video, and slides with interactive sound” (Dove, n.d.). The interactor controls the environment by using a small camera to look around a virtual reality environment and a data glove to touch virtual objects (see Figure 8). As an untrained interactor might be overwhelmed by the technology involved, Dove often uses a trained tutor to interact with her pieces. (Bonin, 2001) The narrative is presented in three parts, each representing different perspectives of the three characters involved in the story: the coroner investigating a corpse, flashbacks from a murdered child, and the Pathologist’s thoughts regarding the case.

Figure 8. (Dove, n.d.) Interactor experiencing *Archeology of a Mother Tongue*

What Dove explores in her art pieces is the “sensation of walking around in a movie, of actually being inside of a narrative space”(Jennings, 1995) and also the “powerful experience” of a “physical action [that] produces a response in video and audio." (Jennings, 1995) In terms of the structure of the narration, Dove rejects the term non-linear and suggests the term dimensional instead:

> I think that there are more complex possibilities for creating a dimensional narrative, and it may not be something that is completely non-linear. It may not be non-linear in a looping random access logic tree structure. It may be something that you move through in some linear fashion but has a different sense of dimension. (Jennings, 1995)

Her idea of dimension gets more clear when combined with her definition of narrative: "I think of narrative as a wandering accretion in a three dimensional cube"(Jennings, 1995). In this light, the "different sense of dimension" (Jennings, 1995) is connected to the awareness of a space of possible stories surrounding the currently chosen path at any given moment. From this perspective, replay as a means to add more layers to a narration becomes essential.

An even more complex example is *Wheel of Life* (1993)*,* a project jointly directed by Glorianna Davenport of the MIT Media Lab and Stanford Literature Professor Larry Friedlander. The large-scale installation was created around the idea of representational spaces for the different elements of water, earth, fire, and space as symbols for both the circle of life and the evolution of life on earth and beyond. Each space contained video screens and projectors, a sounds system, light installations, and interactive objects. What sets *Wheel of Life* apart from other examples is three-way interaction. The piece augments the usual interaction between a computer program and a human interactor by including a second interactor. Individual spaces were designed for interaction between a *guide* controlling the space on a computer display from the outside and an *explorer* experiencing the space from within (see Figure 9):

> Together they had to discover how to navigate through a world that responded mysteriously to their actions; the explorer's task was to decipher the rules and

> narratives governing each area, while the guide sought to help the explorer by using the computer to manipulate the images, lights, and sounds in the area. (Davenport & Friedlander 1995)

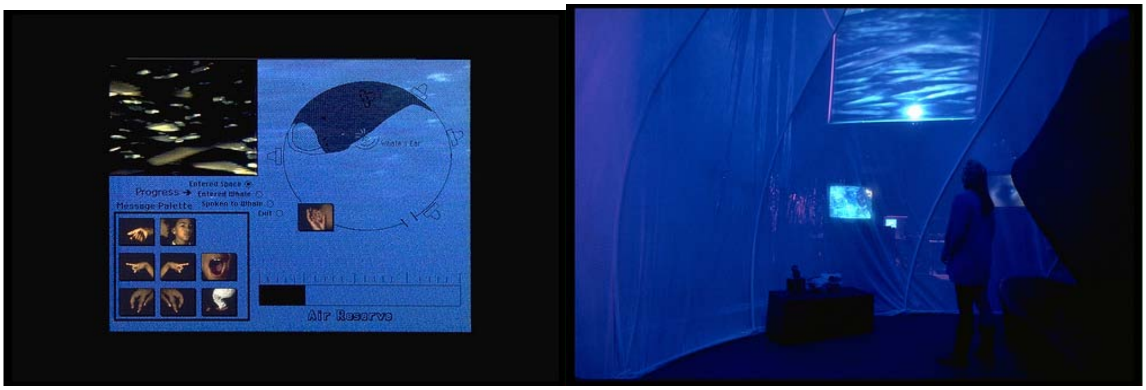

Figure 9. (Davenport & Friedlander 1995) *Wheel of Life* guide interface and actual space for the water part

The design goal for the project was to create an "Interactive Transformational Environment" that would fully immerse visitors in an "interactive world situated in a real space outside of the computer box"(Davenport & Friedlander 1995). Within this framework, a narrative about the cycles of "change and continuity […] in the journeys of our lives" was to be discovered "by the transformative actions of the visitor moving through it" (Davenport & Friedlander 1995).

In evaluating the piece, Davenport describes several challenges and problems encountered in the course of creating and presenting the project. Regarding the design phase of the project, she laments the lack of graphical scripting tools to "enable [the creators] to pre visualize the impact of a new idea on the complex environment" (Davenport & Friedlander 1995), which made the impact of changes in the design difficult to foresee. In terms of the content, Davenport observes a problematic relationship between "puzzle-solving as a way to engage the visitors" (Davenport & Friedlander 1995) and the atmospheric "reverie-like absorption of the experience", which leads her to an important question relevant for many forms of IDN: "Can we find new narrative forms which invite intervention without depending on puzzle-solving?" (Davenport & Friedlander 1995)

Davenport also remarks on the problem of casting the interactor in a role, a task she considers "the most exciting and difficult" (Davenport & Friedlander 1995) but necessary to "to engage the visitor and elicit a spontaneous desire to play along". She observes how familiar situations make this easier, for example by invoking a situation in the "air" part of the installation for the role of the explorer that many interactors related to their memories of the TV series Star Trek. The more abstract role of the guide proved more difficult to grasp: "The tasks facing the guides were more subtle and more varied, and visitors had correspondingly more trouble with them." (Davenport & Friedlander 1995) Consequently, the computer interface for the guides required careful adjustment "to the range of capabilities and expectations of the visitors" (Davenport & Friedlander 1995). Overall, Davenport considers the work as having combined several forms of storytelling specifically, the "fable [,] theater and game-playing" and concludes that "appropriate types of narration" still need to be invented for the "interactive medium." (Davenport & Friedlander 1995)

Camille Utterback's work is an extension of *Wheel of Life* and other earlier experiments. Her first published work, *Text Rain* (Utterback & Achituv, 1999) combines live video with interactive computer graphics. The interactor sees her own image mirrored on a projection screen in black and white, while letters fall on the interactor's virtual shape. By moving her arms and body an interactor can catch and hold the letters; as a result, the words and phrases of a poem become readable. Deciphering the poem in *Text Rain* is therefore a hybrid experience, or in Utterback's words: "'Reading' the phrases in the Text Rain installation becomes a physical as well as a cerebral endeavor." (n. d.)

From the perspective of technology, Utterback's work represents a shift from what we might call "explicit" interfaces consisting of buttons and screen-based interfaces in earlier works towards more seamless ways of interacting with installation pieces. *Text Rain* uses a video camera and computer vision technology to this end; other installations apply various sensors or use tangible user interfaces (TUIs) embedded in objects to create the same effect.

While most of Utterback's work is abstract and has no overt narrative content, the works in the *Liquid Time* Series (2001-2002) as well as the *Potent Objects* (2003) demonstrate potential for narration. In the former, an interactor disrupts a running video by approaching it and thus creating a window into time in the form of a slice as wide as her body. In this slice, a video shot from the same camera position, but at a slightly different time is shown, thereby disrupting the unity of time in the video (see Figure 10). This method could be used in a narrative to present flashbacks or prolepsis.

The later combines video and sensors to create objects that respond to physical actions. For example shaking one of these objects makes a female character shake and scream on the built-in monitor.

Figure 10. (Utterback, n. d. b) *Liquid Time* Series disrupts the unity of time in video

2.8 Virtual Reality Narratives

The term virtual reality refers to visual and fully immersive 3-D digital environments. Early VR applications in the 1960s were in flight simulators used for training purposes by the military. Artistic applications of the technology came later, as the technology was prohibitively expensive initially and required highly specialized expertise. I consider VR narratives (VRN) a form of IC that replace the discrete plane of film representation with a fully immersive representation, created either by head mounted displays (HMD) or 360 degree projection to completely engross an interactor in the virtual environment. The potential for IDN in these environments stems form the combination of visual power and the immersive experience of exploring the virtual space.

An early example of VRN was *Placeholder*, an installation created by Brenda Laurel, Rachel Strickland, and Rob Tow (Laurel, Strickland, & Tow, 1994). This work, created at Canada's Banff Center for the Arts, combined video footage and still photography shot around Banff National Park with 3D imagery and spatialized sound to create three virtual environments inspired by real locations. The interactor entered one of two stone circles and was given a HMD and data gloves to track their hand movements. Within the environments, talking petroglyphs representing a spider, a crow, a snake, and a fish lured an interactor to move toward them. By approaching one of the images, the interactor changed into the role of the respective creature by “entering” its body and experiencing the creature’s physical features for movement and visual perspective. Also, the interactor heard her own voice echoed back distorted when assuming the role of a creature. The voice of a goddess offered help and guidance within the environments, mirroring the guides in MIT’s *Wheel of Life* project. So called ”voiceholder” objects allowed interactors to record their own stories and to listen to stories left by others. Lastly, a portal mechanism allowed participants to travel from one virtual environment to another. The placeholder team took great care in making the environments easy to navigate and the interface intuitive:

> Our motto was “no interface,” expressing our desire to maximize naturalness, to enable the body to act directly in the world, and to minimize distraction and cognitive load. (Laurel, Strickland, & Tow, 1994)

Laurel understands *Placeholder* as a first attempt to adapt VR technology for entertainment purposes and sees their advantage in the participatory nature of VR environments:

> If […] what you want is to create a technologically mediated environment where people can play - as opposed to being entertained - then VR is the best game in town. (Laurel, Strickland, & Tow, 1994)

Consequently, Laurel categorizes the experience in *Placeholder* as “narrative play” (Laurel, Strickland, & Tow, 1994) and sees the work as a creating a “new paradigm for narrative action in virtual environments” by exploring people’s “[…] relationships with places and the creatures" (Laurel, Strickland, & Tow, 1994). These relationships have been the source of stories since ancient times, Laurel observes. One element of narrative strategy in *Placeholder* is therefore to cast the interactor in the archetypal role of an animal, which shapes the interaction with the landscape and creatures. Another important element of the narrative is pre-recorded audio stories embodied in the environments. These audio narratives were created in collaboration with a professional storyteller, who identified motifs and an improv theatre company whose members improvised the actual stories as reactions to the motifs and the virtual environments. The voiceholder objects, which hold "voicemarks" - narratives recorded by the interactors - further enhanced and shaped the narrative experience: "The virtual landscape accumulated definition through messages and storylines that participants left along the way." (Laurel, Strickland, & Tow, 1994). *Placeholder* was built for two interactors at the same time. A third human assumed the role of the Goddess who observed the actions of the interactors and provided help, but also occasionally teased the interactors or "*made suggestions about things to do*" (Laurel, Strickland, & Tow, 1994).

In terms of the success of the experiment, Laurel admits to some technical problems, but overall considers the experiment successful. She identifies VRN as an artistic discipline inviting physical, embodied exploration and interaction that distinguishes VRN from IF or HF.

> VR is really the art of creating spaces with qualities that call forth active imagination. The VR artist does not bathe the participant in content; she invites the participant to produce content by constructing meanings, to experience the pleasure of embodied imagination. (Laurel, Strickland, & Tow, 1994)

In retrospect, *Placeholder* was an important step in the development of VRN works. Casting the interactor into a role by putting her in a different body with different physical characteristics is a powerful variation on "scripting the interactor". What seems problematic about *Placeholder* is the use of a human goddess character to guide the interactors and shape their experience. If the role of the author is to not "bathe the particpant" in pre-made content and "invite participation" as Laurel claims, the goddess figure should not be necessary and in fact might undermine these claims. For interactors to construct meaning on their own, they should be allowed to experience the work without overt guidance or commentary.

Ten years after *Placeholder*, Mark Mine looks back at a decade of research and practice at Walt Disney Company's VR studio (Mine, 2003), which was responsible for creating VR based theme park rides since 1992. The business model of a theme park, which requires a high throughput, imposes constraints on the design of attractions, by precluding complex instructions and cumbersome tracking devices that take minutes to put on. Consequently, the interaction in Disney's rides is mainly limited to "navigation and targeting/shooting" (p. 2) and "control devices with real-world counterparts" (p. 12) to minimize the need for training. If real-world equivalents do not exist, as in the case of Aladdin's magic carpet, the studio tries to find a steering mechanism that is close to an existing counterpart, such as a modified motorcycle seat (see Figure 11). This strategy mimics the no-interface approach of the *Placeholder* experiment.

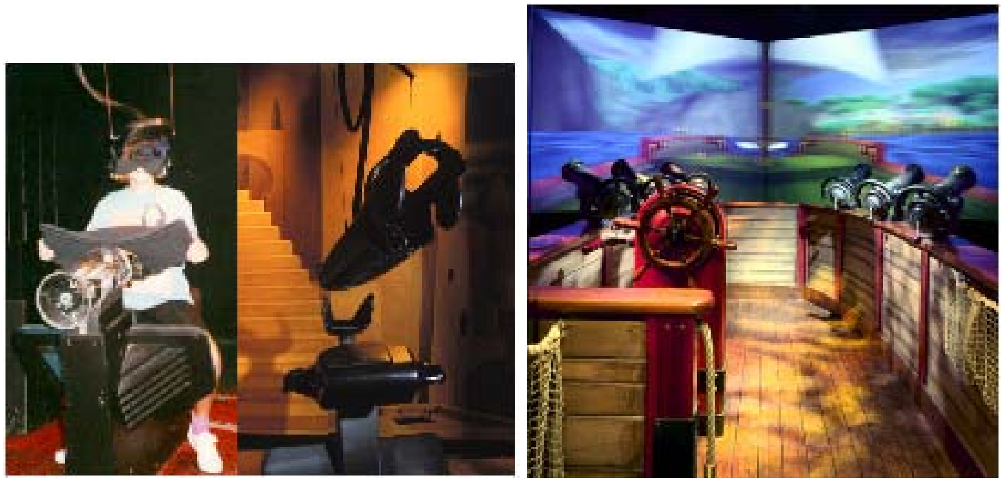

Figure 11. (Mine, 2003, pp. 329-330) Physical interfaces for the *Aladdin* ride (left) and the *Pirates* ride (right)

The designers at Disney's VR Studio apply a combination of strategies to create a satisfying interactive narrative experience. Immersion is created by the combination of physical interfaces and high-end stereoscopic 3D graphics delivered by HMDs or displays surrounding the interactor. Motion platforms add another level of embodied experience and immersion to the ride. The narrative itself is structured in three-parts, as in this example for the ride *Pirates of the Caribbean: Battle for Buccaneer Gold*:

> an introduction, where guests are given time to learn the interface and are given the back story; the main portion of the experience, where guests are free to roam about and explore; and an exciting conclusion, to give the guest a sense of closure. (p. 15)

In the middle part, the designers try to script the interactor by drawing her to three "eye-catching" sights of a "fortress, an erupting volcano, and a burning town" to make guests steer the ship to points of action, which allow the narrative to continue. Two fall-back levels of story elements insure an interesting experience in case they steer away from the eye-catchers: "If these fail to bring the ship to the action, we bring the action to the ship; enemy ships attack from behind, sea monsters rise up from the deep."(p. 15). A last more drastic measure is a storm that puts the ship "back in the center of action."(p. 15).

The general lesson for IDN from Disney's theme park rides is in the combination of multiple strategies to structure a satisfying narrative experience.

2.9 Interactive Drama

The idea of interactive drama is older than digital media. One early example for audience participation in a stage play is Ayn Rand's 1934 play *Night of January 16th* (Rand, 1971), a courtroom drama that takes members of the audience as the jury and puts the decision of "guilty" or "not guilty" in their hands. The author does not provide a "true" version of the events depicted in the play and has the witnesses in the trial relate contradictory accounts. Accordingly, the verdict could be different for each performance with the decisive factor being the particular night's performance of one or more of the actors.

A variety of interactive drama are live action role playing games (LARPs) that have evolved from table-top role playing games (RPGs). Starting in the late 1970, participants of these games started to physically act out their roles in costumes instead of just being the character sitting at a table. RPGs and LARPs are governed by an intricate set of rules and directed by a game master (GM). The participants play specific characters (roles) governed by numerical counters, expressing attributes and skills eg. Strenght=10, Magic = 20, and Wisdom = 30. RPGs often involve rolling a 20-sided dice to determine the outcome of a specific action based on the existing counter values, for example a player with magic > 20 must roll a number higher than 10 to proceed. These rule systems can be expressed easily in procedural terms and therefore provide a starting point for rule sets that structure dramatic performances in digital media.

In the digital realm, interactive drama was introduced by the researchers working on the OZ project at Carnegie Mellon University starting in the late 1980s. The researchers in the OZ group focused on artificial intelligence (AI) techniques in an approach partially influenced by Brenda Laurel's 1986 PhD dissertation, which proposed a neo-Aristotelian approach for interactive digital drama and offered guidelines towards a concrete implementation. The goal of the project was to create interactive drama that would pay "equal attention to both character (believable agents) and story (interactive drama)" and treat "character and story as a unified whole." (Mateas, 1997)

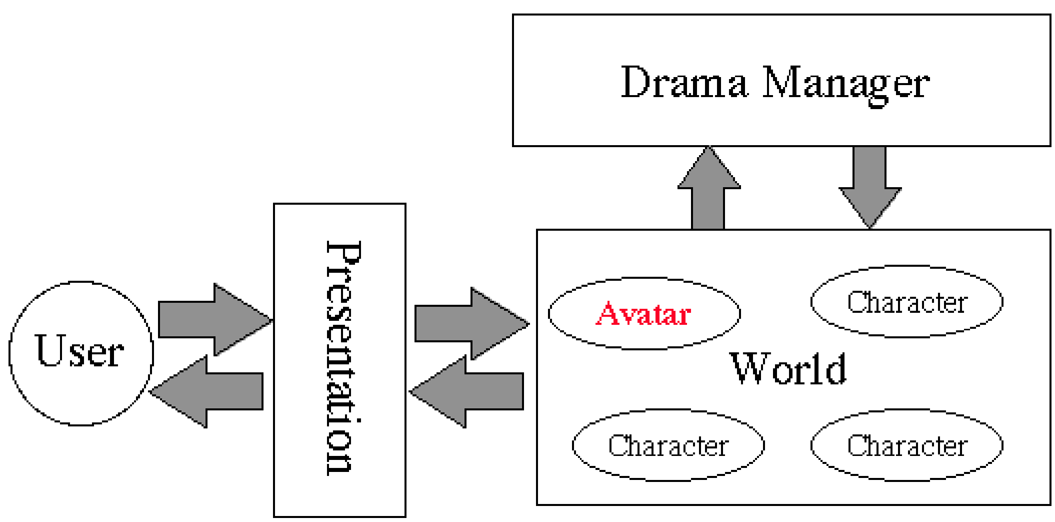

Figure 12. (Mateas, 1997) High level architecture of the Oz project.

The OZ project understands interactive drama as a combination of a presentation element, characters in a story world and the drama manager (see Figure 12). The presentation part contains the user interface and is also responsible for creating the perspective the user has on the drama:

> This presentation may be an objective, third person perspective on the world, or it may introduce various kinds of dramatic filtering - effecting camera angles and point of view in graphical worlds, or changing the style of language used in textual worlds. (Mateas, 1997)

Characters with their motivations, personalities and feelings are part of a storyworld, while the narration is controlled by the drama manager:

> [the drama manager] tries to guide the experience of the user in order to make a story happen. This may involve changing the physical world model, inducing characters to pursue a course of action, adding or deleting characters, etc. (Mateas, 1997)

One focus of the OZ project was on research in believable agents (see Bates, Loyall, & Reilly 1992, Loyall & Bates, 1997) as virtual actors/characters in interactive drama with "emotions, social behaviors, and a unique personality." ("Lyotard," n. d.) The intended purpose for believable agents was to "get away from traditional puzzle-oriented interactive fiction and create more social experiences." (Mateas, 1997) Beyond that, the OZ group of researchers defined believable agents as a "stance or viewpoint from which all of AI is reconstructed." (Mateas, 1997) Instead of a common practice in general AI that is trying to re-create discrete parts of the brain and to "implement a capability in isolation", research in believable agents attempts to create characters suitable for interactive drama which perform well under "fine […] artistic control" (Mateas, 1997). Accordingly the OZ approach also rejects emergent behavior from Alife-type systems (see Langton, 1989) because "emergent system [remove] control from the artist."(Mateas, 1997) Overall, the purpose of AI in the context of the OZ project is to enhance and support artistic expression in interactive drama:

> Any technology, whether it comes from classical or behavioral AI, or from outside of AI entirely, is fair game for exploration within the Oz context as long as it opens up new expressive and artistic spaces. (Mateas, 1997)

The OZ group also wanted to overcome what they considered the conflict between "predestination" and fixed structure of traditional narrative and the "freedom" (Mateas, 1997) of interactivity. The group's proposed solution is the OZ drama manager software, a program that contains an "evaluation function" derived from reverse-engineering traditional narratives in terms of identifying plot points and the sequencing of narrative elements in an attempt to capture the "aesthetics for the story." (Mateas, 1997) In an interactive drama, the OZ drama manager software watches the interactor's actions within a plot point and becomes active once "some sequence of activities in the world [are] recognized as causing a plot transition." (Mateas, 1997) The drama manager then calculates every possible move of the system and the interactor to produce a list of possible resulting narratives. Out of these possible narratives, the drama manager chooses the one rated most highly by the evaluation function and changes the world according to this selection. This method also places the OZ drama manager in a position between narratives with a fixed branching structure and systems generating narratives from scratch. The Oz group understands the former as too limiting and with no incentive for re-play: "after having played through [once], there is nothing new to experience" (Mateas, 1997). Mateas describes the later as mostly non-interactive[29] and therefore not applicable to interactive drama; additionally he generative systems as incompatible with the "richness of a particular authorial point of view" (Mateas, 1997).

[29] Mateas mentions the Universe system (Lebowitz 1984) as one example for non-interactive story generation.

Based on this conceptual framework, the OZ group produced two implementations, one text-based and the other with a graphical front-end. *Lyotard* (Bates, 1992) was a text-based experiment that simulated a virtual house cat in the virtual world of a six-room house. The following is an excerpt from an interaction with *Lyotard*:

Player	GO TO the sunroom
Lyotard	LOOKAROUND NERVOUSLY
Player	PET Lyotard
Lyotard	BITE Player
	RUN TO the diningroom (p. 4.)

The actions take by the *Lyotard* agent are motivated by emotions and goals. Bates explains the above interactions as follows:

> When the user follows Lyotard into the sunroom and tries to pet him, Lyotard sees the action and notices that the actor trying to touch him is one toward whom he feels mild hate. This combination generates another goal: respond-negatively-to-contact. Lyotard responds to this rather than to his escape/run-away goal or any of his other goals because we declared it as having a high priority when we created Lyotard. Further refinement of this goal through a series of choices leads to Lyotard biting the player. (p. 5)

While *Lyotard* contained "no designed story" ("Worlds," n. d.) the OZ project considered it an important experiment for creating virtual actors.

The graphical experiment *Edge of Intention* (Loyall & Bates, 1993) allowed the interactor to control an animated avatar (called *Woggle*) (see Figure 13), while the other three *Woggles* were implemented as believable agents in different roles (*Wolf* – aggressive, *Shrimp* – friendly and meek, *Bear* – protective), which reacted to the interactor's action and changes in the environment:

> The Woggles have individual personalities, they display emotions, they engage in social behaviors (like fighting and playing follow-the-leader), and they react to their dynamic environment ("Worlds," n. d.)

The *Edge of Intention* was another experiment without a set narrative and or a drama manager created as a test bed for "believable characters for simulated worlds." ("Worlds," n. d.)

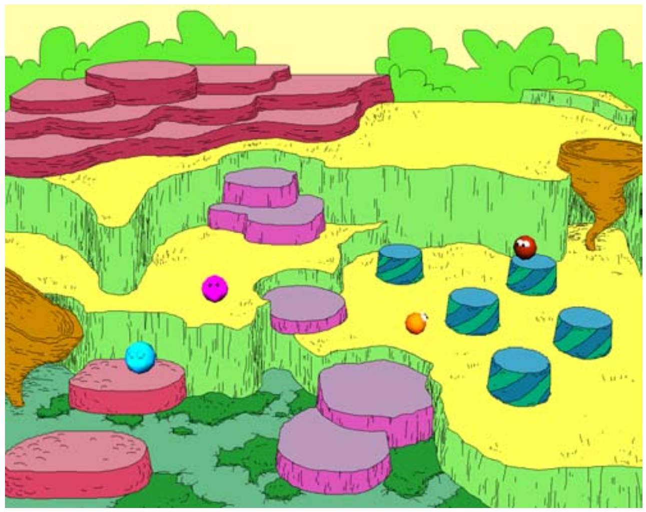

Figure 13. ("Worlds," n. d.) Screenshot of the OZ Project's *Edge of Intention*

Michael Mateas continued the research in interactive drama with his collaborator Andrew Stern by working on *Façade* (Mateas & Stern, 2003, 2005a, 2005b). This one act interactive drama was completed after five years of work to build a "dramatically interesting, real-time 3D virtual world inhabited by computer-controlled characters" in which the interactor can experience the narrative "from a first-person perspective." ("Façade," n. d.)

Façade casts the interactor into the uncomfortable rule of the invited guest who becomes a witness to the heated quarrels of a couple on the verge of a breakup. The interactor must deal with the situation and can side with either of the characters, which can lead to the breakup of the couple, or try to help *Trip* and *Grace* to realize they want to stay together and have to face their problems in order to do so. The narrative can change for each replay, as the interactor attempts different strategies to deal with the problematic couple. The interactor communicates with the two characters by typing her part of the conversations; additionally, the interactor can move around in the virtual apartment and pick up objects. *Façade* is not turn-based, as the action takes place in real-time and does not wait for the interactor.

Façade has received much critical acclaim[30] and was widely praised as a breakthrough, although the work is generally considered a computer game and not understood as an interactive drama.[31] *Façade* is impressive as a fully realized interactive drama in the tradition of the OZ project. Several strategies are applied to draw the interactor into the unfolding narrative - a claustrophobic space (the couple's small apartment), the uncomfortable but familiar situation of a fighting couple, the continuous real-time flow of events and the audible answers of the virtual characters work together to create immersion. In an ideal play through, the interactor will experience powerful agency by reaching closure in the form of a satisfying ending in which she has saved the couple's marriage. Unfortunately, this ending is hard to reach for a variety of reasons, some due to the technical limitations (to which the authors freely admit, for example in regards to limitations regarding the AI's ability to comprehend arbitrary input see Mateas & Stern, 2003), but also due to particular design decisions. In this category belongs the unforgiving textual interface, that allows no correction of typos – once typed, the AI in *Façade* tries to make sense of a word, no matter how misspelled and nonsensical it is.

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[30] Articles on *Façade* have appeared in the *New York Times*, *Newsweek*, *Dichtung Digital* and many other publications ("Façade," n. d.).
[31] 17 of 39 articles listed on the *Façade* home page http://interactivestory.net ("Façade," n. d.) treat *Façade* as video game.

This problem is further emphasized by the design decision for real-time interaction and a continuous, unstoppable course of the narrative, which rushes the interactor to constantly come up with something to say or do. As a consequence, the interactor is given hardly any time to come up with a strategy for dealing with the situation, which can be very frustrating. Even in a real-life situation, one can usually buy some time to consider one's options, for example by excusing oneself and got to the restroom. As this strategy is not available, successful interaction and completion in *Façade* requires many replays. This extensive circle of repetitions is also necessary to find out more about the characters because the interactor is not given any background information on the characters she encounters, even though they are supposed to be old friends. The role of the interactor consequently oscillates between the overt designation as an "old friend" and the implicit role of a couple's therapist, which creates a somewhat awkward and unrealistic experience – an old friend would have more background knowledge to start with and a couples therapist would certainly not work in a client's home. This unclear role definition further limits an interactor's ability to formulate a clear strategy and experience agency. After several playthroughs, the interactor will be better suited for the role of an old friend, but this lengthy process should not be necessary.

Figure 14. (“Façade,” n. d.) The virtual characters Grace and Trip in *Façade*

2.10 Narrative Games

Narrative games are another important tradition in IDN. The designation of narrative games applies to computer-based games if narrative is an integral part of the overall experience. In choosing this perspective, I exclude games like *Tetris* (Pajitnov, 1985), which prioritize the competitive aspect of play.

There is some overlap between narrative games and other forms I have discussed previously, namely IF (section 2 of this chapter) and FMV/Interactive Movie works (sections 5 and 6 of this chapter). The earliest examples of narrative in computer games are IF works from Infocom like *Zork I* (Blank & Lebling, 1980), *Deadline* (Blank, 1982), and *Hitchhiker’s Guide to the Galaxy* (1984). *Deadline* introduced the Whodunit genre of the murder hunt to computer games. The game puts the interactor in the role of a police inspector who tries to solve the murder by talking to suspects, finding clues, solving puzzles and deducing what really happened from this information. The detective story has since become a staple of narrative games, as it naturally integrates puzzle-solving into a narrative and so overcomes a problem mentioned by Glorianna Davenport.[32]

In the late 1980s, IF was superseded by computer games that used on-screen graphics, with far-ranging consequences for narrative games. While text-based IF had allowed the game designers to concentrate on cueing interactor's commands and responding to them in a way that advanced the story, they now had to design visual environments to represent the gameworld on the screen. Furthermore, the interactor was represented on the screen for the first time in the form of an avatar. As a consequence, graphical representation also introduced a perspective not previously available in narrative games. With the representation as an avatar, the interactor becomes an integral part of the game world, but she is also more distanced from the game world, as the interaction is indirect, by means of the movements and actions of the avatar. Many games also replaced the text-based parser with a point-and-click interface.

Starting in 1984, the *King's Quest* series pioneered the new genre of graphic adventure. But it was not until a graphic adventure was created by the games branch of a film production company that narrative took center stage. *Lucasfilm Games* (later renamed to *Lucas Arts*) was founded by film director George Lucas. The new company's first product was a computer game that used motifs from the movie *Labyrinth*. The *Monkey Island* series of games (1990-2000) from Lucas Arts combined narrative and a graphic adventure game. Set in a fantasy world of pirates, the game places the interactor in the role of a hapless pirate who has to prove himself to the pirate establishment. Aside from this main goal, he also has to win the heart of a female island governor and

[32] "Can we find new narrative forms which invite intervention without depending on puzzle-solving?" (Davenport & Friedlander, 1995)

ultimately uncover the secret of Monkey Island. The interactor controls the avatar's movements and actions entirely with her mouse. In this way, playing the game was easier than typing commands in earlier text-based adventures. Instead of having to type a sequence of phrase like "Go north, go west, open door", an interactor could now just click on a door in the gameworld and see the avatar walk towards that door and open it. In the course of the game, the interactor can solve two of the three initial challenges (prove himself as a pirate captain and win the heart of the governor). But the secret of Monkey Island is never revealed and has been kept intact through three more *Monkey Island* games. The *Monkey Island* series featured a rich narrative with many unexpected twists and turns and become famous for its tongue-in-cheek conversations and in-jokes, for example in a scene were the interactor can climb down a tree stump and is prompted for a non-existing "disk #23" to continue the game, or in a non-functioning dialog box after the supposed death of the protagonist that is a parody of rival adventure games.

The flow of the narrative is interrupted at times by puzzles with funny, but improbable solutions that can be frustrating a times; for example the only way to free a prisoner is to melt the iron bars of a prison cell with a potent drink, which the interactor has to carry from a bar to the prison. *Monkey Island* for the most part keeps the balance between puzzle solving and narrative development by establishing a constant jocular tone, but the interactor can still get stuck trying to solve a particular puzzle. Advancement in the narrative becomes the reward for puzzle solving, often in the form of non-interactive cut scenes that follow major accomplishments. As an overall strategy in IDN, making non-interactive parts the reward for interactive engagement is problematic, making interaction into a chore the interactor has to complete before she can relax again and passively watch the story unfold. *The Secret of Monkey Island* also applies cut scenes for a different purpose, in order to inform the interactor about events that happen simultaneously somewhere else, for example when the main enemy of the protagonist (ghost captain LeChuck) is told that a potentially dangerous new pirate is on the island. This use of cut scenes is more effective as it reminds the interactor that a larger narrative is unfolding around her. Additionally, cut scenes create a sense of urgency that puts pressure on the interactor to overcome the puzzles and continue the game. For example, the kidnapping of the Island's governor by the protagonist's enemy LeChuck is designed to make the interactor want to follow him and free the governor.

The Rise of the Dragon (1990) is another adventure game that makes even more use of temporality as a strategy to create urgency and keep the interactor engaged. Set in a future Los Angeles that is dominated by gang warfare, the game puts the interactor in the role of a private detective investigating the death of the mayor's daughter. Time has a crucial function in the game, since the interactor has only three in-game days time to solve the mystery and stop the sinister plans for world domination of an LA gang lord. In-game time runs faster than real time and is keyed to the player's actions, such as traveling from one location to another. Time of day is also important - for example the city hall in the game is only open for business in the mornings. Also if the detective is not home in time for the night, he will fall asleep in the street and be robbed of some essential items during the night. *The Rise of the Dragon* features a time meter that helps the interactor to keep track of the in-game time and provides a constant reminder that time is running out. The temporality in the game puts pressure on the interactor and forces her to act as quickly as possible. At the same time, the interactor must plan the sequence of her actions carefully, or she will not be able to complete the game.

Another mechanic in *The Rise of the Dragon* is character memory. The other characters in the story remember previous interchanges and will act accordingly. If the interactor does not treat them politely, they will refuse to cooperate later and prevent her from solving the mystery. Unfortunately, this promising design element of delayed consequences can lead to a frustrating situation where the interactor could not act at all anymore and was forced to wait for the in-game time to run out so she could restart the game. Overall, temporality and character memory initially enhanced the interactor's engagement with *The Rise of the Dragon*, but became a source of frustration and another set of chores to perform during replay.

One of the reasons why *Myst* (Miller, 1993) became such a big commercial success[33] was the absence of these common sources of frustration in adventure games. *Myst* was carefully designed to avoid trapping the user at any stage before the ending of the game. In the game, the interactor had to solve complex puzzles in order to reach different islands and retrieve pages to complete two books. The designers Robyn and Rand Miller overcame the technical limitations of the time (1x speed CD-ROMs, 8-Bit graphics cards, no real time 3D graphics) by creating slide shows from pre-rendered images to simulate 3D spatial navigation in a virtual world. The choice of islands provided a finite space that could be represented with a limited number of slides.

By combining animations, a seamless soundtrack, and convincing sound effects, *Myst* provided an immersive experience that maximized the contemporary hardware and

[33] *Myst* sold over 6 Million copies ("List of best-selling video games," 2010)

was eclipsed only several years later by much more powerful home computers and games consoles. The joy of exploring the beautifully crafted islands of *Myst* overcome the lack of narrative development throughout most of the game. Only at the very end does the interactor face a meaningful decision –either put the final page into one of the two books in the library and get trapped herself or find the third books and win the game. As Janet Murray points out, the losing variant is actually the more dramatically interesting and rewarding one, while the winning solution is unconvincing (see Murray 1997, p. 140-142).

The Last Express (Mechner, 1997), although a commercially failure, was remarkable successful at integrating narrative and game. This game casts the interactor in the role of a passenger aboard the Orient Express from Paris to Constantinople on the eve of World War I who investigates the murder of a friend and tries to complete his mission. In *The Last Express*, many temporal events happen simultaneously, providing many possible narrative paths. By moving through the train, deciding what characters to talk to, what conversations to overhear, and what actions to take, the interactor assembles a particular narrative. Consequently, replay can reveal completely different pieces of information and result in a different outcome.

The strategy chosen by the designers of *The Last Express* was to enrich a confined space with many possible interactions. The exploration of space is used innovatively to explore characters by gathering information. At the same time, the elements of temporality and geographic precision (the game runs in 6x accelerated real time and presents the current location on a map) enhances the sense of immersion and precludes exhausting the limited amount of possible narratives easily, as the interactor can only be in one location at any given time. The train's stops in stations provided a natural means to structure the narrative into chapters, which made the amount of possible combinations more manageable by folding back to a shared back story.

Bad Mojo (1996) provides a different explanation for a confined space. In the beginning of the narration, the main character is shown releasing the Bad Mojo that turns him into a cockroach. This Kafkaesque metamorphosis puts the interactor in a world where small everyday things become formidable obstacles. By means of this change of scale and perspective, the bar and adjacent rooms in which the narration takes place become a large unfamiliar world, which holds numerous challenges for the interactor's progress, like a garbage disposal that is life-threatening to the cockroach. The interactor has to traverse the world to find out how she can transform back into a normal human being. During the course of the game, the interactor uncovers the past life of both the cockroach and the bar's owner Eddie. In the end, the interactor can save Eddie from the burning house and transform back into into a human shape. If successful, the interactor will then learn that they are long separated farther and son who can now start a new life together. Like *The Last Express*, *Bad Mojo* applies the strategy of a confined space, with close attention to detail, and an engaging back story to make the interactor accept the overall premise and act appropriately within the game. Also, many of the puzzles in the game appear natural to the situation and well integrated with the narrative in their role as obstacle in a journey. In this way, *Bad Mojo* convincingly creates a space that tells a narrative.

The game *Blade Runner* (1997) used an early 3D real-time technology to re-create a world after the Ridley Scott movie of the same (see Figure 15). The interactor assumes the role of a Blade Runner, whose job it is to find Replicants, outlawed replicas of real humans, and kill them. In the course of the game, the interactor must make several strong moral choices that affect the outcome of the narrative. For example, the interactor can decide to go over to the other side and fight with the Replicants, restore his reputation and continue to hunt down Replicants, or leave the city and the fighting behind. These decisions eventually lead to 13 different endings, variations of the 3 main outcomes based on the interactor's earlier choices. *Blade Runner* eclipses many other narrative games by providing alternative endings, not the just the "successful completion" of *Monkey Island, Rise of the Dragon, and Myst*. A key narrative element that enables this enhanced variety is a role change for the interactor in the midst of the game. The police officer turns into an outlaw and gains a different perspective. Role changes for the interactor's character provide opportunities for rich narrative development in IDN experiences. The role change in *Blade Runner* enhances immersion in the game by a deep engagement with the character, but also transformation as a variety, as the game invites the interactor to explore moral ambiguities in the Blade Runner narrative, for example the corruption of police officers, and the ethics behind killing Replicants, humanoid robots that were initially created to replace real humans and have taken a life of their own.

Figure 15. (CVG, n. d.) *Blade Runner* used early real-time 3D technology in 1997

Deus Ex (2000) is set in a dystopian future and gives the interactor the role of a special agent in the midst of political upheaval and fight for resources. In the narrative, the interactor learns where a certain virus originated that causes the Gray Death and three different entities that want to rule the world. The interactor has to make a choice between these different factions, which is difficult, as all of them have their own questionable agendas, from a voluntary step back in time by destroying most technology to world domination by a benevolent dictator to a world controlled by a secret society. After the interactor picks her side, the resulting future is revealed and the game ends. Similar to *Blade Runner*, the choice for one side is ambiguous in moral terms. The narrative in *Deus Ex* also makes each position plausible and so complicates the interactor's decision. This narrative strategy in *Deus Ex* follows along the same lines than *Blade Runner,* but leaves no way out for the interactor as the "neutral" option in the earlier game did.

Indigo Prophecy (2005)[34] contains the narrative of ritualistic murders in New York City in an imagined year 2009. The murders are connected to an age-old prophecy and a secret society that rules the world. The game combines cinematic narration techniques of FMV and split screen with time-based events. The narrative allows for many variations but the most innovative strategy in *Indigo Prophecy* is giving the interactor control over three different characters in one play-through of the game. The interactor can choose to have two characters working against the third and thus creating a different narrative. Multi-character control is a promising strategy for IDN.

A variation of this strategy is used in *Fable II* (2008), with the introduction of a dog as a sidekick for the player. The dog has multiple functions – it helps the interactor accomplish its goals, by finding treasure, helping in combat situations and leading the way in quests. Most significantly, this companion character creates empathy for this non-player character (NPC), and adds another dimension to the narrative aside of the successful completion of quests. This strategy mirrors and extends the role of *Floyd*, *the Robot* in infocom's 1983 IF work *Planetfall*, who accompanies the interactor for a short while and eventually sacrifices his life for the interactor (see Murray, 1997, p. 53). However, the role of *Fable II's* dog is more flexible and not fashioned towards one particular dramatic event. Yet another variation of the companion strategy is applied in the game *Ico* (2001), where the interactor tries to lead a princess through a maze-like castle to freedom. The role of this NPC is more passive, as she is not there to help, but

[34] The game is known as *Fahrenheit* outside of North America.

rather the target of the interactor's mission. These strategies reflect Marie-Laurie Ryan's suggestion of creating empathy by making the interactor's character more dependent on NPCs (see Ryan, 2008).

The title *Hotel Dusk: Room 215* (2007) brings a graphic adventure game to the mobile game console Nintendo DS. In the role of a private investigator, the interactor is sent to *Hotel Dusk* to find several missing objects for a client and investigate the other secrets of *Hotel Dusk* in order to unveil his own life story. The game applies conventions of classic detective novel and the film noir genre like the lonely man with a past, and the beautiful and inaccessible woman in addition to the confined space of the hotel to create an immersive atmosphere. Besides the main narrative, the game has several additional narrative threads, each connected to other characters in the hotel, for example the secret behind the success of a fellow hotel guest and fiction writer, who has stolen his first novel. The game uses an episodic structure, in which each is represented by a time period. To progress from on episode to the next, the interactor has to solve puzzles and in turn slowly uncovers the story of the betrayal of his former partner in cinematic cut scenes while finding evidence that will lead him to uncover the reason for his partner's actions.

While the puzzles are often not well integrated in the narrative, the strategy of motivating the interactor by slowly unveiling a more complicated narrative, which also connects to various side stories works well and provides a promising model for structuring an interactive narration. The game also makes good use of the unique hardware of the Nintendo DS game console, which has two screens in a clamshell design. Navigation and interaction is done on the touch-sensitive screen of the console, while the other screen provides additional views. Dialogs and cut scenes profit the most from this setup, as the game makes frequent use of the cinematic technique of the split screen, which puts dialog partners or remote events into distinct parts of the screen.

Left 4 Dead (2008) casts the interactor in the role of one of four lone survivors in a gruesome world in which all other humans have been infected by a virus and become zombie-like creatures. The designers of *Left 4 Dead* appliy two design strategies: cooperative play and “procedural narrative”. Cooperative play (with the other three survivors, which can either be controlled by other players or by an in-game AI) replaces the singular focus on goal achievement with a more balanced experience that requires cooperative behavior. This added dimension deepens the immersion in the game. With the term procedural narrative the designers of the game refer to a drama-manager like function that is based on a model of player behavior and her comfort level in a given situation. From this perspective, narrative is understood as a more varied way of challenging the player than a simple difficulty level according to developer Gabe Newell:

> To achieve a sense of story you need there to be some notion of intentionality on your opponents’ part. This is entirely different from a difficulty level which just ramps up to a constant level. […] They want peaks and valleys and really big reactions to the choices that they make. (Newell, 2008)

The “Director AI” in the game creates dramatic moments by controlling the onslaught of evil creatures and uses information about game events to create subsequent narrative sequences:

> We look at sequences of events and try to take what their actions are to generate new sequences. If [the players have been] particularly challenged by one kind of creature then we can use that information to make decisions about how we use that creature in subsequent encounters. This is what makes procedural narrative more of a story-telling device than, say, a simple difficulty mechanism. (Newell, 2008)

While limited in its focus on the stress-level of interactors, and not the emotional immersion of the players, the design strategy of "procedural narrative" is a promising avenue for narrative games and other IDN artifacts.

2.11 Works extending across IDN traditions

The overview would not be complete without two examples of IDN, which cross the boundaries of established IDN camps. These artifacts consciously apply "foreign" design conventions and strategies. Adam Cadre's IF *Photopia* (1998) is a work that presents interleaving narrative strands of the events leading up to a car accident, the exploration of an alien planet and a surreal world in which the interactor can fly. However, there are no puzzles, in the sense of obstacles in the interactor's exploration of the narrative, a feature that Montfort (2003a) understands as essential for IF. *Photopia* is therfore a hybrid between IF and HF, a segmented narrative in which standard IF commands such as "go north" are substituted for hyperlinks.

Natalie Bookchin's piece, *The Intruder* (1999) turns a short story by Jorge Luis Borges into an IDN by offering the narrative as a reward of playing several rudimentary video games. Consecutive pieces of the narrative in the form of scrolling text with voiceover appear as the interactor is playing sections that evoke classic computer games like *Pong* or *Space Invaders*. Both Cadre's and Bookchin's design strategies of combining different forms provide an interesting perspective for future experiments.

2.12 Summary: Design Strategies in IDN Space

This overview describes a wealth of design strategies, including patterns of narrative segmentation and interaction, which have been applied in IDN space. Some of these strategies are shared across different traditions like narrative segmentation based on space or time. For example, the spatial segmentation in *The Last Express* (different train cars) is similar to *Zork's* room-based segmentation. In other cases, concepts have been modified and further developed. For example in *The Last Express* the game's designers have taken the concept of temporality as used in *The Rise of the Dragon* and enhanced it considerably to make the experience more engaging for the interactor and prevent repetition in re-plays. Similarly, *Hotel Dusk's* temporal episodes are a variant of the chapters in *The Last Express* and the interaction with objects in the *Monkey Island* series is a continuation of the object-oriented approach pioneered by IF works. As previously mentioned, the dog companion in *Fable 2* reflects and extends the same strategy to create empathy in Infocom's IF *Planetfall* (1983).

Several strategies have been invented to circumvent problems created to successfully script the interactor and create appropriate patterns of interaction and channel expectations. For example, by giving the interactor a particular role, she is invited to behave accordingly. This strategy has been successful since *Eliza.* The design strategy of a confined space of the narrative like a train, a plane, or a ship, or a castle helps an interactor to accept limited freedom of movement and restricted possibilities.

These examples expose a rich resource contained in a space shared b different traditions in IDN that can tapped for future experiments and continuous development. Especially promising is a combination of design strategies across different strands, for example the combination of HF structures with temporal constraints as provided in *The Last Express* and the immersive 3D environment of *Left 4 Dead*. Similarly, IC's default play strategy or Disney's methods for coercing interactors to return to a major narrative path could be applied to prevent boredom and disorientation in complex HF narratives.

CHAPTER 3

THEORETICAL ASPECTS OF IDN

Interactive digital narrative (IDN) in its many incarnations as interactive drama, hyperfiction literature, interactive fiction and other variants, heralds not only a change in the technology of representation, and in the opportunities for artistic expression, but also a challenge to existing concepts in narrative theory, such as the role of the author and the concept of a single unified plot. So far, these challenges have been approached by modifications to established theories. A first milestone was set by Brenda Laurel's re-working of Aristotle's Poetics based on an understanding of digital interactive narrative as similar to the stage play (Laurel, 1986, 1991). Laurel's theoretical approach was used as the basis for practical experiments by Carnegie Mellon's OZ group under Joseph Bates, which eventually led to the first fully realized interactive drama, Michael Mateas' and Andrew Stern's *Façade* (Mateas & Stern, 2005a) Similarly, a post-structuralist approach based on the ideas of Jacques Derrida (1982), Michel Foucault (1972, 1977), Roland Barthes (1973, 1974, 1979), Umberto Eco (1984, 1997), Jean Baudrillard (1983, 1987, 1993), and Jacques Lacan (1977) led to Hyperfiction works like Michael Joyce's *Afternoon* (1991) and Shelley Jackson's *Patchwork Girl* (1995). A third approach has drawn on non-literary and non-western concepts of narrative – for example African aboriginal or diasporic oral narrative traditions – as a theoretical basis of IDN. Pamela Jennings' work *The book of ruins and desire* (1996b) and Fox Harrell's GRIOT system (2007) implement this approach. Finally, an approach based on narratology as devised by Barthes (1975, 1977) and Claude Bremond (1980) and further developed by Gerald

Prince (1982, 1987, 2003), Gerard Genette (1980, 1983), Seymour Chapman (1980), and Mieke Bal (1997) is proposed by Nick Montfort (2003a, 2003b) for IF and by Marie-Laure Ryan (2005, 2006) as a general model for IDN.

To start with any established theory of narrative has clear advantages. Terms, categories, and methods of analysis already well understood can be used to analyze and describe phenomena in interactive digital narrative. On the other hand, analyzing interactive digital narrative within the frameworks of theories created to describe narrative in traditional media carries the danger of misunderstanding or underestimating the nature of the change. For example, once we understand interactive digital narrative to be similar to the ancient Greek stage play we can become entrapped in this analogy and overly wedded to the framework of Aristotel's *Poetics*. Consequently, aspects that do not fit that particular frame of reference (for example digital media's capacity for an encyclopedic treatment of a given topic vs. Aristotle's notion of a complete action that only includes necessary elements) might be misunderstood as minor or even excluded altogether, thus limiting our ability to fully capture the potential of IDN.

An adequate theory of digital interactive narrative should avoid these theoretical pitfalls. In this chapter I will review several existing theories of interactive digital narrative and analyze specific limitations of each of these approaches. The overall project of this review should not be misunderstood as an attempt to fault existing approaches or belittle their contribution, but rather draw attention to limitations in the underlying legacy frameworks and thus provide the basis for an effort to overcome these limitations. In this regard, I propose a more adequate framework as a step towards a fully developed theory of IDN in this chapter.

3.1 An Initial Approach towards IDN

The analysis in this chapter is guided by a framework provided by earlier and contemporary work in the understanding of computers as digital media (Laurel, 1991), the affordances and phenomenological qualities of digital media (Murray, 1997), and aspects of the experience and the design of IDN (Murray, 1997, forthcoming) and narrative (Herman, 2002). This approach takes narrative as a cognitive structure and understands digital media as separate and distinct from legacy media such as the printed page, film, or electronic media. Additionally, digital media is understood to have specific affordances, which consequently make IDN a form of expression that tightly integrates interactivity and narrative.

3.1.1 IDN as a form of Expression in Digital Media

Brenda Laurel (2001) first recognized the computers as a distinct "interactive, representational medium". On this basis Janet Murray develops a descriptive framework for digital media consisting of affordances (procedural, participatory, spatial, and encyclopedic), phenomenological qualities, and a definition of the resulting experience (Murray, 1997).

Murray understands the computer's ability to "execute a set of rules" (p. 71) and to be an engine that runs instructions as the *procedural* affordance. The *participatory* affordance captures the computer's ability to react to user input, and respond in a predictable manner, which Murray considers as the "primary representational property" (p. 74) of the computer. For Murray, the procedural and participatory affordances are the main defining categories for digital media from which all other aspects derive. The *spatial* affordance denotes the ability of computers to represent space and allow a user to traverse this representation on the computer. The *encyclopedic* affordance is Murray's term for the computer's ability to handle huge amounts of data. Murray understands this last affordance to be more a "difference of degree than of kind" (p. 83), but considers it essential in terms of its potential for new forms of narration that incorporate lengthy plots and different perspectives.

Murray then defines the phenomenological categories of *agency, immersion*, and *transformation* to constitute the aesthetics of digital media. She sees *agency* as the experience a user gains by "making something happen in a dynamically responsive world" (Murray, forthcoming) if the digital artifact reacts in a coherent and predictable manner and provides the user with "clear and immediate feedback on the result of their actions" (Murray, forthcoming). *Immersion* is the ability of a digital artifact to hold our interest, and minimize distraction by offering an experience that feels "expansive, detailed, and complete" (Murray, forthcoming).

The resulting experience, Murray notes, would be *transformative* in the sense of a kaleidoscope. A digital artifact that enables and allows for changing arrangements and different perspectives within the same environment would be an example of this "kaleidoscopic" principle:

> Kaleidoscopic design would allow us to see how small elements combine into a larger system, to explore the possibilities of variations in components and in the rules of assembly. It would help us to better capture the complexity of systems that are currently beyond our grasp (Murray, forthcoming).

Based on Murray's understanding of agency as integral to digital media, the compound "interactive narrative" is perhaps misleading, since it can be misunderstood in a way that takes interactivity as an "added feature" for narrative. On the contrary, the perspective taken here understands interactivity and narrativity as inseparable and integral to the emerging expressive form of IDN.

3.1.2 A Definition of Narrative For IDN

During the 20th century, several attempts have been made at an exhaustive definition of narrative. In order to find an adequate definition of narrative for IDN and avoid the danger of being wedded to assumptions based on narrative in legacy media, these definitions will be reviewed form the perspective of the affordances of digital media.

Gerald Prince defines narrative as involving the representation of at least two events, connected in a temporal sequence: “the representation of at least two real or fictive events in a time sequence, neither of which presupposes or entails the other" (Prince, 1982, p. 4). He later augments this definition to allow single events and include both the functions of narrator and audience, although he suggest these roles can sometimes only be inferred, and are not explicitly assigned in every narrative:

> the recounting […] of one or more real or fictitious events communicated by one, two or several (more or less overt) narrators to one, two or several (more or less overt) narrates. (Prince, 2003, p. 58)

Prince’s definition leaves room for the procedural quality in the process of recounting but does not include the participatory element in digital media. The role of the narrator in this definition makes the “narrates” passive receivers of the narrative. This stance is not compatible with Murray’s participatory affordance and the concept of agency, since one cannot have agency in the passive role of a reader or a spectator. This does not mean to say that reading a novel or viewing a movie are not active mental activities. However, neither of these activities offer and include the ability to make meaningful changes in the course of the narration, which is the requirement for agency. Similarly, Jeremy Hawthorn's definition of narrative theory as "concerned only with the issue of how the events which make up this particular story are narrated" (Hawthorn, 1992, p. 130) implies a narrator ("are narrated") and is consequently problematic for participation and agency.

Gérard Genette's basic definition emphasizes a change of state:

> […] an action or an event, even a single one […] because there is a transformation, a transition from an earlier to a later and resultant state" (Genette 1983, p. 18).

While this initial definition could work for IDN, Genette also emphasizes the act of narration and the temporal location of narrative in the form of a story:

> I can very well tell a story without specifying the place where it happens […] nevertheless, it is almost impossible for me not to locate the story in time with respect to my narrating act, since I must necessarily tell the story in a present, past, or future sense. (p. 215)

This assumption is challenged in IDN, since the "narrating act" is transformed into an act of creating and designing an environment ("designing act") that lets the user experience a narrative by participating in it ("participating act"). Furthermore, the procedural quality of digital media complicates the temporal relationship Genette refers to – in digital media, the location in time of a narrative can change constantly.

David Herman (Herman, 2000, 2002) augments narrative theory with additional aspects drawn from "recent developments in language theory, the philosophy of action, and cognitive science." (Herman, 2002, p. 27) In particular, Herman is concerned with "Story Logic", which he considers to be an alternative to mathematical logic and a basic cognitive function. In this way he distinguishes between narrative microdesign (for example the role of verb semantics) and macrodesign, which is concerned with aspects of "storyworlds" (his term for the cognitive structure evoked to comprehend narratives). Overall Herman describes narrative as a cognitive structure that can result from different coding strategies and forms, a position echoed by Marie-Laure Ryan (2006). In this vein, Herman defines narrative as a "forgiving, flexible cognitive frame for constructing, communicating, and reconstructing mentally projected worlds." (Herman, 2002, p. 49) This definition de-couples narrative from specific forms or media and opens up the space for experiments IDN. It also removes the requirement for specific roles of narrator and narratee and is therefore compatible with Murray's framework of affordances. Consequently, Herman's definition will serve to define narrative in my basic theoretical framework for IDN.

3.2 Earlier Approaches

This basic framework for IDN will now serve as a toolset to review earlier approaches towards IDN. Specifically, the review will foreground the limitations embedded in legacy theoretical frameworks in regards to the affordances and experiential qualities of IDN.

3.2.1 The Poetics as a Model

Brenda Laurel's 1986 dissertation and 1991 book *Computers as Theater* are foundational milestones for the theoretical discourse on IDN and the basis of important practical experiments. Laurel introduces the idea that computers can be used to create a form of interactive entertainment, which could rival the depth and impact of traditional drama. Her theoretical framework adapts key concepts from Aristotle's Poetics and combines them with an enhanced model of Freytag's dramatic triangle (1863).

Aristotle describes drama in the *Poetics* (written 350 BC) as a mode of mimesis, which is using the medium of "rhythm, tune, and metre" (Butcher, 1922, p. 1) (language, melody, and rhythm) and the representational mode of a stage play. He defines the dramatic form of tragedy in terms of structure ("complete, and of a certain magnitude"); content ("language embellished"), parts ("separate parts of the play"), representation ("in the form of action"), means ("pity and fear") and goal ("purgation of these emotions.") (p. 7). Aristotle then identifies the six elements of the tragedy as plot, character, thought, diction, melody, and spectacle. Aristotle understands tragedy to be driven by actions represented in the plot and considers characters to be of lesser importance. The plot itself has to be self-contained with a "beginning, a middle, and an end." (p. 8) The dramatic actions contained in the plot have to be causally related according to "the law of probability or necessity."(p. 10) Additionally, the plot must have the right length or "magnitude" (p. 7)– long enough to present a complete change of fortune from good to bad (or the reverse) and short enough so it can still be grasped by the audience: "a length which can be easily embraced by the memory" (p. 7).

Laurel's model is based on two major concepts taken from the *Poetics* – first, that Aristotle's six elements of drama (Action, Character, Thought, Language, Melody, Spectacle)[35] are related by causal chains, and second that human-computer interaction should be understood as a complete action in the sense of the treatment of plot in the Poetics, including the notion of climax as the moment when dramatic probability becomes necessity. The first concept entails a hierarchical system of the elements of interactive drama, in which each element in ascending order provides the material for the

[35] The translation of the *Poetics* used by Laurel differs from Butcher's translation quoted earlier.

next level and each element in descending order continuously re-forms and shapes the next one (see Figure 16).

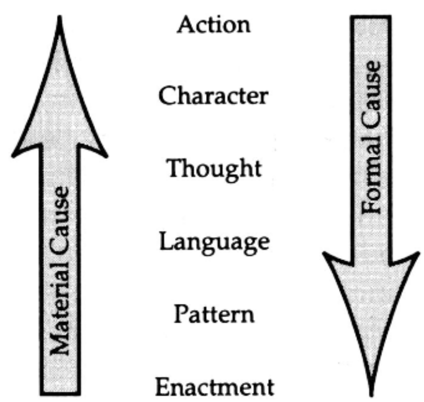

Figure 16. (Laurel, 1993, p. 51) The qualitative elements of structure

For Laurel this arrangement provides a blueprint for understanding and creating interactive drama:

> Following the causal relations through as one creates or analyzes a drama [reveals] ways in which things should work or exactly how they have gone awry. (Laurel, 1993, p.49)

The second concept aligns the plot in interactive drama (as a specific form of human-computer interaction) with the complete and well-formed action/plot in the Poetics.

The structure of the plot in Laurel's model is a story graph based on Freytag's triangle, a way to analyze and graph a drama in the form of a diagram with raising and falling action over time, culminating in the climax at the peak of the triangle.

Laurel defines the role of the user in interactive drama as an actor who influences the events and the outcome by her actions. The central part of the proposed architecture for interactive drama is an expert system, the Playwright, which observes and directs the computer-based characters, but must also incorporate the actions of the human participant into a coherent and “pleasing dramatic whole” (p. 135) by using the chain of formal causality to shape the plot.

Laurel’s choice of Aristotelian Poetics as the main theoretical model for human-computer activity has clear pragmatic advantages, as it provides her with a set of well-understood terms for the description of human-computer interaction and interactive drama at a time when both of these fields of inquiry were still in a nascent stage.

Laurel’s approach has proven to be fruitful as the basis of further research in interactive drama, especially in the experiments of Carnegie Mellon’s Oz group and later in the work of Michael Mateas and Andrew Stern, which resulted in the first fully realized interactive drama *Façade* (Mateas & Stern, 2003). Laurel’s theoretical concepts have been the starting points for much continued research. For example, her concept of the Playwright has led to the development of sophisticated drama managers, and her model of Frytag-style story graph provided a basis for computational representations of plot.

However, the Aristotelian notion of a complete action causes severe limitations for user-driven interactive development of the plot. Laurel very well comprehends the difference between a linear script and the procedural nature of a computer program: “[…] programs are not intrinsically linear in form, while scripts generally are.”(Laurel, 1993, p. 45) Additionally, she understands agency based on participation to be a major differentiating factor between stage play and interactive drama. To this end, she notes “programs can cause different things to happen depending upon the actions of their users."(p. 45). Yet, within a framework based in legacy media, she can only see these affordances of digital media as problematic and consequently warns against the potential for dynamic change in the structure of the plot: "introducing new potential, especially 'late in the game' [can] explode the structure of the action" (p. 73). To prevent this explosion, Laurel argues, designers of interactive drama need to "indirectly guide what people think of doing" (p. 73). In other words: Laurel's notion of plot based on the Poetics is linear. As a consequence, drama management in interactive narrative becomes an exercise in mapping dynamic interaction onto an inherently linear story graph and is thus limiting agency instead of embracing the possibilities of even late dynamic changes in digital media, and considering strategies of how to make good use of this characteristic. While Laurel's work was groundbreaking when it was developed, more than twenty years later, it constitutes a needless limitation regarding the full exploration of the potential of digital media. Indeed, Laurel herself embraces further developments by tacitly correcting her model in the second edition of her book (Laurel 1993), when she modifies her position on the importance of formal structure. At this time, she describes human-computer activity as moving from the concrete artifact "artifactual (like painting or literature)" (p. 208) to a participatory experience "ephemeral (like conversation or dancing)"(p. 208). As a consequence, she sees the focus of the designer to change from the creation of structure to the creation of evocative digital environments:

> [instead of providing] structure with pleasing emotional textures, the problem becomes one of creating an environment that evokes robust projective construction (p. 209)

This conflict inherent in Laurel's original adaptation continues with Michael Mateas' effort to reconcile Murray's model of digital media with Laurel's model of interactive drama. Mateas observes that Murray's concept of “transformation as variety, particularly in the form of the kaleidoscopic narrative that refuses closure,” poses problems for the Aristotelian ideal of “unity and intensification” (Mateas, 2004) in the dramatic plot. However, Mateas is aware of the importance of Murray’s concept and considers it necessary in order for interaction to be meaningful. To solve this conflict, Mateas defines Murray’s concept of “transformation as variety” as outside of the concrete experience of interactive drama and locates it in the cognitive sphere of reflection over several run-throughs, an “experience induced by observing and reflecting on a number of interactive experiences” (Mateas, 2004). For a concrete implementation he follows Laurel’s warning against late changes in the plot and therefore prioritizes early decisions. In this way Mateas limits the potential for agency over the development of the plot and consequently limits transformation in each individual experience. What he foregrounds instead is interactive drama that should in each experience produce a complete and well-formed plot with the associated emotional force of the ancient Greek predecessors: “once the end occurs, any particular run-through has the force of dramatic necessity.” (Mateas, 2004) Mateas’ strategy has clearly yielded impressive results in the form of *Façade* (see Mateas & Stern 2005a), an interactive drama that is capable of producing a large quantity of different plots. However, the conflict he inherits from Laurel’s model of interactive drama based on the Poetics points to limitations intrinsic in the overall project of interactivising traditional forms. In the concrete case, accommodating legacy plot structures into IDN requires a compromise that limits agency.

3.2.2 Poststructuralist Theory as a Model

Many theorists and practitioners of Hyperfiction (HF) understand IDN as either directly fulfilling or at least reacting to issues brought up in poststructuralist literary theory. Poststructuralism was established mainly by a group of French philosophers, amongst them Jacques Derrida (1982), Michel Foucault (1972, 1977), Roland Barthes (1973, 1974, 1979), Jean Baudrillard (1983, 1987, 1993), and Jacques Lacan (1977). Another important contributor was the Italian poststructuralist and semiotician Umberto Eco (1984, 1997). Their writings critique structuralism and logocentrism, a term Derrida used to refer to what he considers the fallacy of the assumption of a transparent relation between signifier and referent. More specifically, poststructuralism questions the understanding of language and texts as a stable system with clearly identifiable meaning. In the words of Terry Eagleton, poststructuralism is:

> […] a shift from seeing the poem or novel as a closed entity, equipped with definite meanings which it is the critic's task to decipher, to seeing literature as irreducibly plural, an endless play of signifiers which can never be finally nailed down to a single center, essence, or meaning (Eagleton, 1983, p. 120)

Poststructuralism – along with Deconstruction and Postmodernism – is sometimes misunderstood as denouncing any kind of stable meaning. While this view is understandable, it misinterprets the intentions of its proponents. What Poststructuralism asks for is a radical awareness of the assumptions any interpretation is based on. With regard to literature this amounts to questioning hitherto unchallenged concepts like that of the author. Barthes famously pronounced the “death of the author” (Barthes, 1977) in order to emphasize the reader’s active creation of meaning of a given text. At same time, Barthes negates not only the author’s authority in the interpretation of her work, but he also rejects the author as an important consideration in the analysis of a text. Barthes asks us to understand a text by itself, as its own solitary artifact. With the authority of the author removed, a text is open to many interpretations, yet the artifact itself remains. It is this idea of re-configuration that HF theorists and practitioners saw as one starting point for their explorations of electronic fiction.

The connection between Poststructuralism and Hyperfiction is drawn explicitly by many HF practitioners and theorists. In this vein, Jay David Bolter, co-creator (with Michael Joyce and John B. Smith) of the HF authoring software Storyspace, and an influential proponent of Hyperfiction, argues:

> […] the printed book as an ideal has been challenged by poststructuralist and postmodern theorists for decades, and now the computer provides a medium in which that theoretical challenge can be realized in practice (Bolter, 2001, p. 3)

Bolter also evokes central poststructuralist positions when he understands Hypertext as disrupting "traditional views of the author as authority and of literature as expression or as mimesis" (Bolter, 2001, p. 170). Similarly, George Landow understands HF as "reconfiguring narrative" by challenging "narrative and all literary forms based on linearity" and questioning "ideas of plot and story current since Aristotle" (Landow, 1997, p. 181).

Similarly, Stuart Moulthrop, author of the HF work *Victory Garden* (1991b), and one of the early proponents of the form, outlines a theory for a new digital literary medium by combining Barthes' concepts of poststructuralist writing (see Barthes, 1979) and Ted Nelson's vision of Xanadu (Nelson, 1981), a universal space for hypertext documents:

> [*Xanadu* is] a business plan for the development of what Barthes called "the social space of writing", a practical attempt to reconfigure literate culture. (Moulthrop, 1991)

HF works contain pieces of text (nodes, also called lexias) connected by hyperlinks. The resulting structure can be described as a map. Moulthrop, understands the predominant qualities of *nodes* and *links* to enable a poststructuralist "play play of signifiers which can never be finally nailed down to a single center, essence, or meaning" (Eagleton, 1983, 120), and result in a wide range of possible readings. Another profound change is in the active role of the user to "explore and construct links", which makes her a "co-writer" (Moulthrop, 1991), a reader freed from the dictatorship of the author as Barthes envisioned it.

HF has been successful in creating structures for narrative that go beyond traditional unisequential story structures and invite exploration by its users. Yet, the promise of realizing the poststructuralist project remains unfulfilled. It is difficult to reconcile claims of the interactor's freedom of choice and his role as a "co-writer" (Coover, 1992) with a fixed structure created by pre-determined hyperlinks. Moulthrop realizes this when he describes HF as a form making creative use of its limitations, by gesturing towards openness and by hiding the author inside the machine: "The author persists, undead presence in the literary machine, the inevitable hand that turns the time. (Moulthrop, 1991) Consequently, HF in its current form limits interaction and thus agency to an act of selection. Similarly Michael Joyce considers this form of "exploratory" HF as deficient:

> [current HF is unable to] convince even the most naïve users that they have engaged in genuine interaction resulting in alterations to their reading behavior and the story's text (Joyce 1995, p. 143)

Joyce tries to further develop HF towards "constructive hyptertext" that "aspires to its own reshaping", and provides a "structure for what does not yet exist" (p. 12).

Joyce's vision has its readers turned into "scriptors" (Barthes' term for an author without the connotations of power)[36] by inviting and providing the tools for its readers to both create and recover "oriented insertions" (Eco, 1997), or additions to the content of the fictional world of the particular HF artifact. In more concrete terms, both the map and the text of a constructive HF would change while a reader traverses them. The reader of a constructive hypertext would not only choose the order of the lexias, but her choices would also change the overall structure of the work. In this way poststructuralist theory would be realized, as any kind of singular authoritative meaning is rejected. Joyce describes the result of a reader's interaction with a constructive Hyperfiction as a contour, the "emerging surface of constructive text as it is shaped by its reading" (Joyce, 1995, 239) Contours as Joyce understands them do exist in the printed book in several forms - table of contents, indices, commentaries, motifs, and tropes. What sets HF contours apart is their malleable nature. The idea of contour is productive, and merits further research. However, Joyce's definition of constructive HF as a "structure for what does not yet exist" (p. 12) remains too vague and elusive. By his own admission his vision of HF that challenges both the authority of the author, and the underlying narrative structure of might be understood as "its own overturning." (p. 206)

The underlying problem with HF and the poststructuralist approach lies in the fact that this theory is concerned with literature and the medium of the printed page, as Bolter's definition and Coover's 1992 pronouncement of the "end of books" demonstrate. HF theory then is a concept that takes digital media as an opportunity to overcome perceived shortcomings of the printed page: "freedom from the tyranny of the line is […]

[36] Joyce here follows Jane Yellowless Douglas (1987)

possible now at last with the advent of hypertext" (Coover, 1992) This perspective does not recognize IDN as a genuine expressive form on its own, with specific affordances, but as a kind of "literature 2.0", still grounded in the framework of printed media, even though the printed page and the linear story are taken together as a negative model to overcome. As a consequence HF is mostly concerned with breaking the tyranny of the bound page by the spatial reorganization of lexias (the digital equivalent of the printed page) enabled by hyperlinks. HF practice thus fails to apply the computer's procedural capabilities beyond simple linking and some amount of conditional branching.

Additionally, HF theory understands meaning as extrinsic to any particular experience: "Meaning emerges not from a single sequence or interpretation but from the coalescence of multiple readings" (Bernstein, Joyce, & Levine, 1992). This perspective again limits agency and the resulting experience of Murray's category of transformation as a kaleidoscope, since it depends on a relocation to a cognitive process similar to the one outlined by Laurel and Mateas for interactive drama.

3.2.3 Oral narrative traditions

Several researchers (Jennings, 1996a, Nisi & Haahr 2004, Harrell, 2007) have proposed narratives outside of the realm of western literature and drama as models for IDN. Oral narrative traditions have been a focus in this area. Pamela Jennings proposes a model that combines African oral narrative traditions with Umberto Eco's concept of the Open Text (Eco, 1997) as well as other postmodern notions of immanence, indeterminacy, and iteration. Jennings starts by rejecting Laurel's Neo-Aristotelian model:

> Aristotle's Poetics is an inadequate narrative model for the creation of computer interactive art, contrary to the chapter laid down by Brenda Laurel's *Computers as Theatre*. (Jennings, 1996a, p. 347)

From Jennings' perspective, Aristotle's Poetics is problematic because it "encourages linearity and truncation of thought" (p. 347) and as such is inadequate for interactive narrative in digital media. Jennings sees digital media as an opportunity to express cyclic narratives, which do not have the "neat beginnings, middles, and ends required by Aristotelian drama" (p. 347). Instead she suggests looking at African oral storytelling as a theoretical model of cyclic narrations with numerous crises and peaks and more than one climax. Jennings points out how this tradition accommodates interaction both with the audience in the form of call and response and in terms of the narrator's reaction to the environment. Additionally, she draws several connections between African oral narrative tradition and postmodernism:

> […] openness of the work is a keystone of traditional oral storytelling, a similar openness has become a staple of postmodern art. (p. 347)
>
> [Immanence and indeterminacy] can be related both to the polyvalency of serialism and the iterative structures of African oral literature. (p. 347)

Jennings' model brings together African interactive and cyclical oral narration and aspects of postmodernism. This combination, Jennings argues, will provide an opportunity to overcome legacy narrative structures and embrace Eco's Openness by allowing interventions in a narrative from the "reader, interpreter, or performer" (p. 345). The result, Jennings hopes, will be a new kind of interactive art that allows artists to create meaningful narrative works that speak to the sensibilities of postmodern reality by closely emulating the "complex patterns of human thought, desire, and emotion." (p. 349)

Jennings' introduction of oral narrative traditions to the discussion of IDN is significant. Later applications like Harrell's have proven the usefulness of this approach. However, further research is needed to determine if the interaction between a narrator and her audience bears more than surface semblance to the interaction between a user and an IDN work.

Digital media artist and researcher Fox Harrell gives a partial answer to this question when he applies concepts from *orature*, which he defines as a system of oral narrative that is grounded in "African diasporic […] traditions" (Harrell, 2007) in his GRIOT system for IDN. He points to similarities between elements of IDN and orature:

> […] architectural space, time frame, an oral equivalent to mises-en-scène, and the audience-performer relationship […] are also central in many forms of computational narrative with its virtual worlds, procedurality, and user-machine interaction. (Harrell, 2007)

Harrell then concludes that orature provides a productive concept for IDN with its "well developed philosophies of interactivity and generativity" that blends in a natural way with the "expressive affordances of computational media." (Harrell, 2007) More exactly, the architecture of his system applies several important concepts of orature such as a relationship with the audience that is both collaborative and improvisational, the structure of interaction as "call and response" (Harrell, 2007), ontologies that represent African diasporic cultural contexts, and oral performance.

The underlying strategy of this approach is to replace one particular set of references (Aristotelian Poetics and Aristotelian Logic) for narrative with another one consisting of an amalgamation of African oral narrative traditions and postmodern concepts. However, Jennings' insightful observation of a general shift of the "organization of knowledge away from the linear motif" (Jennings, 1996a, p. 345) does not turn African oral cyclic narrative structures into an adequate alternative model for IDN. While "call and response" in oral narrative is a productive concept for interaction, Harrell's positioning of orature as a complete separate system, which rejects western-style "formal boundaries of media and conventional artistic form" (Harrell, 2007) and emphasizes specific cultural factors in the form of "thematic ontologies […] related to the African diasporic contexts" (Harrell, 2007) reminds us that "call and response" in the African oral tradition is also highly structured and culturally determined. Indeed, Harrell proposes a theory of "Phantasmal Media" (Harrell, 2009), in which he proposes artistic computing practices that explicitly foreground particular subjective, cultural, and critical perspectives. Similarly, the roles of the audience on the periphery and the oral narrator as the central figure are always preserved. Both the fixed roles of narrator and audience and the specific cultural context of "call and response" in African Oral narratives are potentially limiting agency. The same cultural aspects also make Jennings' connection between African oral traditions and Eco's radical postmodern concept of the Open Text less convincing when we understand postmodernism as an attempt to enable a plurality of meanings, while the African oral tradition is embedded in a specific cultural environment that determines and restricts the space of possible meanings.

3.2.4 Narratology Applied to IDN

Marie-Laure Ryan (2001, 2005, 2006, 2008) is a scholar concerned with the application of narrative theory to IDN. To this end, she conceives of narrative as media-independent and she applies naratology to narratives beyond literature. Ryan shows that both Barthes and Bremond originally conceived narratology as transcending "discipline and media" (Ryan, 2006, p. 4). It was the later work of Prince, Genette and Chatman, she notes, that has restricted the object of narratology to literature and narrated speech acts. Yet, Gerald Prince has later modified his more restrictive definition in the first edition of the *Dictionary of Narratology* (1987), which excluded mimetic modes of narrative. Since then, narratology has been successfully applied to other media forms, for example by David Bordwell to film (1985). Also, Ryan argues, contemporary narratology now supports the concept of narrative as a basic cognitive construct (see Herman 2000), which can be evoked by different artifacts and is media-independent.

From this perspective, Ryan engages the narratology/ludology debate that centered on the argument that interactivity and narrativity are mutually exclusive. In her view, the ludologists like Espen Aarseth and Jesper Juul take Prince's original (and later modified) definition of narrative as the central tenet of narratology since it presupposes a narrator and can be denounced as not applicable to computer games as it excludes mimetic forms of narrative. Ryan’s solution to proclaimed conflict between narrative and interactivity is a distinction between two kinds of play – *paida* and *ludus*. The term *paida* describes playing games of “make-believe” (Ryan, 2005) that require participants to play a role and thus actively use their imagination. In contrast, ludus denotes engagement with games that are “played in a competitive spirit” (Ryan, 2005), for example sports games. Pure ludic experiences like the computer game *Tetris* (Pajitnov, 1985), or the board game *Go* do not qualify as narratives according to Ryan. However, computer games that invite make-believe activity – like *The Sims* (Wright, 2000) - can be described as narratives regardless of strong ludic elements. Ryan understands the combination of *paidic* and *ludic* elements as a new development enabled by digital media:

> If there is one significant contribution of digital technology to gaming, it is to have reconciled competition and make-believe, in short, to have introduced a

> narrative dimension that speaks to the imagination into games of physical skills and strategic thinking. (Ryan, 2005)

Ryan continues to develop her theory of IDN by creating a taxonomy of narrative forms. She identifies three different categories:

> […] embedded stories, represented by *Myst* and mystery-solving games, emergent stories, represented by *The Sims*, and texts with a somewhat prescripted, but variable story, represented by *Façade*, Michael Mateas' and Andrew Stern's project in interactive drama. (Ryan, 2005)

Ryan then relates this taxonomy to the overall space of "digital textuality" (Ryan, 2005), which she understands as comprised by different theoretical and practical approaches towards IDN. On one end, she sees the group of *expansionists* with avant garde concepts to challenge Aristotle and similar traditional concepts of literary form. This group she understands to denounce narrative plots "based on linearity" with a fixed sequence, a definite beginning and ending, and the "conception of unity and wholeness" (Ryan, 2005). The other group Ryan terms *traditionalists* whose goal is "the creation of narratives in which the user interacts intensively with a fictional world" (Ryan, 2005). Amongst the expansionists she counts Jennings, Memmot, and Amerika, while the traditionalist camp contains Manovich, Laurel, Mateas, and Crawford. In a more recent classification (Ryan, 2006), she describes two additional approaches – the *practical* approach that does not consider digital narrative as problematic in any way and is applied by many game designers and digital media producers. Ryan also identifies a *metaphorical* approach that tries to apply narrative to the design of human-computer interfaces.

Ryan also develops a taxonomy for types of interactivity in IDN. Here, Ryan distinguishes four categories in two contrasting pairs: of internal/external and exploratory/ontological (see p. 108). These categories are related to the location of the user (internal: the user becomes part of the virtual environment; external, she stays outside) and the influence a user has on the history of the virtual world (exploratory: the user is only visiting, cannot make changes; ontological: the user affects the history of the virtual world). Ryan then classifies specific artifacts using her taxonomy, eg. *The Sims* as external-ontological (the user is not part of the virtual world, but affects it greatly), and *Façade* as internal-ontological (the user is part of the virtual world and affects it).

Ryan's application of narratology results in a rich methodological toolkit for the analysis of IDN. Her taxonomies for stories and types of interactivity seem especially relevant for theoretical work. Ryan convincingly argues that narratology was not originally conceived to be concerned with diegetic modes of narrative only and has moved past the classical phase of being restricted to narrated speech acts. This view unmasks many of the ludologists' early claims regarding the irreconcilable nature of interactivity and narrativity as depending on a rigid and outdated interpretation of narratology. Her introduction of paida as a dimension of computer games effectively solves the ludologists' theoretical problem regarding narrative and games.

The main problem with Ryan's approach is that she takes interactivity and narrativity as contrasting entities. She understands narrative as a top-down design, and interactivity as a bottom-up design. Ryan's solution to this problem is in preserving the dichotomy by understanding IDN as comprised of "structures of choice (textual architecture)" and "modes of user involvement (types of interactivity)" (Ryan, 2006, p. 100) that need to be combined in a way that is faithful to the original narrative meaning.

This view of exclusivity on a core level, which depicts interactivity as a distraction to narrative ("interactivity is not a feature that facilitates the construction of narrative meaning" (Ryan 2006, p. 117)) is premature, given the early stage of IDN as an expressive form. So far, there is no conclusive evidence that interactivity cannot be used to evoke the cognitive structures Ryan takes to be the core meaning of narrative.

Nick Montfort concentrates his research on Interactive Fiction (IF) works such as *Zork* (Blank & Lebling, 1980) or *Planetfall* (1983). Montfort draws attention to the nonexistence of an appropriate theory for IF: "[…] there is no theory to help us understand works in the interactive fiction form directly." (Montfort, 2003a, p. 23) Consequently he proceeds to outline such a theory. Montfort sees the key to an appropriate theory in a deep understanding of the particular qualities of IF. Consequently, he points out the differences to artifacts in legacy media regarding the key narratological terms narrative and story and their definition by Gerald Prince (1987): "A work of IF is not itself a narrative, it is an interactive computer program" (Montfort, 2003a, p. 25) Similarly, he rejects Prince's narratological definition of story:

> […] interactive fiction is not a story in the sense of the things that happen in a narrative, […] "the content plane of narrative as opposed to its expression or discourse; the 'what' of a narrative as opposed to its 'how'" (Prince, 1987). [Montfort's quote] (Montfort, 2003b)

Montfort clearly establishes the differences between IF and traditional notions of narrative. However, he still considers narratology a useful framework for the analysis of IF works:

> An IF work is always related to story and narrative, since these terms are used together in narratology, even if a particular work does not have a 'story' in this ordinary sense. (Montfort, 2003a, p. 25)

Montfort's application of narratology to IF works and his earlier remarks that foreground the lack of an appropriate theory might appear to constitute a contradiction. This apparent conflict is solved by his observation that IF works are "potential literature", a term Montfort borrows from the Oulipo group and their experiments with literature based on mathematical formulas:

> Interactive fiction has the potential to produce narratives, usually as a result of the interactor typing things to effect action in the IF world." (Montfort, 2003b)

In this way, Montfort establishes a distinction between narrative and IF. The two categories are no longer mapped onto each other, but subject to a complex relationship. Montfort here identifies a key concept that provides a productive direction for future research.

3.3 Towards a Theory of IDN

Modifications of existing narrative theory have been productive in enabling practical experiments and theoretical work in IDN during the past 24 years. To continue this development the limitations of legacy theoretical frameworks described here need to be overcome. This effort is even more important given the direct influence several of these frameworks had on practical experiments, for example Laurel's model on the OZ Group and HF theory on literary hypertext. A way forward is in the development of a specific and adequate theory of IDN, based on the framework derived from Laurel, Murray, and Herman outlined earlier.

The starting point for a specific theory of IDN is a change of perspective. Instead of understanding IDN to be similar to narrative in legacy media, interactive digital narrative is taken as dissimilar. Both the material basis in digital media and the conceptual backdrop of IDN as a participatory transformational experience merit this change. This stance does not represent a departure from earlier approaches but rather a radical continuation based on more than two decades of theoretical and practical research.

In this fashion, Nick Montfort's distinction between narrative and an IF work (Montfort, 2003a) is especially productive. What is embedded in his observation is a distinction between the material artifact as a computer program and its output. This distinction is true for IF and other kinds of IDN. Another important aspect of IDN is in the relation between theses two categories. IDN assumes interaction and thus a participatory process in which a participant engages with the computer program to produce the output.

The product of an IDN work – a recording of a single "walkthrough" - might be understood as a narrative in a more traditional sense and analyzed with the tools and methods of classical narratology. However, the same theoretical framework does not account for the digital interactive system and the participatory process that result in a story.

A new theoretical framework is needed that describes all aspects of IDN and overcomes the product-centered view of legacy theoretical frameworks. The initial approach outlined earlier provides a foundation for this undertaking. However, before I can propose such a framework, the concept of instantiation needs to be examined more closely. Instantiation differentiates digital media from legacy media in many important ways, and exposes the changes regarding the status of the artifact and the role of the recipient.

3.3.1 Instantiation in Digital Media

Walter Benjamin's observation of the impact of mechanical reproduction of works of art in relation to *aura* together with Jay Bolter's examination of *aura* in film and virtual reality experiences and George Legrady's definition of *digital aura* provide a framework for understanding and defining instantiation in digital media and IDN.

Benjamin defines *aura* as a quality, which is connected to the authority of an original work. *Aura* becomes exposed as a result of advancements in technology in the 19^{th} and 20^{th} century, which enable the mechanical reproduction of artworks. His initial definition relates *aura* to an experience of nature, which combines space and time with a "distance, however close." In his 1936 essay *Das Kunstwerk im Zeitalter seiner technischen Reproduzierbarkeit*, (*The Work of Art in the Age of Mechanical*

Reproduction) Benjamin provides a further definition of *aura* as a unique existence in time and space, connected to authority and tradition:

> [Aura ist] einmaliges Dasein an dem Orte an dem es sich befindet (Benjamin, 1978, p. 11)
>
> [Aura is] a unique existence in the location it is right now
>
> […] was aber dergestalt ins Wanken gerät ist die Autorität der Sache. (p. 13)
>
> […] what begins to totter in this way, is the authority of the thing. (own translation)

What destroys or at least reduces *aura* according the Benjamin are attempts to bring works of art closer to the masses by making them available as mass produced copies. Additionally technical "intermediaries" such as the film destroys *aura*, while it is available in the live performance of the stage play.

Given Benjamin's conviction of the steady decline of *aura*, one might ask, how his concept can be applied at all to digital media, as one might expect *aura* to be long lost. Jay Bolter provides an answer to this question by arguing that technical devices like the film camera are not just neutral devices of reproduction:

> […] there is an important limit to the film camera's capacity to destroy aura. The camera remains under authorial control, that is, under the control of the director and the editor rather than the viewer (Bolter, 2008)[37]

From this perspective, film never achieved the destruction of aura Benjamin described. Bolter instead considers film to create a situation, in which aura is both destroyed and recreated:

> […] film traditions have only succeeded in achieving a condition of crisis, in which aura is both negated and reaffirmed. (Bolter 2008)

[37] My citations of this paper are from an earlier draft given to me by David Bolter.

In a similar way, Bolter understands *aura* as present in digital media. However, he is not content to leave *aura* in this unresolved state, and instead aims to make Benjamin's category productive as a "design parameter" for the artist (see Bolter 2008) In this vein, he describes *aura* as an important aspect of his own practice as a creator of new media experiences, specifically in the areas of mixed reality (MR) and augmented reality (AR):

> MR and AR experiences are not perfect reproductive technologies. Instead, they draw on the physical and cultural uniqueness, the 'here and now', of particular places. In the Oakland project, for example, we are seeking to exploit the unique character, the aura, of the cemetery. (Bolter, MacIntyre, Gandy, & Schweitzer, 2006, p. 23)

From this vantage point, Bolter re-examines Benjamin's concept and concludes if *aura* is seen as the process that makes the subject appreciate the distance to nature or art, VR and film can have *aura* by itself, even though Bolter considers this kind of *aura* second-rate. In the case of MR or AR experiences, which are located in physical environments and have *aura* by themselves, technology can create aura by building a "sense of distance-through-proximity" (p. 29) Consequently any media technology that brings the user in the "presence of the authentic" (p. 29) can conceivable enhance *aura*.

George Legrady, a digital media researcher and creator of digital installation works emphasizes the importance of Benjamin's concept from the start:

> Real-time data streams of digital images, texts, and sounds make it currently possible to trespass geographical and cultural boundaries, exponentially increasing aspects of Walter Benjamin's analysis on the nature of art production and its reception within a technologically driven society (Legrady, 1998)

Legrady is concerned with the interplay between "immaterial" digital works of art and the physical spaces of museums or galleries where they are shown. Like films, digital art works need a kind of "projector" - the computer hardware - to be experienced. Yet, Legrady sees an important difference between these experiences, as legacy media like cinema, radio, and TV are experienced in ”ritualized reception spaces” (Legrady, 1998), which do not exist for digital art installations. Legrady considers digital art work to be essentially non-auratic:

> Digital media works possess many of the attributes that release them from the conditions that Benjamin identified as giving rise to the phenomena of acquiring […] "aura" surrounding the unique artwork object. Digital based works are immaterial, they can be everywhere, they have no originals. (Legrady, 1998)

But the non-auratic nature changes, Legrady believes, as soon as they enter the “institutionalized” spaces of museums and are “[…] brought into dialogue with history and its ideological discourse” (Legrady, 1998). Legrady, similarly to Bolter, locates *aura* at the interplay between interactive digital art and the associations evoked by real spaces. Consequently, he recognizes the installation space as an important design parameter for the digital artist.

> [the] surrounding space situating the work and its reception can be left to chance, or carefully planned. In either case, it functions as a key component of the work. (Legrady, 1998)

Following Bolter and Legrady, Benjamin’s concept of aura is still very much applicable to digital media. Their definition of digital aura as concerned with the relationship between the digital art work and the associations of the surrounding real space exposes a particular quality of digital media that challenges and replaces the mechanical relationship between original and copy with a different one characterized by the production of a unique experience through an act of instantiation. Legrady’s observation that the digital artwork by itself has “none of the physical properties normally associated with commodity objects” and thus has the quality of “immateriality” (Legrady, 1998) is a first step towards this important realization. The next step is his contention that digital art only attains physical manifestations by means of computer hardware to play back the piece and the physical space in which the said hardware is placed. In other words: digital art works only acquire the status of a work of art that can have aura by being processed (or run as computer program) on a computer system located in physical space. In the case of an interactive installation, and indeed any kind of interactive digital media, this process requires the active participation by one or more members of the audience, who thusly become interactors. This concept relates digital art to object oriented programming. In this context, *instances* are understood to be objects that are derived from *classes* or object blueprint definitions consisting of characteristics (or properties) and behaviors (or methods). An instance then is an object created at run time that inherits the structures defined in the blueprint and fills the properties with concrete values. Similar to Legrady's description of the "immaterial" digital art work and its concrete manifestation by executing it on a computer in physical space the class is only manifested by means of its derived instance. We might then say that in digital media it is paradoxically the instantiated copy that attains the status of the unique artifact and not the prototypical original. This concept of instantiation marks one of the most profound changes between traditional media and digital media and needs to be reflected in a theory of IDN.

3.3.2 A New Model for IDN

A crucial step towards an adequate theory of Interactive Digital Narrative is to understand IDN works as comprised of *system*, *process*, and *product* (see Figure 17).

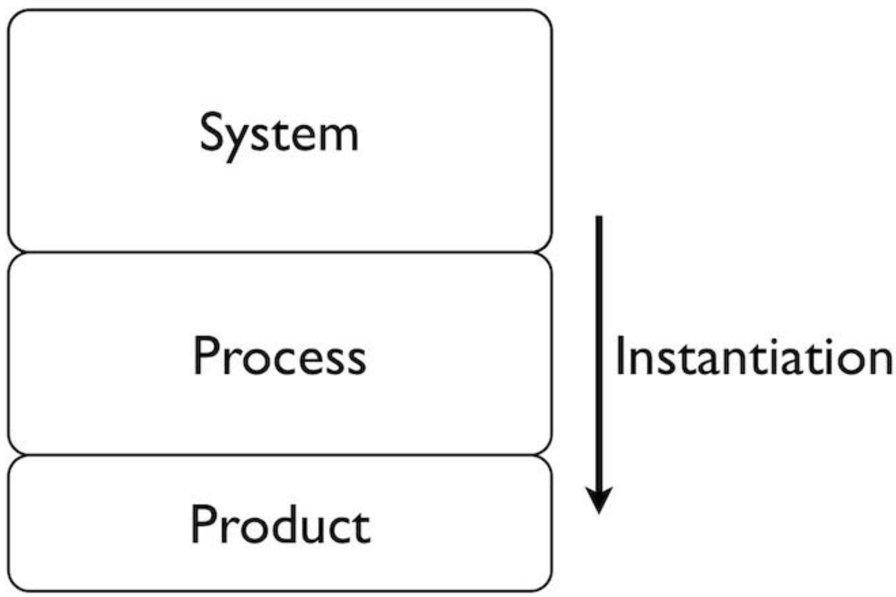

Figure 17. High-level view of IDN

This model of IDN is inspired by Roy Ascott's theory of cybernetic art (1964). He advises artists to look at the scientific discipline of cybernetics, the study of "Control and communication in animal and machine" (Wiener, 1948), and to create art inspired by cybernetics' concern with the behavior and regulation of environments, and with organizational structures. Espen Aarseth (1997) must be credited with the introduction of cybernetics to IDN. He derives his term *Cybertext* explicitly from cybernetics and describes the "cybertextual process" (Aarseth , 1997, p. 1) in which a user effects the narrative as a cybernetic feedback loop. Ascott's definition, however, provides a better basis for a theory of IDN, as he improves upon Wiener's mechanistic concept by merging it with artistic sensibility. The combination of cybernetics and art, Ascott argues, will result in a profound change in the practice and experience of art. His idea for a "cybernetic art matrix" (Ascot 1966) proposes a tight integration between art and the computer and foreshadows the importance of interaction for digital media. Furthermore, Ascott understands cybernetic art to represent a change in the artistic focus from product to process, from structure to systems and thereby turning the "observer" into a "participant" (Wheeler and Zureck, quoted in Ascott, 1990):

> When art is a form of behaviour, software predominates over hardware in the creative sphere. Process replaces product in importance, just as system supersedes structure (Ascott & Shanken, 2003, p. 157)

Many similarities exist between Ascott's definition of cybernetic art and IDN in the focus on process, the description of interaction, and the concept of the recipient as a participant. Ascott's vocabulary therefore can be used productively for the definition of a framework for IDN. I propose *System* to describe the digital artifact, as it exists on a digital storage medium combined with the hardware on which the artifact is executed. This includes the executable programming code and assets - digital representations of pictures, movie clips, sounds, and text, as well as network links to more assets on a local network or the Internet. Additionally, it also includes the connected hardware – keyboards, mice, displays, and other hardware (eg. sensors) used in a digital installation. The *system* contains "potential narratives", a term Montfort (2003b) introduces to describe IF narratives derived from Oulipo group's notion "potential literature", produced by a particular creator or several creators.

Once a user starts to engage with the *system*, a *process* is created. The actions of the user as interactor, and the opportunities provided by the *system* define and shape the *process*. The resulting *product* of interactive digital narrative represents an instantiated narrative.[38] Instantiation here describes the quality of IDN to produce very different results or narrative products from the same source (the system) through a participatory process. Each single instantiated "walkthrough" could be recorded and may be analyzed in terms of traditional narratology, as a linear narrative. While any single *product* is an integral element of any interactive digital narrative, it is important to realize that it represents only one particular instantiation that can and will change as soon as the *process* changes. In terms of theoretical analysis the *product* alone is therefore severely limited as a representation of an IDN work. A full analysis of any interactive digital narrative needs to include an examination of *process* and *system*.

From this perspective, theoretical approaches based on theories for legacy narratives are problematic since they foreground the analysis of the *product* of IDN. A potential criticism of this view is the argument that IDN's *process* represents the equivalent of the cognitive process of understanding literature and other narratives as described by the reader-response theory (Iser, 1976) and contemporary cognitive narratology (Herman, 2002). The model proposed here does indeed take the creation of meaning of a narrative in the mind of a recipient as an active process. However, potential narratives in IDN provide an additional mental plane for the participant. Not only does the participant create a mental model (or *storyworld* in Herman's terms) of the emergent

[38] Noah Wardrip-Fruin (2009) shares the concern for process, which he distinguishes from "output." However, his major interest is in describing the aesthetics of "expressive processes" (see Wardrip-Fruin, 2009) and in foregrounding the evaluation of a work based on these aesthetics.

story, she also speculates about the consequences of her own actions for the narrative, assesses her level of control, and as a result formulates and executes strategies of interaction. This additional plane is an important factor that distinguishes IDN from legacy non-interactive forms. While this plane does also exist in participatory theater, improv performances, story games, and "choose your own adventure" books, these non-digital interactive forms differ from IDN in their material basis in legacy media, and consequently do not share the same affordances as digital media.

As a result, IDN can now be defined more clearly as an expressive narrative form in digital media realized in a system containing potential narratives and experienced through a process that results in products that represent instantiated narratives.

3.3.3 Narrative, Story and Discourse in IDN

A basic tenet of 20th century narrative theory is the distinction between story/histoire/sujet (or the "what" of a narrative) and plot/discourse/fabula (or the "how" of a narrative). First introduced by Russian Formalists Vladimir Propp and Viktor Shklovsky, the idea of story as separate from its presentation has been fruitful for analyzing narrative in legacy media. A continuous story could then be understood as presented by means of a discontinuous plot. While this dichotomy still forms the basis of contemporary narratology, it has been criticized especially in regards to the hierarchical relationship between the two terms by poststructuralists like (see Culler, 1981) and redefined in terms of the concrete relationship[39].

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[39] E.g. Richard Walsh (2001) proposes to reverse the hierarchical relationship and understand *sujet* as the main category from which *fabula* is understood.

Marie-Laurie Ryan as part of her work on a media-independent narrative theory, understands narrative as comprised of story as the “cognitive representation” and narrative discourse as the “representation encoded in material signs” (Ryan, 2006, p. 7). Yet from her perspective, the two categories cannot be productively understood as separate. Instead, she effectively collapses them by equating narrative with story and proposing to understand “narrativity (or ‘storiness’)” as a fuzzy “scalar property” defined by a set of interrelated categories (p. 7).

Ryan’s understanding of story and discourse as interdependent and inseparable provides a perspective that avoids some of the problems that would otherwise appear in relation to IDN. In a procedural environment that invites and indeed requires a participatory process, both the story and the discourse are subject to change in each particular instantiation. The notion of “realized narrative” in this thesis as the result of one run-through of an IDN work is consistent with Ryan’s compound of narrativity and storyness.

Yet, even Ryan’s definitions of story as cognitive representation and narrative discourse as the concrete encoding in material signs do not fully account for the changeable nature of narrative in IDN, as both terms presuppose a fixed state of the objects to be analyzed. For example, in Sara Coopers’s *Reliving Last Night* (RLN) (2001), the interactor explores several related choices of a young woman, which change the course of a night filled with encounters of a former and a prospective boyfriend. The interactor’s choices do not change a particular pre-existing story, but rather assemble a story from pre-made elements. In Mateas & Stern,’s *Façade* (see 2005a), the relationship is even more complicated as the selection of story elements is carried out by the drama manager AI, which considers both an internal plan, and the input received from the interactor. Consequently, in IDN, the state of story changes from a fixed cognitive representation to a dynamic cognitive construction. The interaction also affects the discourse (as the representation encoded in material signs) in the form of different video clips presented to the participant and in different branching points depending on a particular path taken in *RLN.* Similarly, in the case of *Façade*, the interactor influences the representation by means of her utterances and her avatar's actions. This dynamic nature of IDN puts the applicability of the story/discourse terminology into question.

3.3.4 Protostory, Narrative Design, And Narrative Vectors

Given the flexible and malleable quality of IDN afforded by procedurality and participation, neither story nor plot/discourse can adequately describe an IDN work, as the fixed story (or "content plane of narrative" in Prince's terms) of legacy media gives way to a space containing potential narratives. At the same time, plot/discourse as the fixed material manifestation gives way to a flexible presentation of narratives while they are being realized. Additionally, a neat distinction between the two categories is no longer possible, since the IDN *system* contains and encodes aspects of story and discourse by supplying both content and structures of the concrete expression. These aspects need to be reflected in terminology to adequately describe IDN.

I propose the term *protostory* to describe the concrete content of an IDN *system* as a space of potential narratives. Any realized narrative experience is related to the respective *protostory* through a process of instantiation. The term *protostory* is derived not from the classical model of object oriented programming with static classes, but based on the concept of prototype-based programming (sometimes also called instance-based programming). In this variant, not only the content (as with classes), but also the behavior and structures of the equivalent structures (called prototypes) can be changed at runtime (see Noble, Taivalsaari, Moore, 1999).

This flexible model more adequately describes the flexible relationship between an IDN system and a particular realized narrative and clearly distinguishes it from any kind of mechanical reproduction that produces the same copy every time. The *protostory* then is a prototype, or a procedural blueprint, that describes the space of potential narrative experiences contained in one IDN system. However, *protostory* is more than just a computer program, as the term encompasses not only the concrete programming code and interactive interfaces, but also the artistic intent that enables a participatory process of instantiation that results in the realization of potential narratives.

The concept of plot as separate from protostory is problematic given the compound nature of potential narratives, which contain both structure and content. Instead, I propose the term *narrative design*[40] to describe the structure within a protostory that contains and enables a flexible presentation of a narrative. This includes the segmentation and the sequencing of elements and the connections between them. Additionally, the procedural logic applied in the presentation of elements is part of the *narrative design* (see Figure 18).

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[40] In contrast, Michael Mateas uses the same term to describe narrative segmentation (see Mateas & Stern 2003).

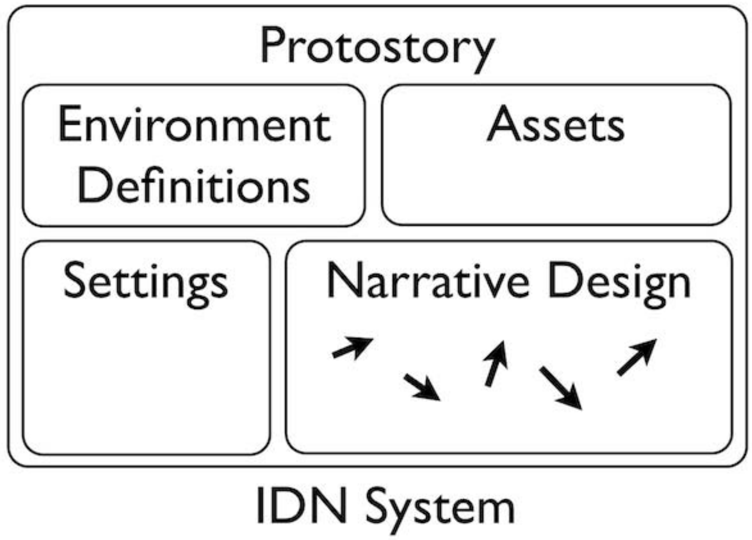

Figure 18. Protostory and Narrative Design

The term *narrative vectors* describe sub-structures in a narrative design that provide a specific direction for the narrative. Narrative vectors work not as isolated structures, but rather in connection to the preceding and the following parts of the narrative. The purpose of such structures is to convey important aspects to the interactor, to prevent an interactor from getting lost and to help to retain a level of authorial control. For example in a IDN murder mystery, a narrative vector could be the occurrence of a murder or the disappearance of an important victim, and also a breakdown of the interactor's car that prevents her from leaving the crime scene before all clues are gathered. Narrative vectors are roughly functional equivalents to the term plot points in legacy media (see Field, 1988). The term plot point has been used to describe positions within a story that are created by the author in order to propel the narrative experience forward.

3.3.5 New Terminology Applied: **Afternoon** ***And*** **Façade**

As a next step I will test this new terminology by applying it to two disparate examples. In Michael Joyce's *Afternoon* (Joyce, 1991), the *protostory* is the space of all lexias and hyperlinks together with the possible paths an interactor can take and the author's artistic intend to let the interactor experience a fragmented narrative of a psychotic state. An interactor instantiates a particular realized narrative by reading lexias and following hyperlinks. The *narrative design* in *Afternoon* describes the segmentation of lexias as well as the hyperlinks connecting them and the guard fields that generate conditional links. *Narrative vectors* in *Afternoon* are combinations of lexias and links that are designed to create specific experiences, for example the re-visiting of a particular lexia after the interactor has gathered additional knowledge (see Figure 19).

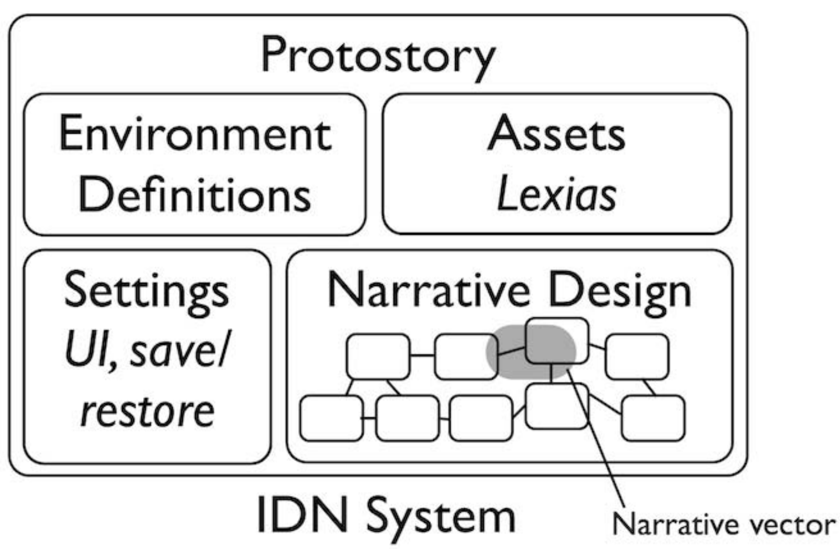

Figure 19. Protostory, narrative design, and narrative vectors in *Afternoon*

Mateas' and Stern's work *Façade* (see Mateas & Stern, 2005a) applies sophisticated artificial intelligence to create a richly varied range of narrative possibilities. The *protostory* in *Façade* is the space of possible stories described by the contents of the beats narrative units, the drama manager's restrictions and goals and the artist's intent to let the interactor experience a marriage falling apart and attempt to save it. By communicating with Grace and Trip, the two other characters in *Façade*, and by moving within the space of their apartment, an interactor instantiates a realized narrative, which could for example lead to the couple breaking up or throwing the interactor out.

The narrative design in *Façade* is in the different beats, the concept of a story arc and pre-authored goals. Narrative vectors are formed by the drama manager component as a result of the interactor's input in by consulting pre-authored goals and distinct phases in the story arc. Narrative vectors in Façade determine if an interactor is kicked out or if she reaches the therapy part in which Grace and Trip are able to rescue their marriage.

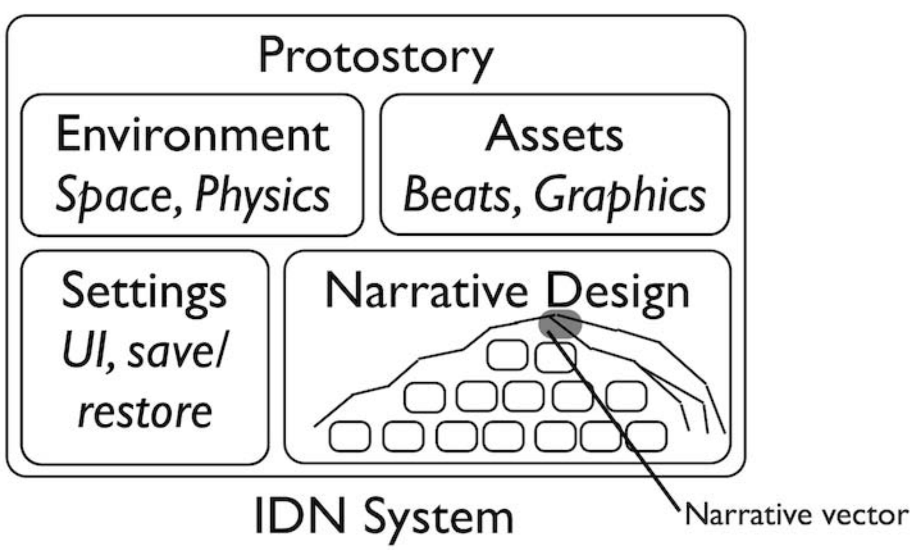

Figure 20. Protostory, narrative design, and narrative vectors in *Façade*

Understanding the two works in this way facilitates the exploration of questions about the content of an IDN work outside of the narrative design, which so far has been mostly overlooked. For *Afternoon,* the aesthetics and participatory possibilities provided by the Storyspace authoring system and its playback component will be analyzed as environment definitions and settings. For *Façade*, the virtual space of the couple's apartment and the possibilities afforded by the physics engine become an integral part of the examination of the protostory and allow a more complete understanding of the work.

In both examples, the narrative design is a complete structure comprised of narrative vectors, which enables a classification independently of legacy story structures – *Afternoon* no longer has to be understood as rhizomic and *Façade* can be classified independently of legacy dramatic structures. Additionally, narrative vectors comprised of lexias and links or the combination of the drama manager and specific beats allow us to examine the particular narrative strategies of *Afternoon* and *Façade.*

3.4 The Object of IDN

As IDN breaks with the legacy of narrative regarding story and plot, we can also expect another part of the tradition to be challenged: the object of narrative. Traditionally, narratives are defined as either plot-driven or character-driven. Aristotle considered the action/plot as the more important part and saw the characters as helping the plot along. Standard Hollywood screenwriting has reversed this relationship – in the typical Hollywood movie, characters take center stage. In both cases, there is a clear object of the narrative – either the plot as dramatic action or a protagonist. Different media forms so far have added specific aspects to the style of narration, but not challenged the need for an object. In this way, the serial novel in the newspaper brought about episodic narratives which were both self contained in each episode and embedded in a larger narrative, while drama added the aspect of performance and film contributed montage and a temporal aspect.

A direct object is often assumed to be necessary for any kind of artistic expression. However, a look at the field of visual art shatters this assumed certainty. With the advent of abstract art in the paintings of Wladimir Kandinsky and also in the works of the Russian Suprematists, a radical change occurred, which eliminated the necessity for a direct object. While an abstract narrative is hard to imagine, another movement in the field of art is more applicable to IDN. Cybernetic art is interested in depicting and exposing systems (in the cybernetic sense) and processes instead of static objects (see Ascott, 1964)

While it can be argued that traditional narratives are also concerned with processes – the development of a storyline, or the changes in the characters depicted in the narrative – these processes are "products" in Ascott's terms, or entities that cannot be changed, once the artifact is finished. Ascott instead envisions a work of art that can change, that does not have an established structure, but rather embeds a system a participant can change.

Many installation pieces fall in this second category, but also kinetic art works and software art. Works in this particular genre are made to expose the workings not of a static object, but of a complex system, which might be either self-contained or require the intervention of an interactor.

Similarly, IDN offers the means to depict a radically different object. Instead of being mainly about character or plot, IDN holds the promise of presenting aspects of postmodern society differently than traditional linear media. Chiefly amongst these would be the depiction of consequences of even the tiniest decisions in the complex system of real life. Letting an interactor experience consequences of decisions she has made herself is already powerful on its own. By allowing the interactor to experience transformation as variety as part of the process of interacting with a protostory and by combining agency with the awareness of different consequences, IDN can offer compelling experiences not available in any other medium. This radical change might be best expressed by associating traditional narratives and IDN with answers to different questions. While traditional narratives answers questions like “How did this happen?” or “How will this character develop?” or “Will the protagonist succeed in this challenge?”, IDN can aswer questions in terms of consequences of actions like “What will happen next if I make this decision?” or “How will the overall outcome change if I go this route” or even “What can I do here?” and “What are the rules of this particular experience?”

E. M. Forster understands the essential quality of any kind of story to be the desire of wanting to know what will happens next, a wish driven by a deeply engrained “primeval curiosity” (Forster, 1963, p. 45). IDN takes this desire to the next level by offering agency over “what happens next” within the framework set by a particular *protostory* and the *narrative design* expressed in *narrative vectors* it contains. The promise of IDN is to combine the pleasure of finding out with the pleasure of agency. By testing the limits of a given *protostory* and discovering the *narrative vectors* embedded in it an interactor experiences this pleasure.

3.5 Kaleidoscopic Narrative Design Replaces the Narrator Function

Many proponents of classical narratology (see Genette, 1980, Prince, 1982, Hawthorn, 1992), assume a narrator function as a given in narrative. While not impossible per se, a stringent narrator will be hard to implement in a form that gives full agency to an interactor. Janet Murray's concept of "kaleidoscopic design" (Murray, forthcoming) outlines a solution to this problem. She defines kaleidoscopic design as a way to see how:

> small elements combine into a larger system, to explore the possibilities of variations in components and in the rules of assembly (Murray, forthcoming).

In IDN this kind of design substitutes for the narrator function. *Narrative design* therefore has a dual function in IDN, both as an equivalent to plot, and as the substitute for the narrator function in legacy narrative. To mark this second function, I will use the term "kaleidoscopic narrative design". *Kaleidoscopic narrative design* in *Afternoon* (Joyce, 1991) is the topic of a psychosis after seeing an accident, the structure resulting from the hyperlinks connecting the lexis, and the concrete lexias as presented to the interactor. In *Façade*, it is the "marriage on the brink of collapse" is combined with the two character's graphics, the utterances recognized by the system and the beats fired by the drama manager in accordance to the position on the narrative arc.

In IDN, it is the interactor who assumes the role of the narrator. Instead of becoming the co-creator of HF theory, the interactor assumes a lesser role of a "second order creator" who can tell of her experiences within an IDN, and a particular instantiation of a *protostory* by means of a traditional narrative. The result is a "second order story", which is not directly contained anywhere in the IDN, but rather a product of the narrative design and a first-person experience of a given IDN work.

With the addition of the term kaleidoscopic narrative design, the theoretical framework for IDN can now be compared to legacy narrative terminology. Table 1 shows the new terms in comparison to legacy narrative terminology in several categories. What is left to do in this chapter is to define this relationship more concretely.

Table 1. Comparison of legacy narrative and IDN

Category	**Legacy Narrative**	**Interactive Digital Narrative**
Narrative entity	Story	Protostory
Narrative presentation	Plot	Narrative design/Narrative vectors
Composition	Fixed	Procedural
Participation	Only in the reception	Instantiating potential narratives
Size	Limited by practical factors (e.g. page count)	Encyclopedic (no practical limit)
Mode of exploration	Linear	Spatial, and multi-linear
Object	Plot/Character	Plot/Character/Systems
Narrative Agent	Narrator Function	Kaleidoscopic narrative design

3.6 Legacy Narrative and IDN - A Relationship of Influence and Translation

So far, I have been adamant in establishing IDN as distinct from legacy forms of narrative. However, the view of IDN as a separate form of expression does not deny the substantial influence of legacy forms. The question is not if this relationship exists, but how it can be understood in a productive way that recognizes the independence of IDN. A key to this reformulation is an understanding of earlier narrative works that push the limits of legacy media as precursors to IDN. However, these works do not transfer directly to digital media. Attempts to do so fail to take the specific affordances of digital media into account. Instead, legacy narrative forms provide tropes and narrative strategies, which IDN authors can apply. This indirect relationship between legacy narrative forms and IDN is best described as one of influence and thus mirrors similar relationships across literary genres and legacy media forms.

3.6.1 Cross-genre influences in literature

In the field of literature, influences exist between different literary genres, for example between the epistolary novel and contemporary literary forms. Introduced in the 15th century, the epistolary novel, a form of narrative by means of a series of fictitious documents became popular during the 18th century with writers throughout Europe such as Samuel Richardson (*Pamela* (1740) and *Clarissa* (1749)), Montesquieu (*Lettres persanes* 1721) Jean-Jacques Rousseau (*Julie, ou la nouvelle Héloïse* 1761), Laclos (*Les Liaisons dangereuses* 1782), and Johann Wolfgang von Goethe (*Die Leiden des jungen Werther* 1774). No longer a dominant literary genre, the epistolary novel's influences extend to contemporary E-mail novels such as Scott Rettberg's *Kind of Blue* (2002) and Ramming/Hirschler's *Scarlett und Dean* (2005).

Similarly, the influence of the Victorian novel persists in contemporary literature. This 19th century genre is characterized by a lengthy plot, a detailed presentation of the development of characters, verisimilitude in depicting the social conditions of British society of the time, and the frequent direct address to the reader. Tropes from Charles Dickens' Victorian works can be found– especially in the chapter introductions - in Alfred Döblin's *Berlin*, *Alexanderplatz* (1929), a novel about a naïve small-time criminal named Franz Biberkopf in the Berlin of the "roaring" 1920s. The more recent example of the *Harry Potter* series (1997-2007) by J.K. Rowling owes even more to tropes and narrative strategies of the Victorian and gothic tradition. Arguably Harry Potter - minus the modern inventions used in the Muggl (Human) world - could have been written in Victorian times.

3.6.2 Cross-Media Influences

Influences also extend across media and get translated in the process. In this way the new medium of film influenced literature and brought about new methods of literary narrative during the 20th century. This phenomenon can be understood as cross-media influences. For example, John Dos Passos and Alfred Döblin use the cinematic technique of Montage (see Eisenstein, 1924) developed by D. W. Griffith (*The Birth of a Nation*, 1915) and Sergej M. Eisenstein (*Battleship Potemkin*, 1925) in their novels. Dos Passos applies montage technique in *Manhattan Transfer* (1925) to portrait the bustling New York City of the early 20th century as a place full of diverse characters who try to "make it." Döblin's *Alexanderplatz* concentrates on his protagonist Franz Biberkopf to expose his naivety against the merciless multifaceted character of the big city Berlin. Both authors present a fragmented representation of reality with changes in perspective, location, and style that includes interjected newspaper clippings, and advertisements. Dos Passos is especially interested in creating a multi-voiced, polyphonic narrative of the great American city, while Döblin connects physical reality with greek mythology and biblical motives to create a more psychological and spiritual narrative that enforces the notion of the naïve, doomed common man who tries to be good, but fails. Additionally, Döblin applies cinematic techniques of framing in *Alexanderplatz* by operating a “literary camera” to create the equivalents of close-ups, pans, and long shots.

Dos Passos and Döblin are influenced by narrative methods created for a different medium. In this case of cross-media influences, however, the narrative methods are translated first and take on a different form. A section of a text in a literary narrative, which can be recognized as the equivalent of a close-up in film is the result of such a process of translation. Similarly, narrative methods from legacy media require translation in order to be used in IDN.

Janet Murray’s classification of a number of legacy media works as “Harbingers” (Murray, 1997) of IDN should be understood in this way. Therefore, Jorge Luis Borges’ 1941 short story The *Garden of Forking Paths* (1964), Frank Capra’s *It’s a Wonderful Life* (1946), and *Groundhog Day* (Albert & Ramis, 1993) exemplify methods of multi-form narrative in literature and film, but these works do not provide a blueprint on how to apply this method to IDN. Indeed, IDN works might express multi-form in very different ways. For example, a kaleidoscopic narrative design might not need repetitions, which are a necessary part for multi-form narrative in legacy media, by making the interactor aware of alternatives, and procedurally generating only the chosen path.

3.6.3 Two Cases: Vonnegut and Johnson

The definition of the relationship between legacy media forms and IDN as characterized by influence and translation opens up a productive perspective. As long as we are aware of the need for a translation process, many legacy media works can provide narrative strategies and material for IDN. This is especially true for works that push the boundaries of legacy media. To exemplify this perspective I will add works by two literary authors, Kurt Vonnegut and Uwe Johnson, to the list of harbingers and propose how their narrative strategies could be applied in IDN works.

Vonnegut's novel *Slaughterhouse Five* (1969) explores his experience of the fire bombing of the city of Dresden on February 13, 1945, and the aftermath when he - a US PoW - was ordered to remove corpses from destroyed houses. In order to narrate these horrible events, Vonnegut discards the fixed sequence of time and jumps between different stages in the life of the protagonist. The author has his readers accept the fragmented structure of the narrative and the jumps in time and place with the explanation that the protagonist has become "unstuck in time" and is therefore doomed to continuous travel between places he has visited during his life. This device also allows Vonnegut to interrupt horrifying descriptions midway and provide comic relief. Two additional perspectives - a chorus that provides commentary and the author's voice reflecting on the writing process – add further depth to the narrative.

Vonnegut uses a similar device in *Timequake* (1997) in the form of a "time quake" in the year 2001 that causes everybody to relive the past 10 years form 1991, but with no possibility to change anything. Only after this period ends, free will becomes available again, though most people are unprepared for it. That makes the book's protagonist, the hero of the narration, as he is able to deal with free will again first and instruct others in the forgotten practice. Injected in this narration are small story fragments that explore the topics of free will and determinism while the book's characters are forced to re-watch the bad choices in their lives. Vonnegut further fragments the narrative by inserting self-conscious comments about his work as an author. In this way the reader becomes aware of the process of the production of the narration.

Uwe Johnson's 1959 novel *Mutmassungen über Jakob* (*Speculations about Jakob*) (1983) is set in the GDR in 1956, the year of the Hungarian uprising. The book begins with Jakob's death. He, an experienced railroad dispatcher, walks across the tracks at the wrong time and is killed by a train. Thus, the speculations begin: was it an accident, a suicide, a murder? All of these options are possible, the reader learns by means of a fragmented narrative told from many perspectives. Different narrative voices represent different versions of the events leading to Jakob's death – a stream of consciousness section is followed by a section narrated by an auctorial narrator followed by a dialogue that withholds the names of the speakers. Also, the narrative jumps around freely in the sequence of time. As a result the reader becomes engaged in process of speculation that mirrors the theme of the narrative itself – whose voice she encounters, at what point in time she is right now and how the current section relates to the overall narrative. Johnson keeps the reader in this state of uncertainty, since the cause for Jakob's death is never established.

Jahrestage (*Anniversaries*) (1984), Johnson's magnus opus, follows the life of one of the characters in *Speculations*, Gesine Cresspahl, Jakob's friend and one-time lover, who gave birth to Jakob's child after his death. Gesine emigrates to New York City where she lives as a bank clerk with her daughter Marie. *Anniversaries* chronicles a year in her life from August 21st, 1967 to August, 20th, 1968. During this year, Gesine relates her family history to her daughter, starting with her grandfather's death in 1888. In the 1,890 pages of narration fictitious diary entries provide starting points for explorations into the characters' private lives, and contemporary and historical political and social events that shape and influence them like the Viet Nam war, the assassination of Robert Kennedy, local New York events, the Nazi years in Germany, and German post-WW 2 developments.

3.6.4 Application in IDN

Johnson's and Vonnegut's narrative strategies represent opportunities for adaptation in IDN. The four works push the limits of what is possible on the printed page in their pursuit to express complex, traumatic events, comment on specific conditions, and present an exhaustive account of the characters' lives. As a result of this artistic quest, neither of these works is easy to read. However, the fragmented narratives are well suited as the basis for a translation to IDN. Such re-created versions could preserve the complexity of the originals, but offer the benefits of digital media to the interactor as a result of the translation.

In this way an IDN version of *Slaughterhouse* could arrange the fragments spatially around the central location of Dresden and let the interactor create her own paths on the resulting map. At the same time the control over the length of engagement with emotionally difficult passages could be put into the hands of the interactor. Another opportunity for IDN treatment is Vonnegut's idea of a character "unstuck in time". This state could be reflected in an IDN version by a function that randomly pushes the interactor to different parts of the narrative.

The "forced replay" in *Timequake* might be experienced in an IDN version as sections in which the interactor can only perform specific actions, while the unexpected re-appearance of free will could be depicted by a sudden overwhelming choice of actions.

In the case of *Speculations*, an IDN version could offer an interactor help in navigating the fragmented narrative or offer a choice as to what trail of speculation she wants to follow next. An IDN version of *Anniversaries* could make the vast content more accessible, by introducing links between related sections, bookmarks and personal annotations. Additionally, the depth of the presented material could reach encyclopedic proportions by incorporating links to large databases and online resources.

In the light of theses examples, it is important to realize that the IDN versions proposed here cannot be faithful recreations, but rather "translations" that make use of some of the same material to create very different and altogether changed experiences. An author of an IDN work who intended for example to create the same level of confusion as Johnson's *Assumptions* would need to develop very different narrative strategies.

3.7 Summary: A Theoretical Framework for IDN

The theoretical framework of *system*, *process*, and *product* described in this chapter overcomes the limitations inherent in approaches that re-work existing theories of narrative grounded in legacy media and describe IDN more adequately. The terms *protostory*, *narrative design*, and *narrative vectors* clearly distinguishes IDN from narratives in legacy media. The advantage of this new vocabulary is in their explanatory power in comparison to legacy-derived terms such as story and plot/discourse that cannot account for concrete, manifest states that precede them. Taken together and based on the initial approach towards IDN outlined earlier, the new vocabulary forms the framework of a more fully developed theory. Further work in this area should analyze the primitives and the segmentation of protostories and create a taxonomy of narrative designs to identify forms and genres.

In practical terms, the clear departure from legacy narrative opens up a space for bold experiments in IDN that do not need traditional narratives as a yardstick to measure against and help avoid a pattern of "interactivisation" Jennings eloquently denounced in 1996:

> It is a waste of energy and resources to make applications that merely imitate media that exist in other forms, such as print, television, and film. (Jennings 1996a, p. 349)

However, it is often difficult to conceive of narrative that moves beyond the deeply engrained and culturally determined traditional forms. The concepts of a specific object of IDN and of kaleidoscopic narrative design provide two points of departure for the way IDN narratives could overcome this problem and differentiate themselves from traditional narrative.

Lastly, the definition of the relationship to legacy narrative opens a productive perspective for the application of legacy tropes and narrative strategies as the raw material for a translation process that is mindful of the particular and independent nature of interactive digital narrative.

CHAPTER 4

PRACTICAL ASPECTS OF IDN

The problem of fully unlocking the potential of IDN concerns both theory and practice. A theoretical framework alone cannot fully account for the complex issues of practical work in digital media. Consequently, the theoretical considerations of the previous chapter need to be augmented with a discussion of practical aspects of IDN as an emerging artistic practice. The focus here will be on issues of tools and architectures by analyzing the limitations inherent in existing approaches and on a proposal for a new architecture as way forward. As a first concrete implementation of this architecture, a modular software package developed as part of the research for this thesis is introduced, and early results are evaluated.

4.1 Technology And Art: a Complex Relationship

Throughout history, a complex relationship existed between artistic achievement and technological innovation. Sometimes an invention opens up new possibilities for an art form sometimes art drives technology.

Examples for technology enabling new artistic expressions are photography and cinema. Artists experimented with the relationship between aperture, shutter speed, length of the lens, and the sensitivity of the film stock to create photographic art as a new form of visual expression. Similarly, in the case of film, artists explored the temporal and material aspects of the new medium to devise artistic methods like montage in order to create a novel artistic representation. Incremental innovations allow further refinements of an art form. For example, the introduction of small, simple to operate 35mm cameras and more sensitive film stock tha made a studio and a tripod unnecessary enabled the new photographic language of László Moholy-Nagy and the Bauhaus school.

One example for Art driving technology is the invention of an inexpensive method for color printing by French painter and printmaker Henry Toulouse-Lautrec, which made possible the colorful posters he become famous for. Another example is the cinematographer Gregg Toland, who introduced modifications to lenses and lighting in collaboration with director Orson Welles to create the deep focus film imagery *Citizen Kane* (Welles, 1941) is famous for.

The complex relationship between art and technology continues in IDN. At this point in time, the practice of IDN as a form of expression is still in its infancy. Janet Murray's reflects this state of affairs by designating many early forms of IDN (for example literary HF or IF) as "harbingers" (Murray, 1997) of a fully developed form and also by the title of her forthcoming book *Inventing the Medium*.

In order to further the practice of IDN, we must enable artists to progress towards mastery of digital media as a technology for narrative expression, so that they can make the technical demands that will expand the expressive range of IDN.

4.2 The Importance of Authoring Tools For IDN

The technical complexity of the digital medium constitutes a considerable obstacle in the way of a more fully developed form of IDN. The mastery of the technical aspects alone requires specialized knowledge in several areas. For example *Reliving Last Night* (RLN) (Cooper, 2001) is the result of knowledge in video production, mastery of various software tools on the computer for editing video and creating graphics, and an understanding of programming and user interface design to create the procedural and participatory aspects. Even more daunting is the level of technical expertise required to create an AI-based work similar to Mateas' and Stern's *Façade* (2005b).

Few potential creators command this advanced level of technical knowledge and are thus prohibited from experimenting with IDN as an expressive form. In order to enable more experiments, it is important to simplify access to the procedural and participatory power of digital media. While it would be ideal if everybody could program in a high-level programming language like C or Java, this is just not the case today, and quite probably will never be. Instead, artists wanting to explore and apply the possibilities of procedurality and participation, frequently turn to so-called authoring tools. This kind of software abstracts the intricate details of computer programming and makes procedurality more easily accessible to practitioners not well versed in this area. Authoring tools fill the void between content creation software and tools intended for software development and play a crucial part in the creation of the large majority of digital works.

4.3 An Intricate Relationship: Artifacts And Tools

A large variety of authoring tools exist on the market today. In principle, many of these tools should enable the creation of IDN works and indeed have been used in this capacity. However, similar to the way legacy theoretical frameworks influence and limit the full exploration of the potential of digital media, many authoring tools are wedded to metaphors and concepts that influence and potentially limit the works created with it.

This problem is related to the more general question of the influence that a particular technology has in the production of an artwork. Walter Benjamin engages this questions 1936 in his essay *The Work of Art in the Age of Mechanical Reproduction* (1978). For him, a specific quality of an art works– the aura[41] –, is diminished and ultimately destroyed in the technological processes of creation (for example by means of taking a picture with a photographic camera, or discontinuous recording of filmic narration), and by means of mechanical reproduction. As Benjamin focuses his attention on aura, he treats the technical aspect of the creative process as transparent. In this sense, he understands the photographic process for example to involve the taking of a picture, which depicts what was there at the point in time and can then be reproduced. The influence a specific camera or film stock exercise over a particular photographic image and the necessary mastery of the technology of the camera by the photographer are of little concern to Benjamin. Therefore, Benjamin in his essay *Kleine Geschichte der Photographie* (*Short History of Photography*) (Benjamin, 1978) sees improvements in the sensitivity of film material only as a factor that further diminishes aura. What Benjamin's view fails to fully take into account, is the totality of the process involved in creating an artwork with the help of technology. Writing 60 years after Benjamin, Simon Penny argues for a more inclusive understanding of the creative process involving digital media and art:

> When artists engage […] digital tools, a negotiation occurs between methodologies of traditional art practice and the value system inherent in the tools themselves. This negotiation is implicit and rarely discussed. The nature of artistic practice, the artistic product, and the consumption of the work are thereby changed. (Penny, 1997)

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[41] For a more in-depth discussion of aura, see the previous chapter

For Penny, the main conclusion from his observation is the discovery of an inherent conflict between art and technology. He understands computers as a product of science, and therefore embedding the Cartesian dichotomy of body and mind as separate instances, and "traditional artistic" (Penny, 1997) methods which he understands as being holistic in nature. While such a broad claim might be problematic in its scope, Penny's observation of an "implicit and rarely discussed" (Penny, 1997) process of negotiation between art and technology represents an important insight and clearly improves upon Benjamin's basic assertions. However, Penny's is a high-level view, and his discussion does not exemplify the relationship between particular tools, the metaphors embodied in them and the works of art created with it.

Lev Manovich (2001) presents a more concrete example of a particular value system and its influence on an interactor, when he reminds us that the timeline and discreet on-screen buttons for play, pause, rewind, and stop in Apple's QuickTime Player and many other media player software applications are there to present a familiar metaphor to users – that of tape-based devices such as compact cassette players, tape recorders, and VCRs – and thus enable interaction with digital media files without the need to learn a new kind of metaphor. However, Manovich notes, by emulating legacy devices, these controls obscure one of the most important characteristics of digital media files: the ability to access any point in the media file instantly:

> "[…] digital media players […] emulate the interfaces of linear-media machines such as VCRs. […] In this way, they make new media simulate old media, all the while hiding new properties such as random access." (Manovich, 2001, p. 118)

The problem Manovich alerts us to is the usage of metaphors from pre-digital times in digital media, and, more importantly the consequences that arise from this usage for the perception of digital media artifacts. When we combine Manovic's warning with Penny's observation of the influence of particular tools in the artistic process, we can see that legacy metaphors like the tape-recorder buttons also influence the creation of digital media works. Therefore, legacy metaphors constitute a major obstacle towards capturing and realizing the full potential of digital media. As a consequence, digital media might be treated merely as an enhanced version of legacy unisequential media, for example, as a kind of "film 2.0" in which a user can change between several layers of film. Such "digitally enhanced" works fail to fully apply digital media affordances like procedurality and thus limit meaningful agency.

Given the importance of authoring tools, the impact of legacy metaphors embedded in many of these tools is significant. A short history of authoring tools will highlight the pervasive use of legacy metaphors instructing digital artifacts. A discussion of a particular feature of many authoring tools – the timeline - will then demonstrate the problem in more detail.

4.3.1 Metaphors in Authoring Tools

The first widely available digital media authoring tool was Apple Inc's *HyperCard* in 1986. The main idea behind *HyperCard* was to make programming simple – so easy according to Bill Atkinson, the software's main designer, that users without programming knowledge could "express themselves"[42]. *HyperCard* provided a library of graphical elements like clickable buttons and an easy to understand English-like scripting language called *HyperTalk*. The metaphor *HyperCard* introduced was that of the card –

[42] Interview with the KnownUsers: The Genius behind HyperCard: Bill Atkinson http://www.savetz.com/ku/ku/quick_genius_behind_hypercard_bill_atkinson_the_november_1987.html

all graphical elements such as buttons or text fields were placed on a card. A larger project – a “stack” in *HyperCard’s* terms – would contain many such cards. *HyperCard’s* card-based metaphor was “event based” taking advantage of object oriented programming techniques and accommodating a high level of interactvity to foreground the participatory affordance of digital media. In the event-based model nothing does happen until a participant clicks a button or causes any other change, for example by entering text in a field. Internally, *HyperCard* would then relay the event as a message down its message path (see illustration) and as a result switch to another card populated with different content.

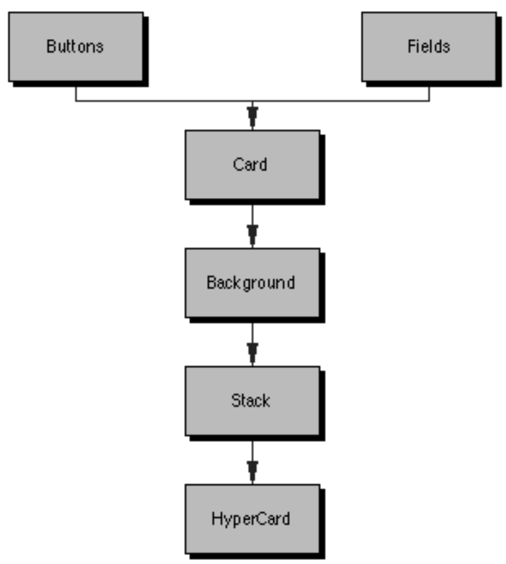

Figure 21. (Kantel, 2001) Schematic message flow in Apple HyperCard

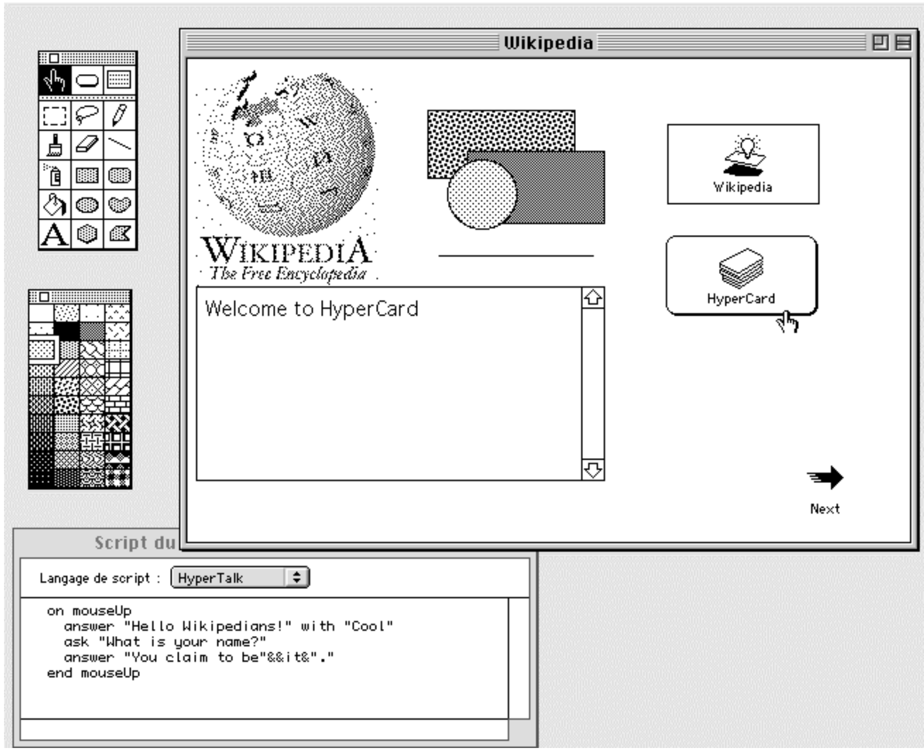

Figure 22. (“Hypercard,” 2010) A HyperCard project with a populated card

HyperCard introduced many interested authors to the potential of digital media and enabled creators with little programming knowledge to built impressive projects. Indeed, *Myst*, one of the most successful computer games in commercial terms, was developed with *HyperCard*. The authoring tool also inspired a number of similar programs (e.g. SuperCard (“Supercard,” 2009), MetaCard/Runtime Revolution (“MetaCard,” 2010), ToolBook (“ToolBook,” n. d.)), some of which tried to broaden the card metaphor – for example SuperCard provided support for multiple windows. *HyperCard’s* lasting achievement is in bringing a level of mastery in creating hyperlinked content and objects with inheritance within reach of many non-programmers.

HyperCard eventually lost the leading position in the market for authoring tools to Macromind’s (later Macromedia and subsequently Adobe) Director, an application, which came to dominate much of the 1990s. Director won in the market place because of its ability to deliver “projectors” (Director’s name for packages that combined project files and an executable) for both Macintosh and Windows computers, its superior support for color[43] and its perceived ease of use.

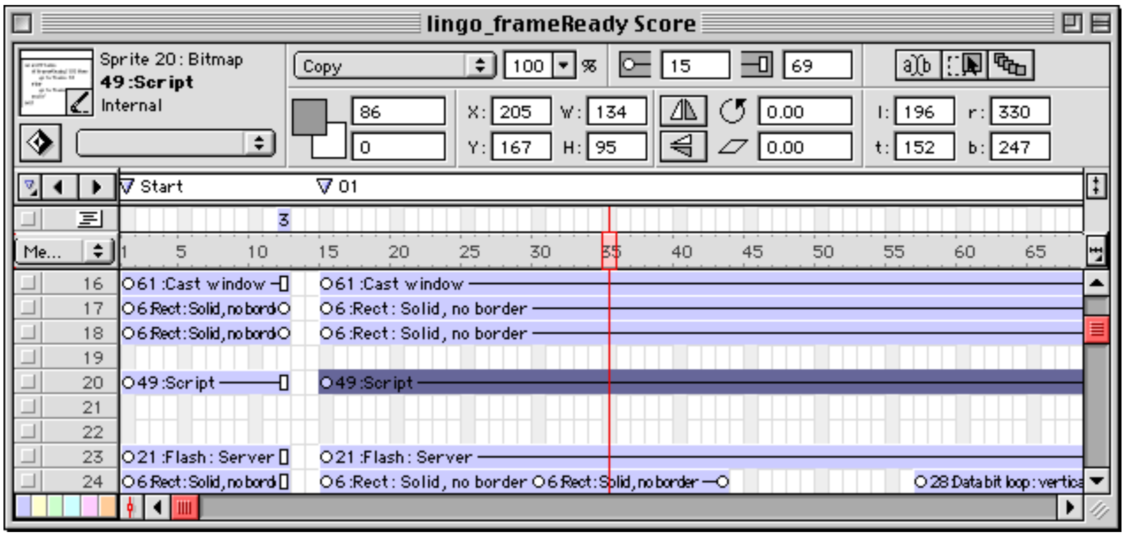

Figure 23. (Marshall, 2001a) The timeline in Macromedia Director

Director started out as a tool for creating animations called *VideoWorks*. Authoring functions and a scripting language were added only later when the product was renamed *Director* in 1988 (see “Adobe Director,” 2010). *Director* introduced a metaphor derived from film and drama with a frame-based timeline, a cast that contained graphical and other multimedia assets, and a stage window for display. Even though *Director’s* Lingo scripting language itself was independent from purely time-based events, the program never dropped the timeline metaphor form the original animation tool. Indeed, interactivity in *Director’s* time-based model involved stopping the timeline by means of

[43] HyperCard only supported color by means of an external module.

looping scripts to wait for user input and then continue or jump to another part of the timeline.

A competitor to *Director* was *mTropolis* ("mTropolis," 2009), an authoring system that offered a mix of the metaphors introduced by *HyperCard* and *Director.* The program featured both an event-based system with cards and an optional timeline for animation of individual objects. After good reviews and a promising start with well-received commercial projects created with mTropolis like the computer game *Obsidian* (1996) and the BAFTA award winning educational title *MindGym* (1996), the software was bought out and discarded.

Macromedia also produced an in-house competitor to *Director* in the form of another authoring tool, called *Authorware* ("Macromedia Authorware," 2009)*,* after the merger with the company of the same name. This software originated in the space of learning programs and was not based on a timeline, but instead applied a flowchart metaphor, in which projects are built by assembling and connecting building blocks that represent objects, attributes such as color, or programming functions such as loops. The underlying concept of this and similar approaches are often referred to as "visual programming".[44]

[44] http://en.wikipedia.org/wiki/Visual_programming_language

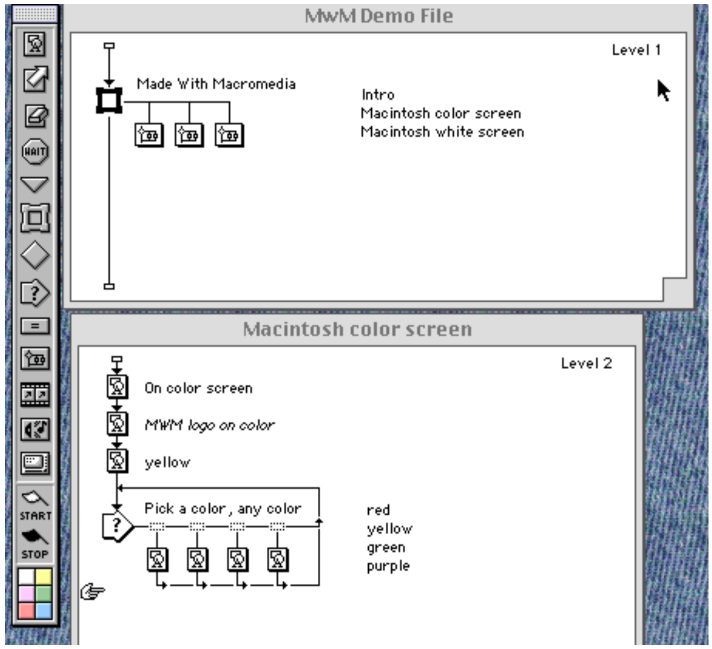

Figure 24. (Marshall, 2001b) Flowchart metaphor in Macromedia Authorware

Authorware was a highly regarded product, but sold at a much higher price than *Director*[45], which severely limited its user base. Additionally, Macromedia marketed *Authorware* as a tool for creating computer-based training courses, while *Director* was billed as a general multimedia authoring tool. Unfortunately, there was no attempt by Macromedia to consolidate the two products, which might have resulted in a more flexible approach that offered a choice of metaphors.

The most successful implementation of visual programming to this date has been *MAX/MSP* ("Max (software)," 2010), and its variants. The metaphor used in this family of tools is derived from the analogue musical synthesizers of the 1970s and early 1980s, which consisted of many sound generator and effects modules with numerous inputs and outputs. So called patch cables were used to make connections between the modules to

[45] The retail price of *Authorware* was several times hat of *Director*.

create individual sounds. In order to replicate these settings, the connections were written down as “patches”. This term is retained as the name for projects in *MAX/MSP*. The emphasis of this authoring tool is real-time manipulation of multimedia data like video, sound, and images, which makes it suitable for performances and interactive installations.

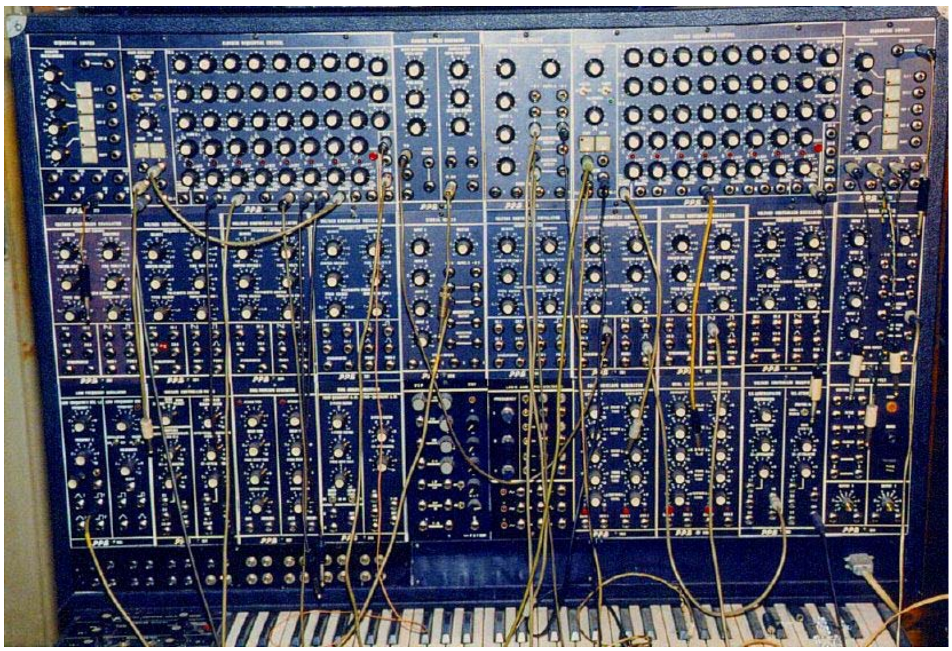

Figure 25. Analogue synthesizer with patch cables

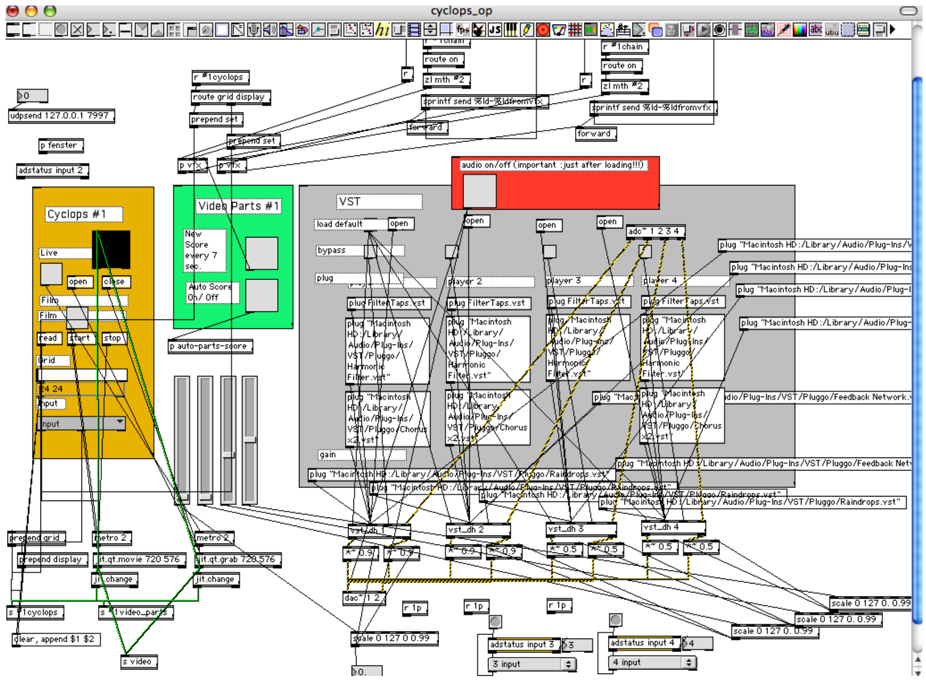

Figure 26. A MAX/MSP patch

Arguably the dominating authoring tool today, Adobe *Flash* shares as similar heritage with *Director* by originating as an animation program called *FutureSplash*.(see “Adobe Flash,” 2010) The application initially applied the same film-derived metaphor as *Director* with a frame-based timeline, a cast library, scenes as an organizing unit, and functional objects (objects that could contain scripts and react to user events like mouse clicks) called “MovieClip”. Later versions of *Flash* (starting with *Flash MX 2004*) provided alternative project “views” that hide the timeline and instead apply a slide-show metaphor (presentation view, see fig. 28) or a metaphor based on form entry (application view, see figure 29). Ever since, the general direction of the *Flash* platform has been away from the concept of an authoring tool that integrates aspects of design and programming and towards a distinction between the roles of the artist (graphic design and animation) and the programmer. In this way, the introduction of *Flex* (a collection of interface libraries and modules for connectivity to databases to enhance *Flash*) was accompanied by the move to the *Eclipse* ("Eclipse (software)," 2010) IDE (Integrated Development Environment) as the interface for development. *Eclipse* is built around functions for writing and debugging programming code and presupposes advanced knowledge of programming languages. The current version (Flash CS5) of *Flash* platform tools finalizes this split by introducing separate versions for programmers (*Flash Builder*) and designers (*Flash Catalyst*). From the perspective described earlier of authoring tools as a means to enable a level of mastery of the expressive potential of digital media, this development is actually a setback.

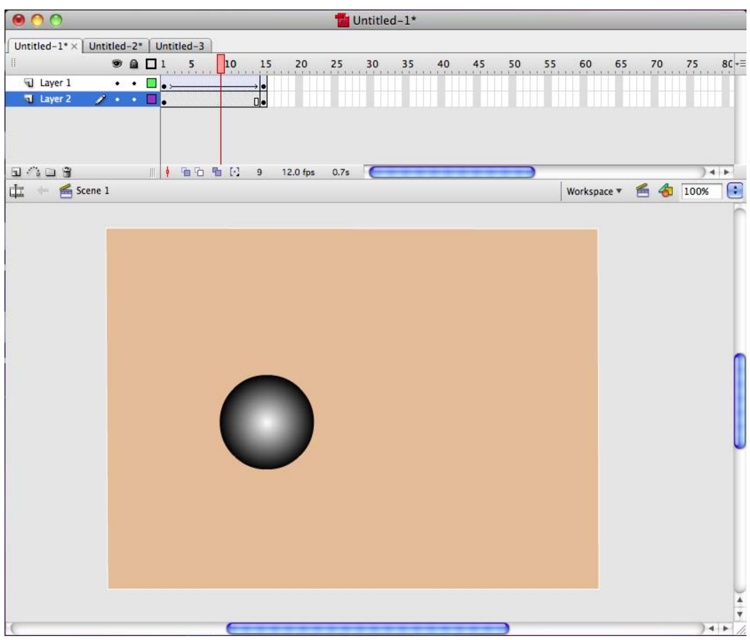

Figure 27. Standard view with timeline in Adobe Flash CS3

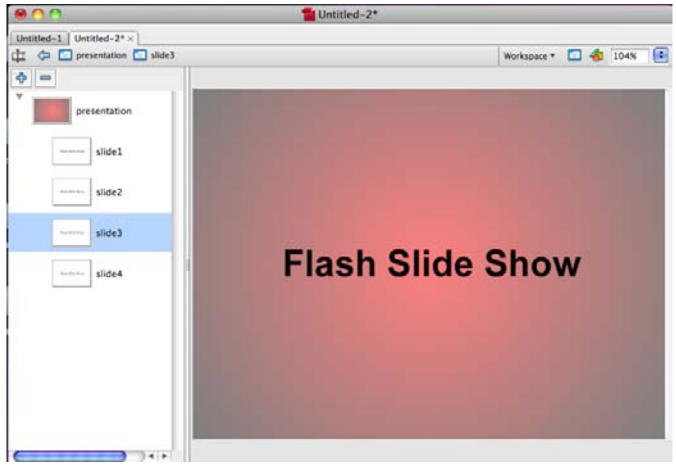

Figure 28. Slide-based presentation view in Adobe Flash CS3

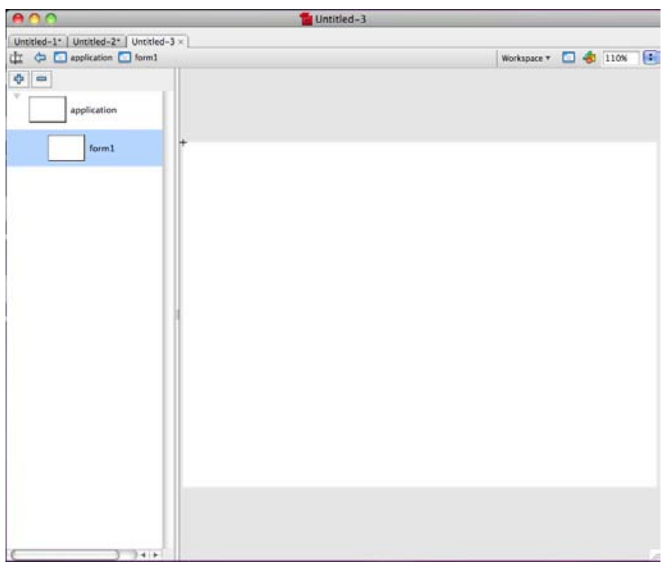

Figure 29. Form-based application view in Adobe Flash CS3

4.3.2 The Timeline – a Problematic Metaphor

The timeline metaphor applied in *Director* and many similar authoring tools is easy to understand, especially for creators who have already acquired an understanding of time-based media such as film or video. However, by representing digital media as time-based, *Director* obscures key aspects like random access and procedurality independent of a timeline.

Many advanced practitioners eventually become aware of particular metaphors in authoring tool and the limitations that arise as a consequence. More specifically, the approach in *Director* is presented as a hindrance in regards to applying the potential of the participatory affordance of digital media. The same concern is mirrored in academic papers. For example, a 1995 paper on the eText Project at CalTech declares the timeline metaphor a hindrance for digital media projects that incorporate encyclopedic content and freedom of navigation:

> Several […] PC and Macintosh presentation software packages, such as Macromind Director and Asymmetrix Compel, […] are built around a metaphor of a timeline and a screen. These systems cannot be adapted to present large volumes of information, nor to allow real freedom in navigation. […] these systems have minimal support to incorporate interactive simulations or navigation/linking. Hence, the timeline metaphor and screen-size scaling of these systems sets them at odds with the true goal of hypermedia. (eText 1995)

The critique of the timeline metaphor has not lessened over the years and is apparent in a 2005 paper on an art project as a "negative requirement", or a structure to avoid in order to enable participation and multi-sequential narratives:

> The work had no set linear timeline, because it is the potential for interaction and non-linear narrative that initially engaged me in using the computer as a tool in my art practice. (Gartland-Jones 2005)

These critiques of the timeline metaphor serve to illustrate the problematic nature of legacy metaphors in authoring tools. A preliminary conclusion from this discussion might be an attempt to avoid any usage of legacy metaphors in authoring tools. However, it will be extremely difficult and indeed probably impossible to avoid any and all legacy metaphors. A more productive stance would be to foster an open discussion regarding the respective merits and limitations of particular metaphors. A first step and indeed a prerequisite for this discussion is a full declaration of the metaphors applied in a particular software package. Unfortunately, few software packages offer a sufficient explanation of the underlying concepts. In this way, artists are denied an educated choice that is as important as the one between chalk or oil, bronze or clay.

4.3.3 Existing Authoring Tools For IDN

A range of authoring tools has been specifically designed for IDN. A short but by no means complete list includes Storyspace (Bolter & Joyce, 1987), Agent Stories (Brooks, 1999), Art-E-Fact (Iurgel 2004), the authoring part of the IS engine (Cavazza, Charles, & Mead, 2004), DraMachina (Donikian & Portugal 2004), Adventure Author (Robertson & Nicholson, 2005), Scenejo (Weiß, Müller, Spierling, & Steimle 2005), Bowman/Zócalo (Thomas &Young, 2006), Scribe (Medler & Magerko, 2006), Inscape (Balet 2007), FearNot! authoring tool (Kriegel, Aylett, Dias, & Paiva 2007), Inform (Nelson 2007), Narratoria (Van Velsen, 2008), Rencontre (Bouchardon, Clément, Réty, Szilas, & Angé, 2008), and Wide Ruled (Skorupski, Jayapalan, Marquez, & Mateas, 2007). Additionally, there are commercial programs like Chris Crawford's Storytron/SWAT (2009a) and freeware solutions like the Korsakow system (2010). These software packages clearly provide many valuable insights on how to implement and improve specific authoring tasks. However, from the integrative perspective foregrounded in this thesis existing tools can be broadly described as belonging to three broad categories, which limit authors' abilities to fully exploit the potential of IDN in different ways. The first of these groups of authoring tools incorporates particular traditions in IDN. Some examples in this group are:

Storyspace – HF

Inform – IF

Recontre – HF

Korsakow system – Interactive Cinema

The second group contains individual approaches in IDN research like specific AI planning algorithms for generating narrative. Examples from this group include:

Agent Stories – agent-based narrative with story clips,

Art-E-Fact - directed graph based dialogue,

IS engine - character-based approach with hierarchical plans,

Bowman/Zócalo –Domain Elaboration Framework incorporated with a planning system,

Adventure Author – branching dialogue trees,

Scenejo – story graphs in combination with dialogue patterns,

Scribe – front end for interactive drama in a training environment,

FearNot! –emergent narrative from the interaction of planned agent behavior,
Narratoria – branching narrative,

Wide Ruled - text- based author-goal driven story planner

Tools in the first and second group are subject to the limitations inherent in the respective underlying theoretical frameworks and particular practical approaches. The third group (DraMachina, Inscape) represents a "pragmatic" approach (see Ryan, 2006) that omits a clear definition of IDN. This approach renders it difficult to evaluate resulting artifacts specifically as IDN works.

A number of more detailed examples will serve to highlight the limitations in inherent in specific approaches in more detail. One example for the first group is Storyspace (Bolter & Joyce, 1987, Bernstein, 1991), released to the public in 1991 and still available today through the commercial company Eastgate[46]. Two of the architects of Storyspace, Jay Bolter and Michael Joyce were proponents of literary HF and consequently the software was designed around the assumptions and goals of this particular tradition of IDN (see Bolter & Joyce, 1987). Therefore Storyspace incorporates a metaphor based on nodes (which are similar to cards), offers provisions for creating hyperlinks between nodes and features a map view to display and navigate the resulting structure. The emphasis on nodes and links results in reduced attention paid to other areas. Storyspace only offers limited procedurality in the form of "guard fields", or hyperlinks that are initially hidden and only appear after some conditions are met, for example when specific hyperlinks have been followed. Another example in the same group is the Inform system (Nelson, 2007), which includes a highly specialized and domain specific programming language and an authoring tool (Inform IDE) for building IF works. Inform also incorporates a text parser to handle user input. In active development since 1993, the latest version (Inform 7) introduced a programming language whose commands and declarations read like English language sentences[47]. Additionally, the Inform IDE authoring tool provides a flowchart view of possible paths and a map view to aid in the development and debugging of IF works. These innovations are intended to vastly simplify the creation of IF for non-experts. Regardless of these improvements, Inform remains thoroughly rooted in an understanding that positions IF as some kind of written literature derived from the printed book. Therefore the focus of

[46] http://www.eastgate.com/storyspace/
[47] For an example, Inform 7 interprets the sentence "John wears a hat" to describe a character named John to wear an object called a hat. (cf. http://en.wikipedia.org/wiki/Inform#Inform_7_programming_language)

Inform is on text, while only limited support is provided for images and audio[48]. Movie clips cannot be used at all. The book-derived perspective is clearly communicated in the Inform manual, for example in a section discussing the inclusion of images:

> Illustrations do not suit every book, but they are an option we would like to have available.[…] The most successful illustrated books are those whose pictures are well-chosen, have a sense of design to them, and above all are consistent. […] IF writers may want to look for collaborators with a visual eye, just as most novelists do not draw their own illustrations. [49]

One example for the second group of tools is the European research project *Inscape* (Balet, 2007). This suite of software programs is the result of collaboration between a group of about 15 European research institutes, universities, and software companies with the aim to produce a "collaborative tool […] to enable digital content creators to plan, build, experience and publish interactive multimedia stories."[50] *Inscape* is meant to enable the creation of many different types of IDN experiences and thus has no standard form of representation or content (see Kafno, 2007). Therefore, this research project echoes the integrative and totalizing view on IDN guiding this thesis. This shared perspective extends to the study of existing practices and concrete authoring tools as a basis for future research:

> We should aim to understand in detail the process of creating interactive narrative. [By studying] existing work practices involved in creating interactive narrative [and we should] learn from previous attempts to create computational environments for developing narrative or computational story engines, for example Chris Crawford's 'Erasmatron', and 'Façade' developed by Michael Mateas. (Tallyn & Benford, 2005)

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[48] Sound currently is only available on the Windows platform and the number of supported file formats for images is limited.
[49] http://inform7.com/learn/man/doc356.html
[50] Description on the official website www.inscapers.com, retrieved December 2009.

However, the nine example projects originally presented on the project's website[51] under the heading of "interactive multimedia stories", do not feature narrative as a shared concern, focusing instead on demonstrating the wide variation of projects created with the authoring tool[52]. As of this writing, the project's website is no longer accessible and development on the tool seems to have stopped, partially because of restrictions related to commercial modules in the software package[53], and because the research project had run its course.

Overall, *Inscape* represents an effort that brings together several modules with embodied legacy metaphors designed around the established workflow of digital media content creators. *Inscape's* "story planner" (Kafno, 2007) is a prototyping tool based on a storyboard metaphor, while the "story editor" applies the metaphor of a stage, which can then be populated with assets produced in editors for 2D, 3D, and audio content. An innovative approach is the use of a common XML-based markup-language that enables the different modules to work together and interchange data.

What is missing in the *Inscape* project is a definition of IDN shared by all the project partners, which would have helped in creating and shaping a common vision. An mid-project overview (Inscape 2006) lists seven papers on issues related to theoretical issues of IDN from very different perspectives, including attempts to apply narrative

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[51] As of March 2010, the *Inscape* website is no longer available.
[52] The examples show *Inscape* as a tool for prototyping an IPTV application, for use in advertising, as a training simulation, for creating educational material about the solar system and Wolfgang Amadeus Mozart, an arcade-style game, an augmented reality project, a location-based mobile experience, and a database-driven scientific simulation.
[53] At a demonstration at the ICIDS 08 conference in Erfurt, the presenter pointed out problems with the 3D engine in *Inscape*, and its commercial developer.

theory (Tallyn & Benford, 2005) to a proposal for making stories by recording interactive experiences (Logan, Benford, & Koleva, 2005).

While authoring tools like *Storyspace* and *Inform* limit authors by incorporating only particular forms of IDN, the *Inscape* project exposes a problem with an approach on the opposite side of the spectrum. When narrative is defined only loosely in the concept for an IDN authoring tool, the result will be a general-purpose tool for interactive experiences of any kind. Narrative then becomes a desirable but unnecessary by-product and puts the burden of definition on each individual author. In this way, *Inscape* has only minor advantages over other general authoring tools like *Flash* in regards to the practice and research of IDN.

4.4 Requirements For an Open and Integrative Approach

The lesson for IDN authoring tools from the discussion so far is fourfold. First, legacy metaphors carry the danger of locking authors into frameworks of legacy narrative forms of expression, eg. *Director*'s timeline casts digital media as some kind of enhanced film. Secondly – since it might well be impossible to design an authoring tool independent of a specific kind of conceptual framework – that the particular framework and related metaphors applied need to be made explicit to its users. In this way authors can make a conscious choice and pick a tool suitable to their artistic vision. Thirdly, authoring tools that incorporate particular approaches or traditions towards IDN are too limiting as a basis for experiments that aim to capture the full potential of digital media and bring about a more developed form of IDN. Fourth, a complimentary problem exists when IDN is taken as a term that is equal to “any kind of interactive experience.” In this case, IDN has no definition and becomes arbitrary.

An improved approach towards an authoring tool should then apply legacy metaphors, but make the chosen metaphors explicit and clearly communicate them to the user. Furthermore, the overall architecture should be able to incorporate and integrate multiple traditions and various practical approaches within IDN. At the same time, the tool should be grounded in a broad definition of IDN to preserve the focused on IDN. Lastly, the new architecture should be grounded in the realization that at this early stage of IDN practice it is impossible to avoid misconceptions, misguided foci, and dead ends. Therefore, it is essential that a practical approach for IDN should make provisions for and indeed anticipate future revisions.

4.5 A Better Model: The World Wide Web

The architecture of the World Wide Web (Berners-Lee, 1989) provides a model for a robust architecture that has the ability to sustain major revisions, accommodate changes in technology, and act as an intermediary between existing technologies.

Tim Berners-Lee, a programmer at the European nuclear research institute CERN, originally conceived what would later be know as the WorldWideWeb as a means to allow access to documents on other computers on CERN’s dispersed network and across diverse computer platforms. His original proposal (see figure 30) provided provisions to include different media types (“hypermedia”, “HyperCard”), links to the CERNDOC database system, the wiki-like ENQUIRE system and communication forms like uucp news and computer-based conferencing. In order to bridge the gaps between different kinds of documents and media, Berners-Lee designed a modular architecture based on the concept of linked hypertext that separated document format (plain text documents written in the Hypertext Markup Language (HTML)), presentation software (Browser), server software (initially HTTPd), and authoring tools (initially any available editor for plain ASCII text). For the communication between server and browser in a network he created HTTP (Hypertext Transport Protocol) as a protocol layer within the already standardized Internet protocol TCP/IP.

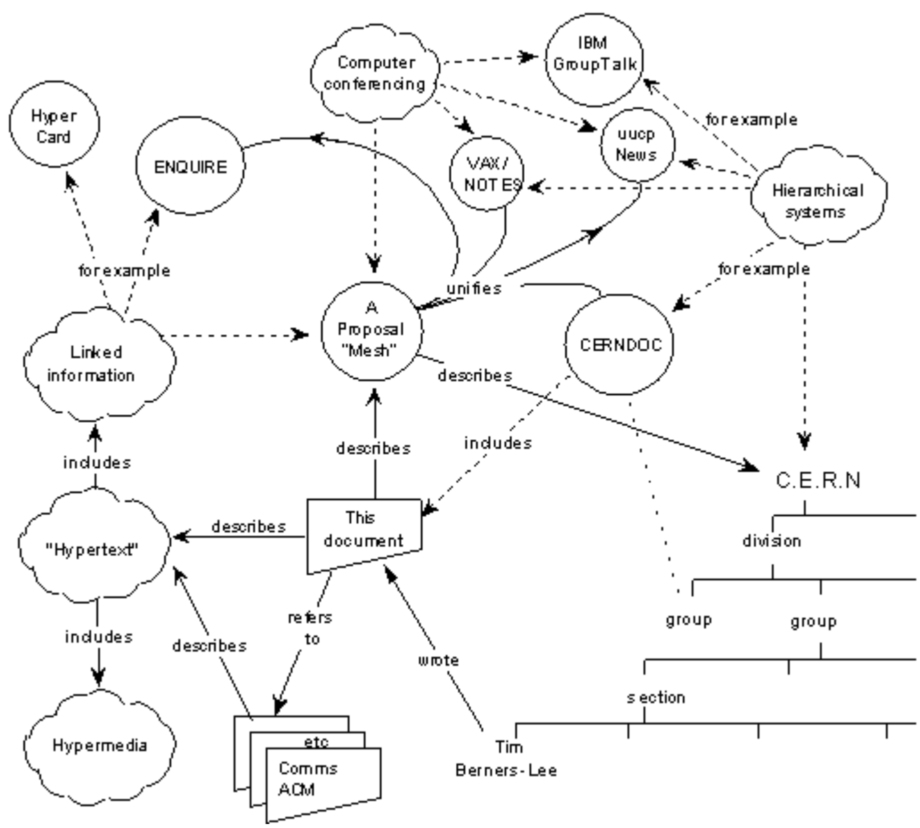

Figure 30. (Berners-Lee, 1989) Berners-Lee's original diagram

Arguably not very advanced from a both a conceptual and a purely computational point of view even at the time of its inception[54], Berners-Lee's architecture has nevertheless been able to sustain the explosive growth of the WWW ever since. Key factors in this success story were the open standards HTML and HTTP, which were quickly embraced by many research institutions worldwide. Consequently, it was not CERN, but other institutions that contributed important additions that popularized the WWW like the *Lynx* text-based browser (University of Kansas) or *Mosaic*, the first widely available graphical browser, developed by a team at the National Center for Supercomputing Applications (NCSA) at the University of Illinois at Urbana-Champaign (UIUC). Today's Web2.0 is built on many additions made to the original architecture, for example in the from of Cascading Style Sheets (CSS) which provided fine-grained control over the presentation, JavaScript/ECMAScript as a built-in scripting language, and sever-side scripting to enable functions such as hopping cart and consequently online commerce. Additionally, both the HTTP protocol and the HTML markup language went through several major revisions.

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[54] In contrast Ted Nelson's earlier (1974) proposal for networked hypertext was more advanced. Nelson's concept called for provisions that would prevent breaking links by accommodating new document versions automatically, protect the copyright of authors, and incorporate micropayment to compensate authors

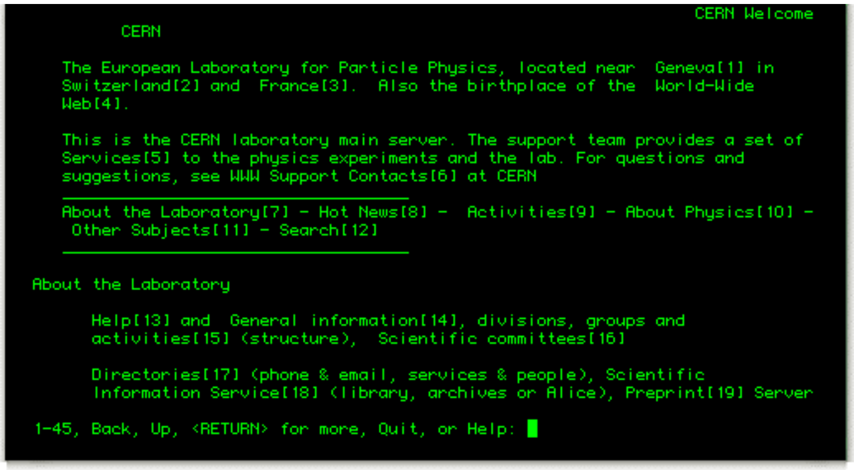

Figure 31. ("Cern," 2008) info.cern.ch ca. 1991

Figure 32. info.cern.ch 2010

A crucial aspect of the WWW's continued development and growth is a standard organization, the World Wide Web Consortium (W3C) that creates new standards within the WWW framework and oversees revisions of existing ones. The W3C also protected and maintained HTML and related standards like CSS during the dark years of the "browser wars" in the 1990s, when both Netscape and Microsoft tried to monopolize the

Web by promoting and implementing proprietary additions to HTML, forcing web designer and developers to accommodate competing implementation in different web browsers. The W3C was eventually successful in countering these attempts by establishing a culture of open discussions of any new proposal, and a process of revisions before a proposal is declared a standard.

Both the architecture of the World Wide Web and the work of the W3C standard organization provide valuable lessons for an IDN authoring and presentation system. These lessons have been incorporated in the design of the Advanced Stories Authoring and Presentation System (ASAPS) (Koenitz, 2010), an experimental software platform, which was developed as a part of this thesis.

4.6 An Experimental Implementation: Advanced Stories Authoring And Presentation System (ASAPS)

ASAPS is a platform for experiments that reflects the practical considerations in this chapter and the theoretical framework developed in chapter 3. ASAPS foregrounds *system* and *process* and incorporates *protostory* and *narrative design* with *narrative vectors.* These concepts are represented in the overall design and in the form of specific features, for example by a holistic view of the space of potential narratives, provisions for conditional branching, and by a mechanism for accumulated and delayed consequences. The name "advanced stories" was chosen for two reasons:

a) To convey the difference to legacy narrative while preserving a connection to narrative traditions

b) To clearly mark this implementation as one possible architecture without a totalizing claim, which precludes a name that includes the term interactive digital narrative.

ASAPS is also the result of a multi-year research effort with the aim to simplify the production of interactive narratives for non-technical authors. The Advanced Stories Group at the Georgia Institute of Technology, a research group founded by the author of this thesis under the direction of professor Janet Murray was instrumental in developing the underlying concepts, shaping the software components and creating several example narratives[55].

In accordance to the overall view of the concepts introduced in this thesis as a decisive - but by no means final - step towards a better understanding and practice of IDN, the focus for the development of ASAPS was on creating a robust architecture that allowed for future revisions. Consequently, modularity and extensibility were prioritized over a specialized feature set and the implementation of computationally advanced functions. Indeed, the architecture is designed to enable the addition of advanced functions as external modules that connect to ASAPS by means of communicating over standard protocols. For example, a text parser could be realized as an external module that communicates with ASAPS via the Internet protocol TCP/IP. Since such components are external to ASAPS, they could be updated independently or exchanged for different

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[55] The ASAPS software components were programmed entirely by the author of this thesis. I also wrote the original the ASML language specifications. ASG group members provided many valuable observations and suggested many features during the development process. Group members also created the Red example narrative. Especially valuable were the many contributions by Katharine Fletcher, who designed the ASB user interface, created an example story, wrote a part of the user guide, and provided graphics for the *Red* example narrative.
For a list of ASG contributors, refer to the ASG website (see Koenitz, 2008)

implementations. In this way, the ASAPS architecture avoids being locked into any particular implementation. This design is based on the model provided by the World Wide Web. Similarly, ASAPS is expected to both undergo major revisions in the future and be augmented by means of additional technologies, from text parsers to server-side dynamic content creation to AI technologies. To continue this analogy ASAPS in its current state is comparable to the state of the WWW at its initial unveiling to the public in 1991.

4.6.1 Concepts and Metaphors in ASAPS

ASAPS makes use of established concepts in legacy narrative, integrates metaphors introduced in earlier IDN work, and applies the concepts and terminology developed in the previous chapter of this thesis. In this way, ASAPS reflects both the continuity and the change in regard to legacy forms of narrative and earlier forms of IDN.

The conceptual basis of the ASAPS architecture is derived from a descriptive model of narrative taken from stage drama with the three categories of *set*, *character* and *plot* and expanded to include four aspects - *settings*, *environment* definitions, *character* definitions, and *narrative design* to include all aspects of *protostory*. The overall model was chosen because it provides a clear separation of different aspects of the overall experience – a perspective authors are familiar with from work in legacy media forms like film and the stage drama while. This similarity lowers the threshold for practitioners wanting to experiment in IDN while allowing them to focus on the level of *protostory*.

The extension to four categories is necessary to define a complete *protostory*. While the legacy categories of character and plot are roughly equivalent to character definitions and narrative design, *set* is insufficient as a category in IDN. Some aspects of *set* in the participatory experience of IDN are internal (for example the definition of virtual locations, and of conditions like specific rules of physics or constraints of a virtual society), while other aspects of *set* pertain to the concrete presentation and the human-computer interface. ASAPS reflects this distinction in the two categories of *settings* (for definitions related to the presentation and interface) and *environment*, which contains definitions for virtual environments and general rule sets (see Figure 33).

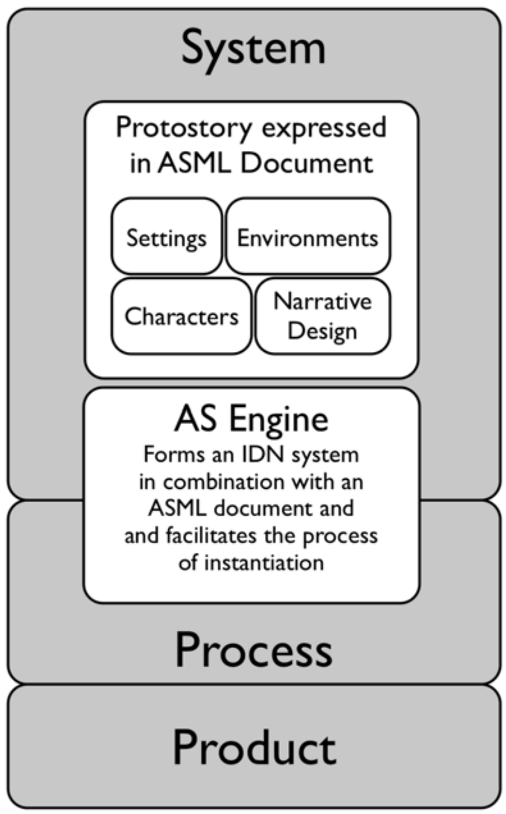

Figure 33. ASAPS structures and chapter 3 theoretical concepts

In the first concrete implementation of ASAPS, the *settings* category contains definitions for the overall look and feel of an IDN experience, with a choice of typefaces, colors, and appearances of buttons and hotspots. Additionally, settings for a debugging functions are placed here that aid an author during the development of an IDN, in the form of a selection for the number of the starting beat and for an optional display of the current values of variables and other information.

The descriptions in the *environment* category for example define spaces in which the narrative takes place and the available props. *Environment* is also the place for definitions of rule sets that shape the experience - for example a physics system or a system of rules pertaining to emotions or the societies the interactor is placed in. Additional rule sets would describe the progress of time, or a historic period and the associated social rules in which the IDN takes place. The definition of *environment* can vary greatly, as the requirement of an IDN might be as small as a single space or as large as the complete definition of an imaginary world. In the current implementation of ASAPS, environment is used for place definitions in the form of background graphics (*nodes)*, and *props*, which encompasses the concept of theatrical props and effects as used in comic books (e.g. words used to described an explosion) and in video editing programs (overlays, short animations).

The concept of *characters* encompasses active characters that an interactor commands and non-player characters (NPCs) controlled by the overall narrative. *Characters* must be able to change in the course of an IDN and react to actions. In ASAPS, *characters* have *states* in the form of different graphical representations, but also in the form of numerical variables (called *counters*). ASAPS allows an author to associate a virtually unlimited number of such variables with a character in order to provide a dynamic mechanism for expressing changing character states such as particular character traits and achievements. Additionally, these variables can also be used for other aspects such as tracking overall progress. Furthermore, a character in ASAPS can have an *inventory* for items found during the course of an IDN.

Narrative design supersedes the legacy notion of *plot.* As described in the previous chapter, *narrative design* is what an author of an IDN creates, a flexible structure that defines a *protostory* and contains *narrative vectors*. The contents of the categories of *environment* and *characters* supply material for the narrative design. The concrete design consists of assemblages of atomic narrative units, called *beats*, a metaphor taken from stage drama (see Mateas & Stern, 2003). Combinations of beats constitute *narrative vectors*, or substructures of the overall narrative design that shape the course of an IDN. In ASAPS, an author creates the narrative design by choosing *beats* and making connections to other *beats*. These connections can take the form of clickable hyperlinks, but ASAPS also allows procedural connections based on conditions (counter values, presence of inventory items, or state of global variables), or a random choice amongst a range of pre-defined beats. Additionally, timed connections can move the narrative forward without user intervention and are a means to selectively take away control from the interactor.

In the current implementation of ASAPS there are twelve different beat types, of which nine are visible beats that can contain material such as *nodes*, *props* and *characters* and three beat types that provide functions invisible to an interactor such as condition checking, or setting a variable at run-time.

4.6.2 ASAPS Components

Modularity is an important aspect of the overall ASAPS architecture to enable independent development of individual parts and preserve clear divisions along functional lines. This concept is incorporated in the form of three separate components (see diagram): Advanced Stories Markup Language (ASML), Advanced Stories Builder (ASB), and Advanced Stories Engine (ASE). The following brief descriptions provide an overview of the individual components.[56]

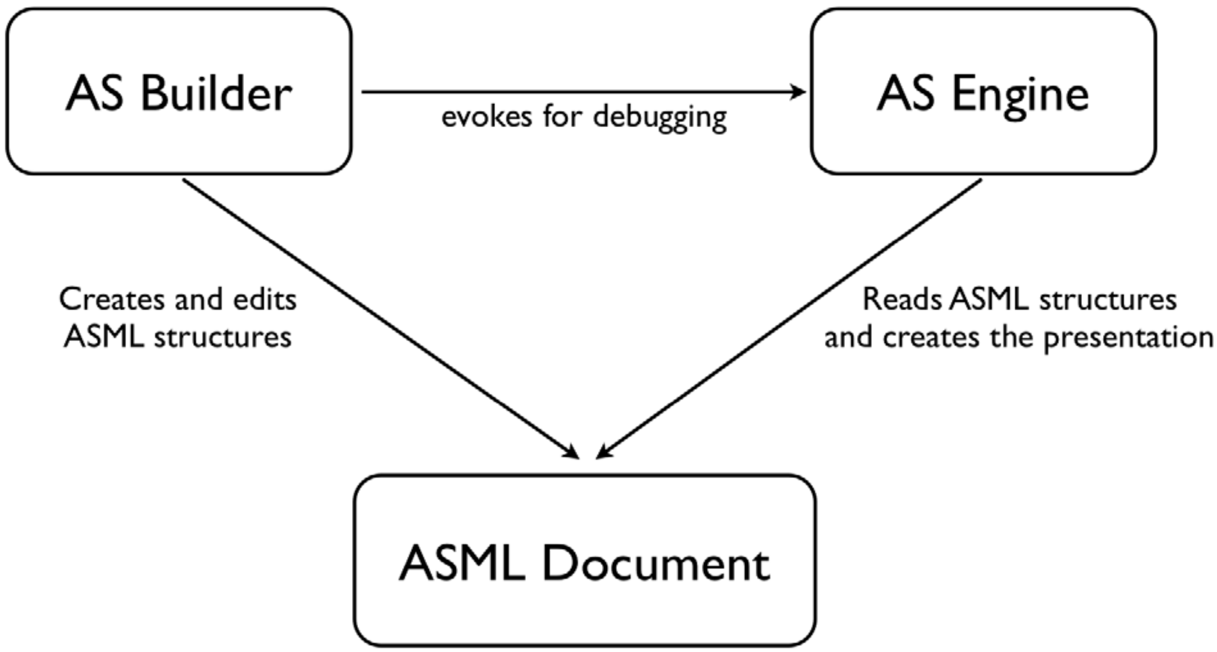

Figure 34. ASAPS modular structure overview

4.6.2.1 ASML (Advanced Stories Markup Language)

ASML is an XML-based markup language to describe complete IDN experiences in human-readable form. ASML provides the format for plain text files that are used by ASAPS. Similar to HTML, ASML files reference external files such as images, animations, or movie clips. The XML definition contains four top-level entities (Settings/Environment/Characters/Plot) and twelve beat functions (TitleScreen,

[56] See Appendix A *ASAPS User Guide* for a complete description of ASAPS.

DurScreen, IntroText, ConversationChoice, MovementChoice, PickProp, VideoBeat, SWFBeat, SetGlobal, ConditionCheck, RandomBeat, and EndScreen). The complete ASML specification is available online as well as a Document Type Definition (DTD) for the verification of ASML files (see Koenitz, 2008). The following example shows sections from an actual ASML file, *Red's Path Through the Woods* (described later in this chapter, for the full version see appendix B).

```
<settings>
<debug firstbeat="0" showvals="on"/>
<colors pcolor="0x7D8DA3" palpha="90" nonpcolor="0xCCCCCC"
nonpalpha="90"/>
<textbox radius="10"/>
<fonts titleFont="Gothic" textFont="Handwriting2" btnFont="Handwriting2"/>
<copyright notice="Copyright © 2007-2008 ASG All rights Reserved"/>
</settings>
<environment>
<prop id="2" name="wine" fPath="wine.jpg"/>
…
<node id="1" name="titleNode" fPath="Hut_ext.jpg"/>
…
</environment>
<chars>
<char>
<id>0</id>
<name>Red</name>
<graphics>
<state kind="default" fPath="Redsm.png"/>
…
</graphics>
<role kind="interactor"/>
<counter name="friendly" val="00"/>
…
<Inventory item1="matches"/>
</char>
<chars>
<plot>
...
<beat>
<id id="20" name="beat 20"/>
        <function kind="ConditionCheck">
<method val="inventory"/>
```

```
<cond char="Red" val="sweets" YesTargetbeat="21" NoTargetbeat="22"/>
</function>
</beat>
<beat>
<id id="21" name="beat 21"/>
<node>forestDetail</node>
<locs>
<loc kind="char" name="Wolf" state="right" x="63" y="155" width="100"
height="200" size="80"/>
...
</locs>
<defaulttarget targetbeat="undefined" val="0"/>
<function kind="Conversationchoice">
<questioner>1</questioner>
<question>Well?</question>
<delay>1500</delay>
<choice id="1" content="Would you like some candy?" counter="adult,03"
targetbeat="23"/>
</function>
</beat>
...
</plot>
```

4.6.2.2 ASB (Advanced Stories Builder}

ASB is an authoring tool that simplifies the creation and editing of ASML text files. The software provides an easy to use graphical interface for all current ASML functions. In ASB, a designer loads assets such as image files, animations, or videos and designates them as nodes, props, and character states. Then, she creates the narrative design by adding and connecting beats. The structure of the narrative design is plotted out in The *Graph* view (Figure 35) to provide an alternative view the simplifies development. In turn, the graphical contents of individual beats are edited in the *Graphics Editor* (Figure 36). Additionally, ASB allows a designer to change settings of the ASPAS Engine that define the overall look and feel like the shape of buttons and the typefaces used.

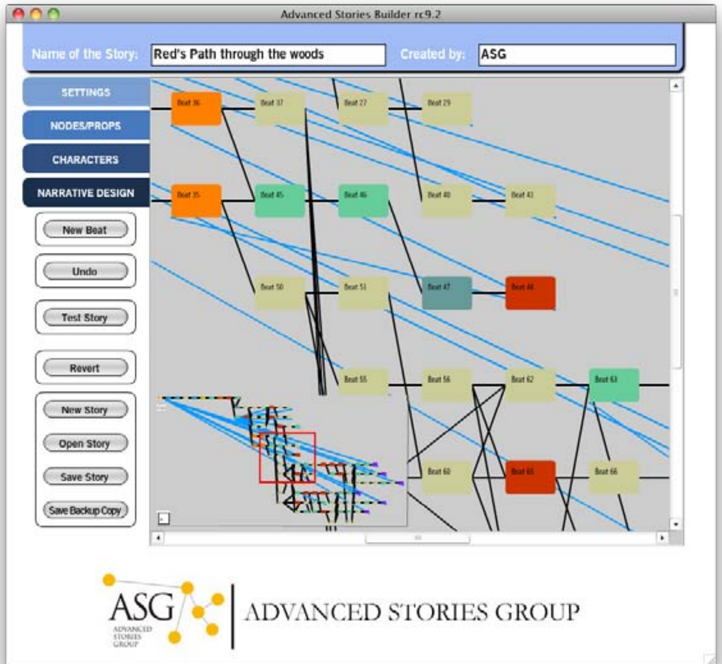

Figure 35. Graph View in ASB displaying beats in a particular narrative design

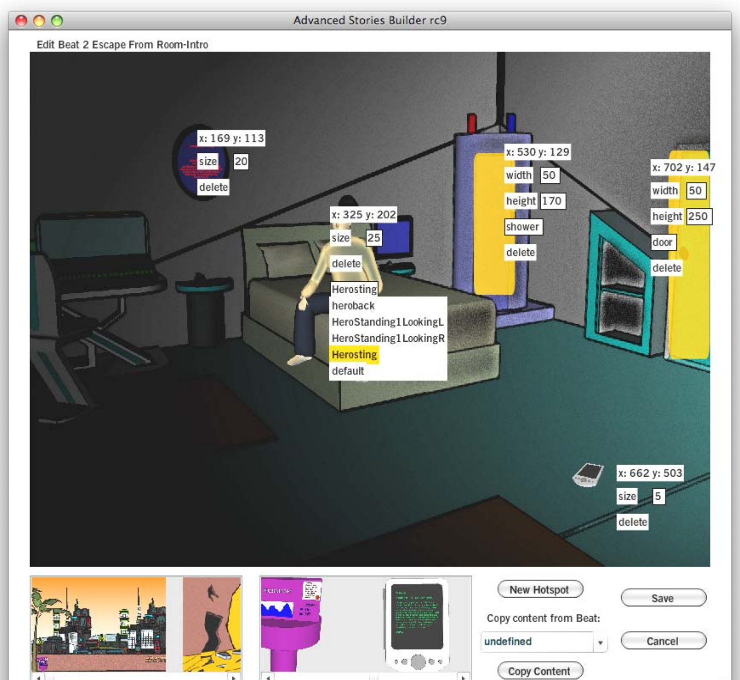

Figure 36. The Graphics Editor in ASB

4.6.2.3 ASE (Advanced Stories Engine}

Finally, the ASE component reads ASML files and referenced media assets and generates the presentation for the user. Repeated play-through is fully supported in ASAPS, and the ASE engine automatically resets all parameters for each repetition. A user can also save the current state of an IDN and resume at a later date. ASE is tightly integrated with ASB and aids during development with a debug function. A developer working in ASB can test her story in ASE with a click of a button in an iterative process of test-while-edit.

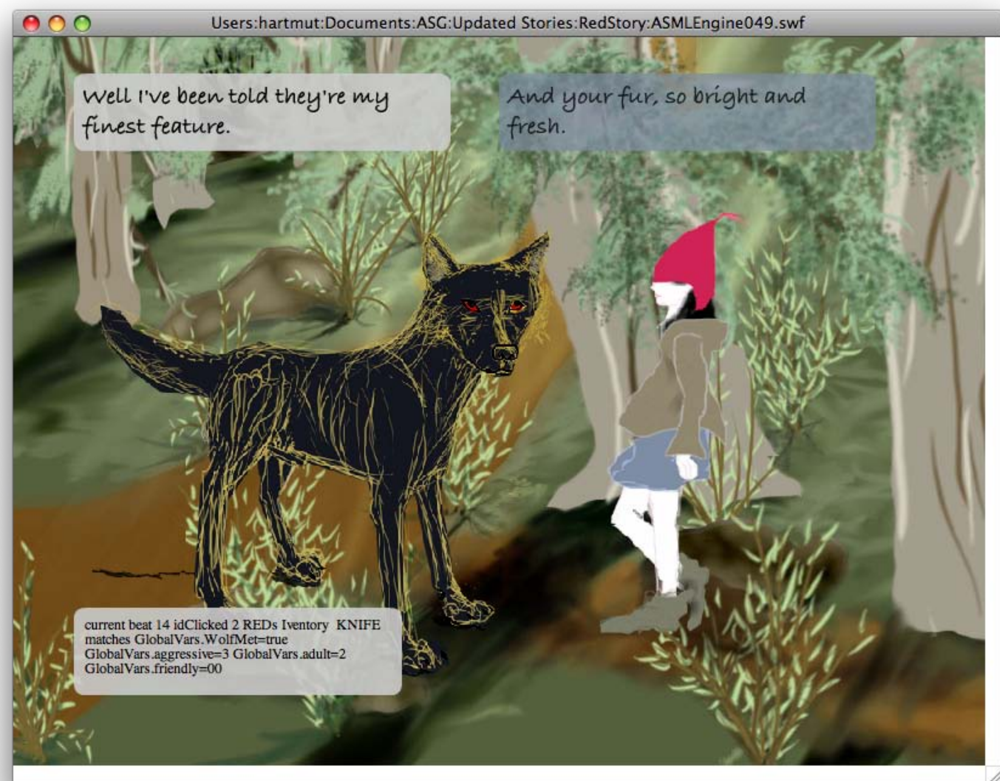

Figure 37. ASE presentation with debug overlay visible

4.6.3 Software Platform

Currently, the ASE engine and the ASB authoring tool are implemented in Adobe Flash and programmed in ActionScript language. The software is currently in public beta. The package is available for MacOS X and Windows platforms from the ASAPS web site. (Koenitz, 2008) A combination of open-source software packages neko (www.nekovm.org), haxe (www.haxe.org) and swhx (haxe.org/com/libs/swhx) are used to turn the Flash file for ASB into a standalone program. The engine component ASE is a Flash .swf file that is contained in the authoring tool and automatically copied when a new folder is selected for an ASAPS project. This file can be used for local playback on a computer's file system or integrated in a web page.

4.6.4 Features Not Yet Implemented

The focus for this first version was on developing the architecture and creating a usable and stable version. Many more features are planned for the future versions, especially in the areas of presentation, narrative representation for the author, and enhanced functionality.

3D representation and user control of movement will increase the range of possible visual styles in ASAPS. To broaden the audience, an engine version that is optimized for play back of ASAPS works on mobile platforms like the iPhone OS, Android OS, or Symbian OS is planned.

The representation of narrative design for the author in the AS Builder currently only displays an approximation of the overall structure of ASML narratives as a branching structure. What is missing from this representation is a visualization of the procedural aspects of ASAPS including the dynamic changes in state of counters and other variables and its effects on the system. For example, a part of an ASAPS narrative might be represented as a linear sequence of beats, but could contain many choices that influence counters and global variables. The experience of such a sequence can vary markedly as the interactor makes different choices and have very different consequences later on by means of condition checking beats. The following mockup shows a possible visualization of these procedural aspects.

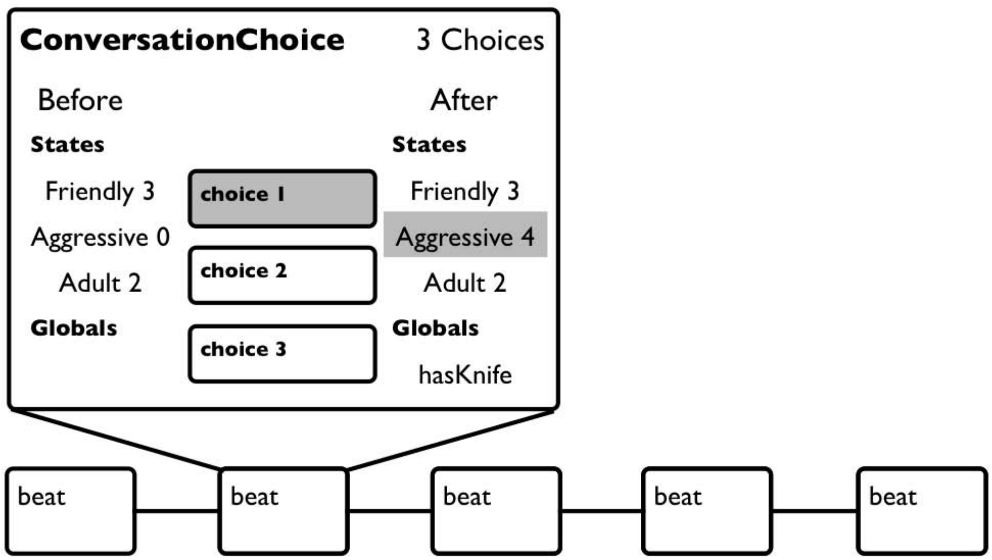

Figure 38. Visualization of procedural parameters

Another planned feature are “networked Beats”, which are intended to augment ASAPS with the ability to send parameters to and receive beat content from remote servers. This will enable many additional functions in ASAPS without burdening the system itself. For example, in concert with a text input function, a conversation could be realized by sending text to an online chatterbot service and displaying the reply in a beat. In a similar way, a query could be sent to a knowledgebase like Cyc (www.cyc.org) and the reply processed by ASAPS. Additionally, a function will be added to send the current state of an ASAPS narrative to a remote server and integrate the answer as "remote Beat" in the existing structure. In this way, beats could be created by other systems.

4.6.5 Future Directions

The long-term goal is to establish ASAPS as a standard interchange format and middleware between different systems. Similar to the way WWW enabled access to different media types and communication between different systems, ASAPS could serve this function in the IDN space. So far, a void exists that prevents competing system to communicate with each other. With an established standard, researchers could concentrate on specific issues like dialogue generation and use exchangeable components for the user interface and other aspects of IDN.

With the published ASML specs and a Document Type Definition (DTD) available online, other software developers are encouraged to create their own implementations of ASAPS. This would be a first step towards establishing a standard format for IDN.

4.6.6 Early ASAPS Narratives

ASAPS has been used to create several IDN works; these artifacts serve as an indication of the flexibility of ASPS architecture by accommodating different narrative and authorial styles.

Red's Path Through the Woods (2006) was the first ever ASAPS artifact, produced in 2006 by the ASG research group as part of the development of ASML and the ASMLEngine and originally coded by hand in an XML editor. *Red's Path Through* *the Woods* is loosely based on the brothers Grimm's popular fairy tale *Little Red Riding Hood* (Das Märchen vom Rotkäppchen). The main motive in this new version is character development as a result of an accumulation of decisions made by an interactor. The interactor is offered alternatives for many actions, but oftentimes does not encounter immediate repercussions. Instead – and is as often the case in real life – the consequences of several actions are presented only at a later stage.

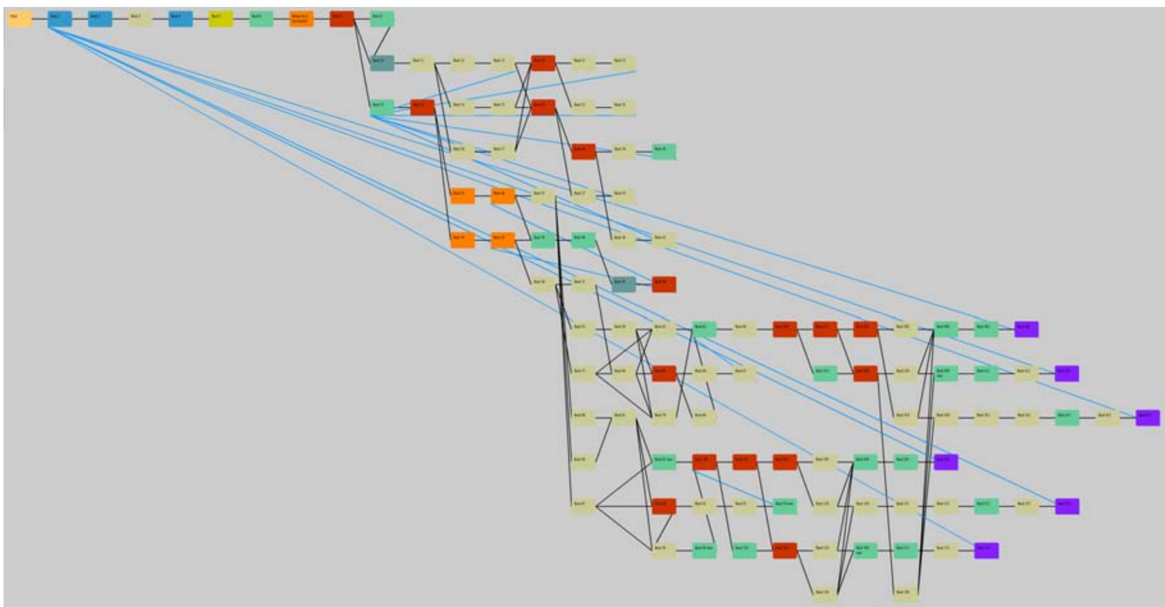

Figure 39. Structure of *Red's Path Through the Woods* in ASB's Graph view

Red's Path is comprised of 112 interconnected beats with several return paths (see diagram). The concept of delayed consequences is implemented by three counters, which are used to track different character traits; *friendly* for the nice, shy, and a little naïve girl, *aggressive* for the determined, forceful girl, and *adult* for the flirtatious girl in the process of discovering her sexuality. Every decision in *Red's Path* influences the counters, while great care was taken to make choices non-obvious, yet causally related to the respective character trait. For example, in a forest scene, the interactor can choose to leave the current path and engage the wolf directly and add to the adult counter because of Red's interest in the unknown beast, she can hide behind a tree and add to the aggressive counter as a expression of determined action, or she can continue on the current path as an expression of the friendly, shy girl that avoids all contact. Condition checking beats are used throughout the narrative, but especially during the last part to determine overall development and the options available to the interactor's character Red. For example, if the interactor avoided contact with the wolf, she will meet grandma later on, else the wolf will have overtaken her and await her, dressed in grandma's clothing. The discovery of an axe will allow Red to use this tool as a weapon against the wolf at a later stage. Also, if Red's character has flirted frequently before and consequently has a high *adult* counter, she has the option of "talking her way out" when attacked by the wolf later on. *Red's Path* has six possible outcomes, but a much larger number of possible walkthroughs, as a consequence of a narrative design with return paths and accumulated counters. The structure of *Red's Path* represents a narrative strategy that preferences branching based on accumulated variables.

Different authors have produced a number of additional stories. Katharine Fletcher create a short spoof on Batman and Robin stories with her work *Jingle Bells* (2007), which also served as a test bed for the use of sound and Flash animations in ASAPS. This works shares the preference for branching with *Red's Path* in a simpler structure.

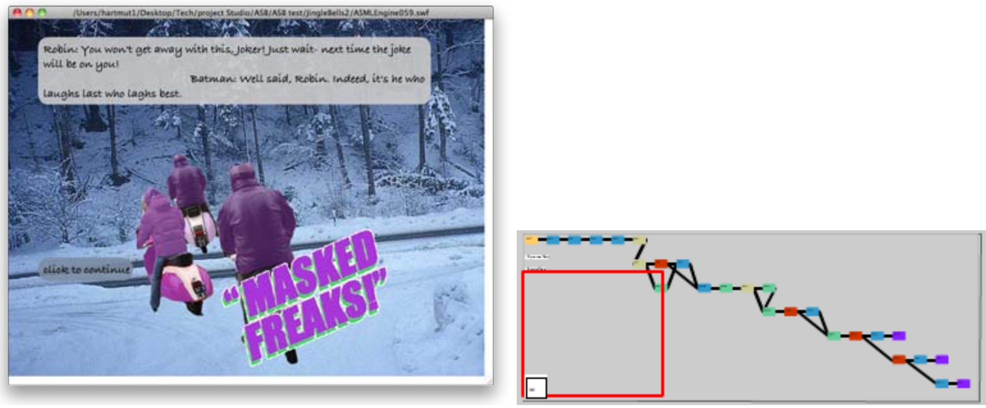

Figure 40. Scene from *Jingle Bells* and overview of the structure

Digdam and Tonguc Sezen's *The Multilingual Bus* (2008) explores issues of cross-cultural stereotypes in the setting of a university shuttle bus. This IDN work explores a different way of presenting delayed consequences. Instead of an emphasis on influencing later actions as in *Red's Path*, the structure shows a series of beats at the end of the narrative that check the condition of state counters and other variables. The results of this check are then relay to the interactors in a series of animation that form a coda to the main narrative.

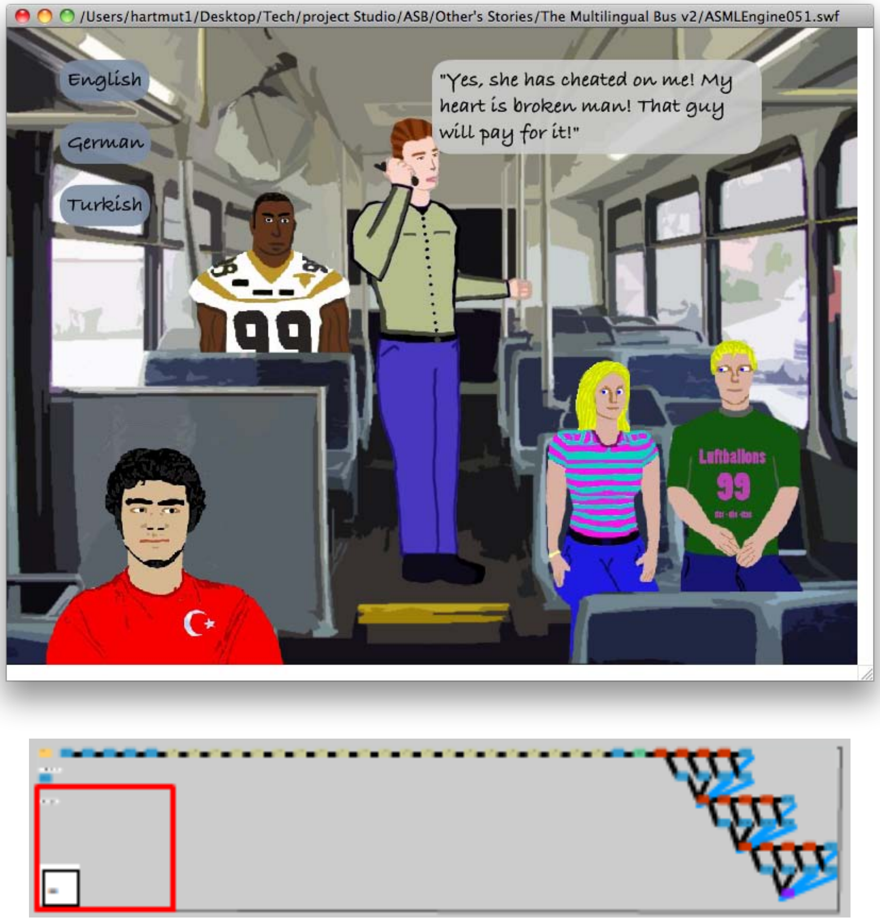

Figure 41. Scene from *The Multilingual Bus* and overview of the structure

Tonguc Sezen also created *Tears* (2009), a work in the tradition of adventure games. In *Tears* the interactor assumes the role of a journalist who lives in a colony on planet Mars and wakes up to an emergency alert. The journalist receives an assignment to investigate the catastrophe that has struck the colony and must first escape from his own apartment, which proves to be difficult since power is not available. During the course of the narrative, the interactor is faced with difficult moral choices, including the decision to rescue a potential attacker. *Tears* applies rendered nodes that give the appearance of a 3D game engine. The narrative design represented in the overview of the structure (see next page) reflects a spatial strategy based on different interconnected places, which are visible as clusters of beats.

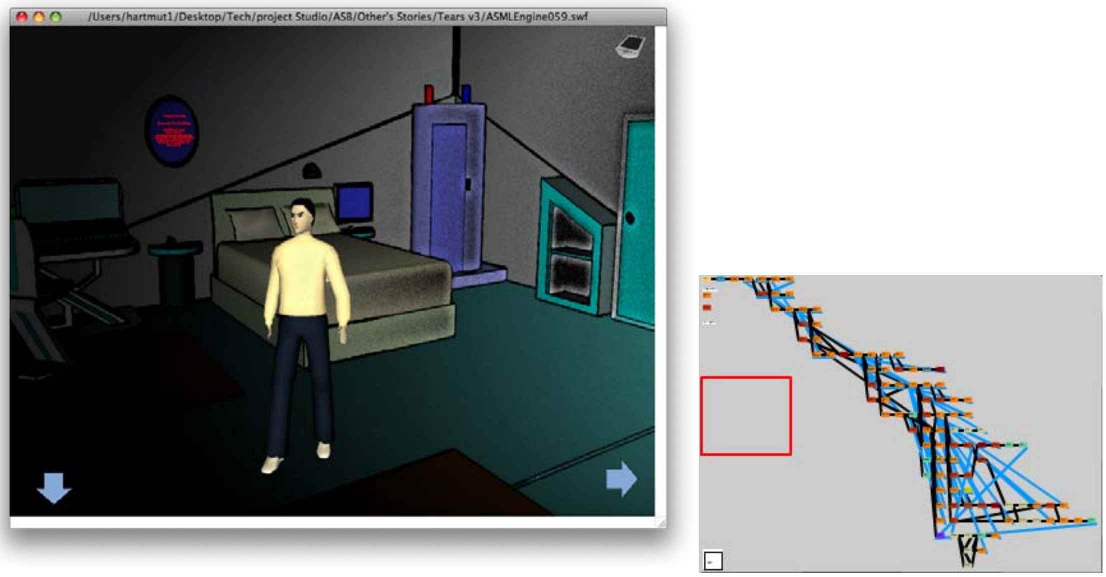

Figure 42. Scene from *Tears* by Tonguc Sezen and structural overview

Hank Blumenthal’s work *Reflections* (2009) puts the interactor in a New York apartment filled with the memories of a couple that lived there together. The memories are expressed as movie clips, which the interactor finds in the various rooms. By exploring the spaces and viewing the clips, slowly a story of love, betrayal, and finally, murder emerges from the discontinuous parts. Blumenthal, who has previously worked as a film director and producer, uses ASAPS to create an interactive experience that is initially bewildering, but rewards the interactor with a rich and captivating narrative. The structure represents a spatial narrative design based on the rooms of the apartment with the video clips as memory objetcs. In contrast to *Tears*, the structure here reflects the cyclic narration of *Reflections* in a tightly grouped representation of staggered beats (see figure 43).

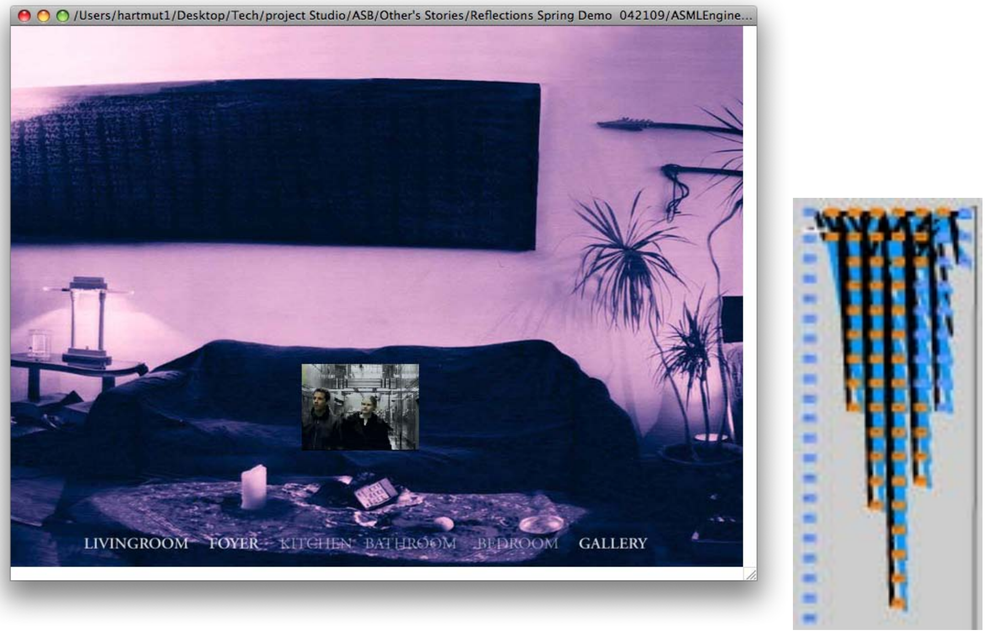

Figure 43. Scene from *Reflections* by Hank Blumenthal and structural overview

4.7 Preliminary Evaluation of ASAPS

The aim for ASAPS was to create a robust foundation that facilitates future revisions and enables additions by third parties. Modularity and extensibility were described as key aspects to enable these goals. Additionally, the theoretical framework introduced in chapter 3 with protostory, narrative design, and narrative vectors had its first practical implementation for the first time in ASAPS. While it is too early for a full evaluation of ASAPS, a preliminary evaluation of the technical goals and the effects and effectiveness of the implementation of the theoretical framework raises points important for continued development of the system.

Several observations can been made that demonstrate the validity of the overall technical approach. In the course of the development of ASAPS from 2006 to 2009, the

ASML markup language has undergone more than 20 changes[57], including the introduction of a new top-level category (settings), changes in the structure of beats (definitions of locations were changed, addition of default target and timers), and the addition of several beat types (randomBeat, videoBeat, swfBeat). Each of these changes was successively integrated as new features in the ASB authoring tool and the ASE engine. The architecture of ASAPS was flexible enough to accommodate these changes, which is testimony to the overall robustness. Accordingly, there is room for further expansion within the current framework in the future.

The modular approach allowed the asynchronous development of the ASE playback engine and the ASB authoring tool. In this fashion early experiments with TCP/IP communications for server-based assets were successfully made by only changing code in the ASE component. Similarly, the authoring component gained features like the Graph View graphical beat editor without requiring changes to any other parts of ASAPS. However, modularity so far has also meant extra work, since changes in ASML required changes in the code base for both ASB and ASE. For more efficient future development, the two code bases should be synched as much as possible to streamline development. The open source neko/haxe wrapper technology has turned out to be less stable on the MacOS platform than on Windows OS, especially when loading larger amounts of assets, as is the case with Hank Blumenthal's *Reflections.* Since the same code was working without any problems on Windows, the weak point here was clearly a deficiency in the platform-specific implementation of neko/haxe. In order to

[57] The example IDN work *Red's Path Through the Woods* developed by the ASG research group has been updated 20 times since its first public showing at the Digital Media Demo Day in December 2006

alleviate this problem, the loading mechanism had to be modified substantially to avoid crashes on MacOS. Such extra work should not be necessary and for the next major revision of ASAPS, a change in the development platform should be considered, for example to the cross-platform framework QT (see qt.nokia.com).

The questions regarding the practical implementation of the theoretical framework for IDN cannot be fully answered yet, as the results are inclusive so far. However, several aspects can be pointed out already, based on initial experiences and feedback.

The works discussed in the previous section show how ASAPS in its current form is able to accommodate different narrative strategies. To this extend the implementation of protostory in ASB has been successful in getting authors to experiment. However, the flexible toolset of ASAPS could support more complex narratives and radical experiments. Several features were requested based on author feedback (automatic transfer to another beat if the participant does not act in a given time frame, random next beat), but have not been used yet in any projects outside of small test implementations. One open question here is if further alienation of authors by introducing unfamiliar terms in the authoring environment (for example a different term for characters) would be helpful in brining about radically different narratives by making it more difficult to resort to legacy patterns of developing narratives.

The authors of the works described in the previous section have commented that seeing the narrative design in Graph View is very helpful in creating an IDN work. The structures produced by them differ markedly from legacy story structures, which indicate a successful implementation of the narrative design concept. However, narrative vectors need to be more visible, as these substructures of narrative design are difficult to identify currently. The proposed visual display of procedural parameters would greatly improve the visibility of narrative vectors and is therefore a priority of future development.

Overall, more research is needed to fully evaluate the success of the practical implementation of prototstory, narrative design, and narrative vectors. In order to gain a better understanding of the advantages and shortcomings of the current implementation, a public beta test will be conducted, which should result in many more examples to analyze and allow for a more conclusive evaluation.

4.8 Summary: Continued Development

The framework developed in this chapter is oriented toward practical aspects of IDN, and is especially concerned with authoring tools. Based on an analysis of existing tools, this framework consists of four perspectives for IDN authoring tools:

1) Avoid metaphors connected to legacy media forms like the timeline

2) Enable conscious choices by practitioners by making metaphors explicit

3) Authoring tools that incorporate particular approaches or traditions towards IDN are too limiting as a basis for experiments that aim to explore the full space of IDN

4) An underlying inclusive definition of IDN is necessary for an IDN authoring tool or it becomes arbitrary.

ASAPS is an implementation of this practical framework. Additionally, ASPAS implements the theoretical framework for IDN developed in chapter 3 and exposes the new terminology and associated structures to authors. Early results in the form of several works developed with ASAPS are promising but do not yet allow a conclusive evaluation. The sustainable development of ASAPS so far and the range of narratives created with the system warrant further investigation. The practical limits and the full expressive power of ASAPS have not been reached yet

CHAPTER 5

PARTS TO A PROCESS

The holistic view of IDN described in chapter 2 as encompassing a multitude of traditions, the theoretical framework developed in chapter 3, and the practical framework described in chapter 4 amount to a change of perspective on IDN. This last chapter will describe how these approaches provide productive avenues and answers to the challenges and problems described in chapter 1. Finally, these approaches will be combined as parts of an inclusive, open-ended, and iterative process for the future development of IDN.

5.1 Fragmentation/Positioning

The historical overview in chapter 2 surveys the many traditions related to IDN, and the associated narrative strategies and aesthetics. Rather than seeing these traditions as mutually exclusive or arguing for the superiority of any of these approaches, I have proposed using IDN as an umbrella term to describe a unified field encompassing many diverse traditions, which are complimentary in their effort to develop a new digital form of narrative expression. This change of perspective is intended to increase the exchange between the different camps. Fragmentation will be reduced as a result of practical experiments and theoretical insights based on a combination and synthesis of different approaches. Such hybrids could for example combine the procedural qualities of IF with the filmic aesthetics of interactive cinema or the character-based plotting of interactive drama planner systems with the intricate structures of HF literature.

Additionally, as a result of the view of IDN as field encompassing many traditions, practitioners and researchers could position their particular approach in relation to other approaches within the whole field of IDN and not only within one particular tradition. This would establish relationship between different traditions, and consequently improve the overall discourse by means of a better understanding of relative positions. For example, interactive drama approaches that foreground the causal consequence of individual walkthroughs can be seen in relation to HF's emphasis on complicated structures that foreground association. A topic for future research would be a complete mapping of the landscape of IDN to improve the understanding of relative positions even further.

5.2 Interactivisation

The term interactivisation is a new critical term proposed here to describe efforts to apply legacy narrative theory and practice to the affordances and phenomenological qualities of digital media. Works displaying the strategy of interactivisation take interactivity as an "add-on" feature to existing structures. Chapter 3 critiques interactivisation as conflicting with a definition of IDN based on the autonomy of digital media, with the cognitive-science based definition of narrative as a flexible mental model that can be evoked by many media formats, and with the affordances and phenomenological qualities of digital media. The reliance on legacy theoretical frameworks characteristic for interactivisation severely limits the potential of IDN for radically different forms of narrative expression by focusing on the product of IDN, which is most similar to traditional narrative.

The theoretical model proposed in chapter 3 instead changes the focus of inquiry from the narrative product to the narrative system and the narrative process. Furthermore, this model identifies instantiation as a major differentiating factor of digital media. Consequently, the need for a new definition of narrative categories like story and plot becomes evident, since these categories are insufficient to depict dynamic systems and processes that are subject to instantiation. The terms protostory and narrative design describe related functions in an IDN system, while the term narrative vector describes substructures of narrative design, which are equivalent to plot points. Protostory is derived from the concept of prototypical programming and describes a structure that is subject to instantiation and changeable at run time by a computational process.

In terms of content, IDN opens an additional avenue to pursue for practitioners. Legacy narrative is often understood to be character-driven or plot-driven. The procedural and participatory qualities of digital media provide a third possibility, of a system-driven narrative, primarily concerned with describing not people or events but the functioning of a complex social or cultural system. In this way, interactive narrative follows a similar change of focus made earlier in regards to the object by the cybernetic art movement in the 1960s and 1970s. Further experiments and research is required to determine if this "systemic object" will indeed prove to be a major topic in IDN works.

Finally, the relationship between IDN and legacy narrative forms is described in terms of mutual influence and a process of translation. From this perspective, IDN will continue to be influenced by legacy narrative works, however legacy narrative works cannot be transferred to IDN without limiting the affordances of digital media. Although individual tropes and narrative strategies of legacy narrative can be reused in IDN works, their use requires a process of translation and adaptation akin to the integration of filmic techniques of montage and framing in 20th century novels like the works of John Dos Passos (1925) and Alfred Döblin (1929). The theoretical framework marks a distinct departure from legacy media and thus liberates IDN research from the restrictions imposed by legacy frameworks. It also forms a basis for radical practical experiments by removing the need to conform an IDN work to legacy notions of story and plot.

5.3 Obsolescence

IDN works and authoring tools are affected by the rapid development of computer hardware and software and the incompatibilities introduced as a result. In this process, computer software can quickly become obsolete, as older software does not run anymore on newer computer systems, or only does so with considerable problems. In this way, much of the work of the Interactive Cinema Group at MIT is already lost, including, for example, the agent-based authoring tool described in Kevin Brooks PhD thesis (Brooks, 1999). This technical reality poses a serious challenge for academic research, which is based in part on the study of older artifacts and experiments. Obsolescence also limits the study of earlier works by practitioners, which has been instrumental for artists in other areas to shape their own practice.

One answer to the challenge of obsolescence is the practical approach described in chapter 4, which embraces an open and standards-based model similar to the World Wide Web. Tim Berners-Lee (1989) conceived the WWW as an addition to the established TCP/IP networking protocol standard, which allowed the deployment of the new technology on existing infrastructure. At the same time the www could integrate links to already established TCP/IP services like FTP. In order to popularize the new service, the source code for text-based browser was given out to interested parties, and the specifications of the HTTP protocol were published[58], which allowed other developers to extend the original capabilities. This structure has sustained development of the World Wide Web for more than 20 years now and therefore been proven to be robust and conducive to continued development. Three additional qualities are instrumental for this success – a preference for architectural strength that anticipates and incorporates future changes; a modular approach, which separated server, browser, and documents and enabled separate development; and finally the understanding of the WWW as a "middleware" that enables communication with already existing software, eg. database servers. This strategy allows the use of other software as a resource and thus greatly reduces the wasteful practice of the duplication of existing efforts.

The experimental implementation ASAPS attempts to implement the architectural strength of the WWW model and combine it with the theoretical framework developed in chapter 3. Similar to the World Wide Web, ASAPS implements a modular approach, an extensible markup language, and a perspective on the roles as middleware. In this way, ASAPS provides a solid architecture and implements enough IDN-specific features to be useful in its current form but leaves room for future expansion and the integration of existing resources like online knowledge bases or available text parsers. As an authoring tool, ASAPS enables designers to work on the level of protostory by exposing its components in the form of the categories of settings, environment, characters, and narrative design. The AS Builder component and its user interface with editors for beat

[58] See http://www.w3.org/Protocols/HTTP/AsImplemented.html, accessed April 2010

functions, narrative structure, and node content simplifies development of IDN artifacts and let practitioners focus on the creative part.

5.4 Research/Practice Divide

Some might say art is not compatible with a conceptual framework such as the one presented here and therefore any attempt to provide one is futile. Art, this argument goes, develops in an unpredictable manner and cannot be jumpstarted or directed. Consequently, other fields of academic research like literature and film studies concentrate on describing and analyzing works after the fact. However, there are precedents for exactly this kind of a close and continued relationship between a theoretical framework and a practice in the history of art. The proposed IDN movement resembles the avant-garde art movements of the early 20th century, in that a new form of human expression is developed alongside with a descriptive framework. In particular, Surrealism and Futurism developed in this very fashion.

Both of these movements can be understood as comments on political, social, and scientific developments in the late 19th and early 20th century. Specific interpretations of the state of western society and the role of the artist constitute the descriptive frameworks on which Futurism and Surrealism are based. For example, Surrealism as an art movement was born out of the discontent with the prevailing rationalism of its time, and its inability to account for fantastic phenomena. In this regard, Surrealism followed other anti-enlightenment art movements like Romanticism, and Gothic literature. However, Surrealism also was inspired by scientific exploration, such as Sigmund Freud's theories of dreams and the unconscious which provided the single most important starting point for the Surrealist movement. As an art practice, Surrealism favored new modes of seeing and writing by depicting uncanny shapes in painting, using distortions and other filters in photography and film and experimenting with "automatic writing" born out of semi-conscious states.

Conceptual frameworks such as this were articulated and published in the form of manifestoes. In the case of Surrealism, the French Artist André Breton defines the new movement in the first Surrealist Manifesto as follows:

> SURREALISM, n. Psychic automatism in its pure state, by which one proposes to express -- verbally, by means of the written word, or in any other manner -- the actual functioning of thought. Thought, in the absence of any control exercised by reason, exempt from any aesthetic or moral concern. […] Surrealism is based on the belief in the superior reality of certain forms of previously neglected associations, in the omnipotence of dream, in the disinterested play of thought. It tends to ruin once and for all other psychic mechanisms and to substitute itself for them in solving all the principal problems of life. (Breton, 1972, p. 26)

This definition summarizes the essential qualities of Surrealism: the interest in articulating "internal processes", the view that these thoughts must be recorded in a passive, uncensored way, and the belief in the "omnipotence of dream" as a means of solving essential problems of life.

Marinetti's 1909 Manifesto of Futurism (Marinetti, 1909) was the first in a long line of similar art manifestoes that have been produced by different art movements even since (see "Art manifesto," 2010). However, both the Surrealist and the Futurist manifestos stand out since both were amended and updated as the interpretative stands, theoretical positions, and the related art practice developed. In the case of Futurism, at least eleven manifestoes were written until 1933 by different authors to clarify the movement's positions on artistic and political matters, for example on painting, sexuality, and religion (see Apollonio, 1973). In the case of Surrealism, Breton published two iterations of the Surrealist Manifesto in 1924 and 1930 and worked on a third version during the late 1930s and early 1940s, which is referred to in his essay *Prolegomena to a Third Surrealist Manifesto or Not* (Breton, 1972) from 1942, as well as a range of other writings to clarify surrealist positions.[59] Amongst the changes propagated was an endorsement of the Marxist principle of dialectical materialism as an analytical tool and an emphasis on the practice of group actions.

An important lesson from both the Futurist and the Surrealist movements is that the manifestoes eventually attempted to steer the whole movement in particular political directions, towards Fascism in the case of Futurism and toward Communism in the case of Surrealism, which led to their ultimate demise. Once locked onto these specific goals, the manifestoes had lost the ability to integrate new artistic developments, adapt the framework accordingly and provide a direction for future work.

5.5 An Inclusive Open-Ended Iterative Process for IDN

Despite their failures, both Futurism and Surrealism provide a key piece towards a structure for future IDN research and practice by highlighting the importance of an inclusive process in which practice and theory mutually participate. The lengthy process that is evident in the continuing revisions and refinement of the manifestos bears testimony to the sustainability of this kind of relationship between art theory and practice. This concept can be turned into a productive structure for IDN research and practice when it is combined with two key concepts from the successful model of the World Wide Web – openness and iterative progress.

[59] Nine separate publications are presented in (Breton, 1972)

Unlike the technical perspective on the WWW as a successful model of software development foregrounded in chapter 4, this perspective focuses on structural aspects. In this regard, openness and an iterative approach distinguish WWW from similar projects and are instrumental in its success. An important aspect of this strategy is the creation of working software that is "good enough" in each iteration to give users a useful and valuable experience, but does not attempt to be overly ambitious in computational terms and leaves more advanced features for future iterations and add-ons. This strategy contrasts with Ted Nelson's Xanadu project (Nelson, 1981), which described a more ambitious approach, and offered many advantages over Berners-Lee's 1989 proposal[60], but took more than 30 years to implement[61] and has yet to come to completion as a useful system.

The aspect of openness contrasts with the formulation of a specific goal. A clearly specified goal has the advantage of focusing development, and its absence can lead to long, and tedious discussion about future directions. The "browser wars" of the 1990s, during which several different extensions of the HTML standard competed in the form of various browser applications, are a testimony to this problem. However, these problems were ultimately resolved and arguably resulted in better technology and a better user experience. For the development of an emerging field such as IDN, the advantages of an open model outweigh the negative aspects as long as a structure channels these discussions. Such a structure is provided by the integration of openness in an iterative process. In this way discussions about future directions are made productive, by

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[60] For example, Nelson proposed non-breaking links, an integrated versioning sustem, copyright protection, and micropayment to compensate authors.
[61] A downloadable version of Xanadu was made available on the Xanadu website in 2007.

understanding them as a part of a long-term process and by subjecting them to the corrective of small, iterative steps.

The inclusive, open, iterative process I am proposing would be an adequate model for IDN research and practical experiments because changes on both sides would be anticipated and could be integrated in the existing framework. The theoretical framework in chapter 3 combined with the practical framework and experimental implementation described in chapter 4 are designed as starting points for this process. Both of these parts are expected and indeed intended to be the subject of continuing refinement, revisions, and additions. This approach contrasts with theoretical definitions and practical frameworks designed to meet only the needs of a particular approach or singular artifact, and are in danger of becoming obsolete quickly in the light of the nascent and steadily changing nature of IDN. Instead, the perspective presented in this thesis re-casts IDN research and practical experiments as a continuous process, which mirrors the procedural nature of digital media itself.

5.6 Where to go from here

This thesis reframes IDN as an emerging, yet emancipated expressive narrative form that cannot be adequately described or understood with references to legacy narrative theory or practice. The theoretical and practical frameworks developed here should serve as starting points for future research and practical experiments.

In the theoretical field a finer-grained analysis of existing IDN artifacts should aim to identify genres and structural elements and extend the theoretical framework introduced here. On the practical side, ASAPS should be extended in the manner laid out in chapter 4, to allow the creation of more sophisticated artifacts and the inclusion of functionality from other areas of IDN research. The near goal for practical experiments would be in implementing and evaluating narratives structures that avoid legacy notions like a Freytag-style story arcs and instead apply the concept of narrative design and narrative vectors to find narrative structure that are emotionally satisfying and aesthetically pleasing. The findings of these experiments would help to refine the theoretical framework and shape successive experiments in accord with the concept of a shared iterative process. Another important undertaking is the development of a design vocabulary for IDN. Shared between descriptive theoretical frameworks and practical experiments, it would be influenced by both. Its significance would be in facilitating the dialog amongst practitioners and researchers and supercede the current vocabulary based on legacy media that masks the particular qualities of IDN.

Interactive digital narrative has come a long way since Weizenbaum's *Eliza* demonstrated the expressive power of digital media for the first time. More than four decades later, much insight in this power has been gained, but a large unchartered territory remains. It is exciting to expand the range of human expression by exploring these unknown provinces and discovering new forms of narrative.

APPENDIX A:

ASAPS USER GUIDE

ASB

ADVANCED
STORIES
BUILDER

User Guide

Version 1.0

Table of Contents

Introduction

The Advanced Stories Builder (ASB) allows you to quickly create interactive experiences such as games, interactive narratives, or training exercises. It can also be used as a rapid prototyping tool for projects that require more elaborate features. ASB requires no coding, and works with regular graphics, animation, and video file formats. Prototypes can be built entirely within ASB, without any additional files.

ASB is part of the ADVANCED STORIES AUTHORING AND PRESENTATION SYSTEM (ASAPS), developed by the Advanced Stories Group at the Georgia Institute of Technology. The design goals for the ASAPS system were modularity, extensibility, and simplicity. ASAPS is fully cross-platform and works on Macs (OS X 10.4 and 10.5) and Windows (XP and Vista). The AS system is the result of 3 years of research and work in building a new system from the ground up. Its first goal is to provide a solid foundation that allows for future growth. To that end, it is modeled after the system behind the world wide web, with story files (similar to web pages), a playback engine (the equivalent of a browser), and an authoring tool (ASB, the “Dreamweaver” for story files). Story files are written in an XML-based markup language (ASML) that was invented by ASG. The ASMLEngine plays back the story files, and generates the representations for the user to interact with. The ASB provides an easy and fast way to create the story files. The development of the system will continue and we have planed many exciting new features for the future.

The Advanced Stories Group was founded in 2005 by PhD student Hartmut Koenitz. Dr. Janet Murray is the faculty advisor to this group.

Some General Concepts

There are a few general concepts in the *AdvancedStories* system. Understanding these concepts makes it easier to work with ASB:

- **Document** and **Engine**: stories created in ASB are saved as ASML (Advanced Stories Markup Language) in a file called *Story.xml*. Additional files (graphics, videos, animations) are linked to from the story document. The engine reads the story file, finds the referenced graphics/videos/animations, and creates the experience for the interactor. This is similar to how web browser work.

- **Props**: Like in drama, props can be everything from a knife to a spaceship. The interactor can add props to her/his inventory

- **Nodes:** backdrops for visual beats, can be shared by many different beats.

- **Characters:** the characters in your story.

- **Beat:** The smallest functional unit in a story generated with ASB. In other words: you create, edit, and link beats to produce stories

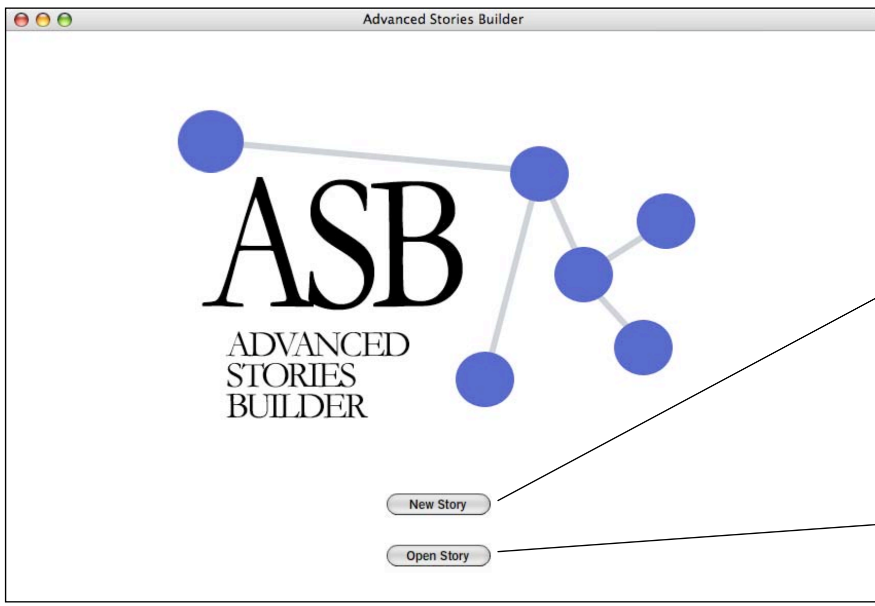
To learn more about the terms and definitions used in ASB, have a look at chapter 5: *AdvancedStories Definitions*.

Quick Start

If you want to dive right in, skip the Overview section and go directly to the tutorials. You may want to come back to the overview later, to learn more about additional features available in ASB.

Feature Overview

Splash Screen



New Story
This button creates a new story in the ASB.

Open File
This button loads a pre-existing story into the ASB.

Main Controls

Story/Creator Name
Type the name of your story in the first field and the creator in the second one. Both will appear automatically on the title screen of your story.

Settings Tab
Click this tab to go to the Settings screen, with debugging and text box tools.

Nodes/Props Tab
Click this tab to go to the Nodes and Props screen, where you can add and edit the objects in your story and the node backgrounds.

CHARACTERS Tab
Click this tab to go to the Character screen, where you can add and edit characters and counters.

PLOT Tab
Click this tab to go to the Plot screen, where you can add and edit story beats and the graphical elements of the story.

Test Story
This launches the current story in the engine.

Undo/Revert
Undo removes the last change you made, revert goes back to the last saved version.

New Story
Use this to start a new project.

Open Story
Use this to open an existing project.

Save Story
This button saves the current story.

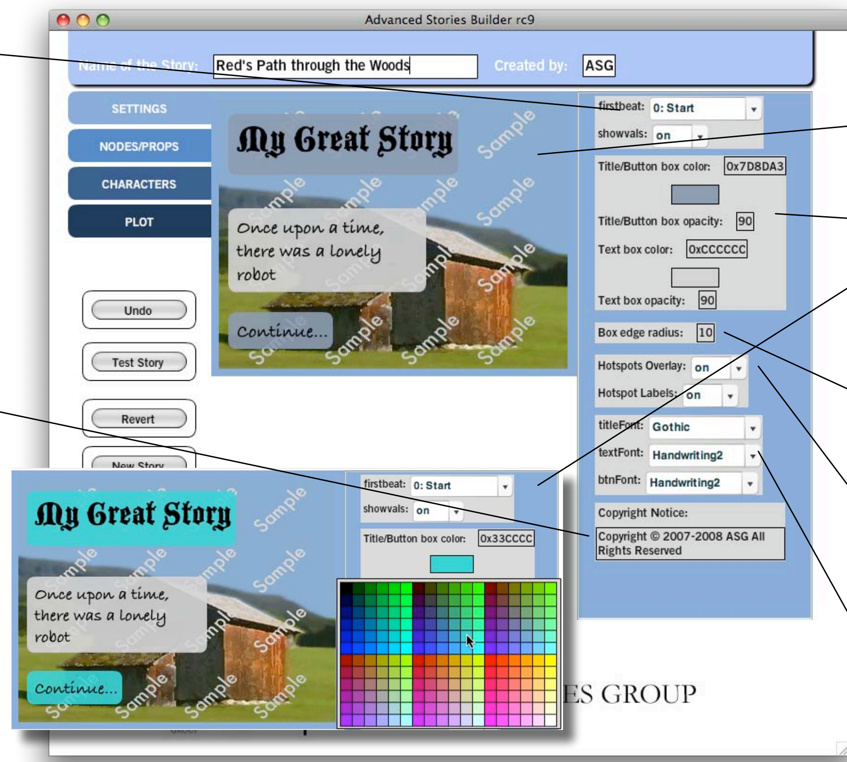
Save Backup Copy
Saves the current story file under a new name in the folder you select.

Settings Screen

Debugger
You can start the story at a specific beat by changing the value in the "firstbeat" field.

The default setting displays the debugging information in the corner when the story runs. You can hide this by changing the "showvals" field value to "off."

Copyright Notice
This copyright notice will be saved in your story file. The normal form is "Copyright © *Year Author* All Rights reserved"
The copyright notice is not visible in the engine.



Text Preview
Preview your font and color choices as they will display in the story.

Background Color, Story Text Boxes
You can change the opacity and color of text boxes here. Click on the color swashes to select a color (see inset). You can also input a hexadecimal color

Box Shape
You can change the amount of curve in the corner radius of the text boxes.

Hotspots
You can decide if hotspots are visible and if the labels are displayed.

Fonts
You can select different engine fonts for the text in each of the 3 types of boxes.

Props and Nodes Screen

Prop
Each prop added to the story appears in a light grey box like this.
prop id: the identification number
unique to each prop; automatically added by system
prop name: the name you give it
Asset File: the name of the graphics file

Node
Each node added to the story appears in a dark grey box like this.
node id: the identification number
unique to each node; automatically added by system
node name: the name you give the node
Asset File: the name of the graphics file

New Prop
Click this button to add a new prop to the story.

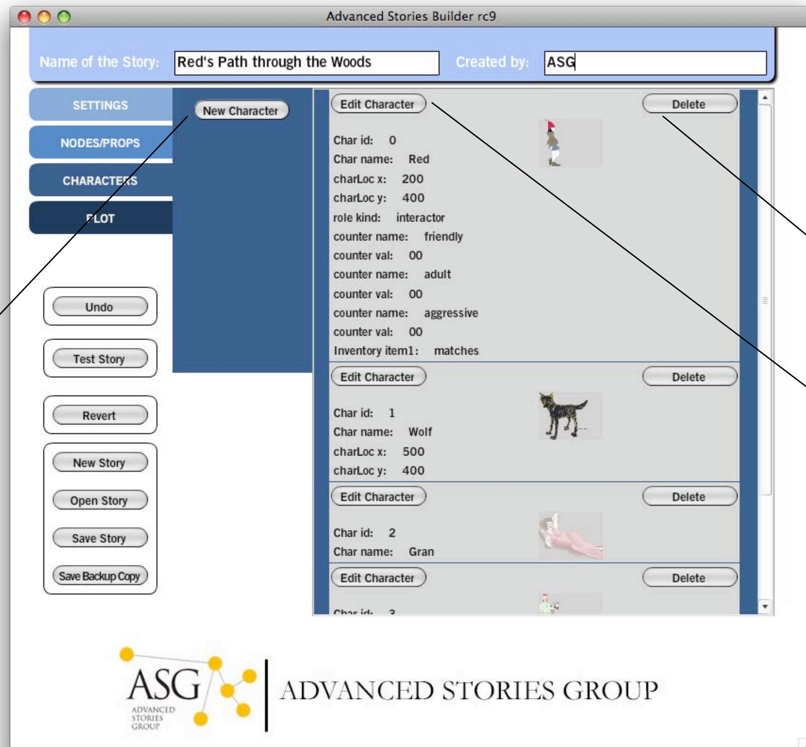
New Node
Click this button to add a new node background to the story.

Delete
Click these buttons to delete a particular prop or node.

Characters Screen

Character
Each character added to the story appears in a box like this.
Char id: the identification number unique to each character; automatically added by system
Char name: the name you give the character

New Character
Click this button to go to add a new character with the Character Editor.



Delete
Click these buttons to delete a particular character.

Edit Character
Click this button to go to the Character Editor, which enables you to add graphics, states, counters, and items to that character's inventory.

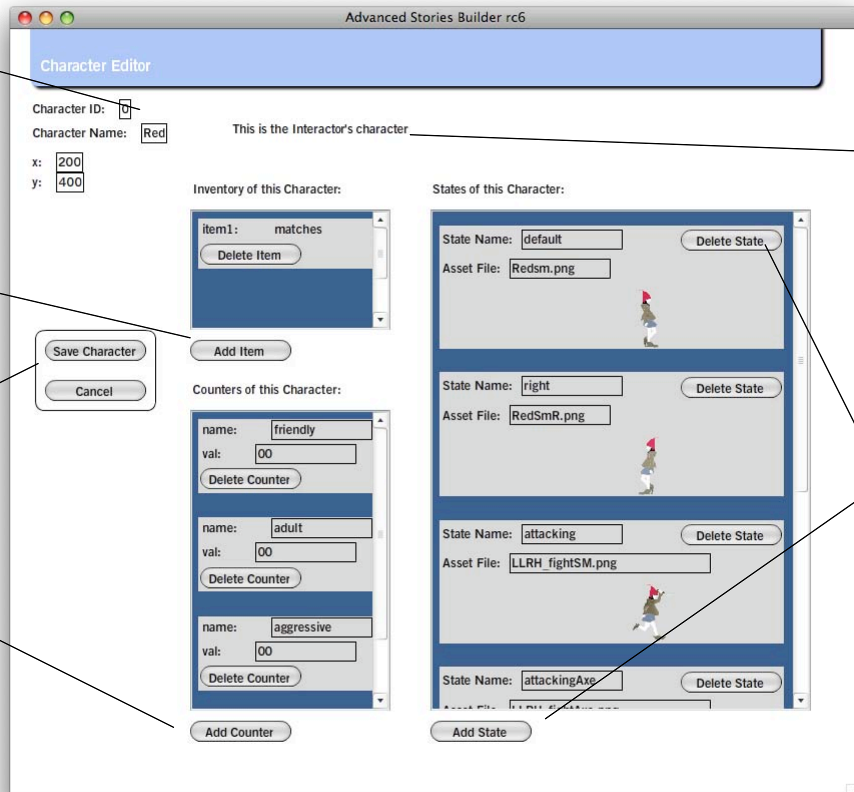
Character Editor

Character Name/ID
You can change the character's name here.
The ID is assigned by the system and should not normally be changed.

Inventory
Click this button to add an Item to the character's inventory

Save/Cancel;
Use these buttons to leave the character eidtor

Counters
Click this button to a counter to the character. You need to specify a name and an initial value.



Interactor role
One character must be designated the interactor's character. Once it is set, the button disappears for this character

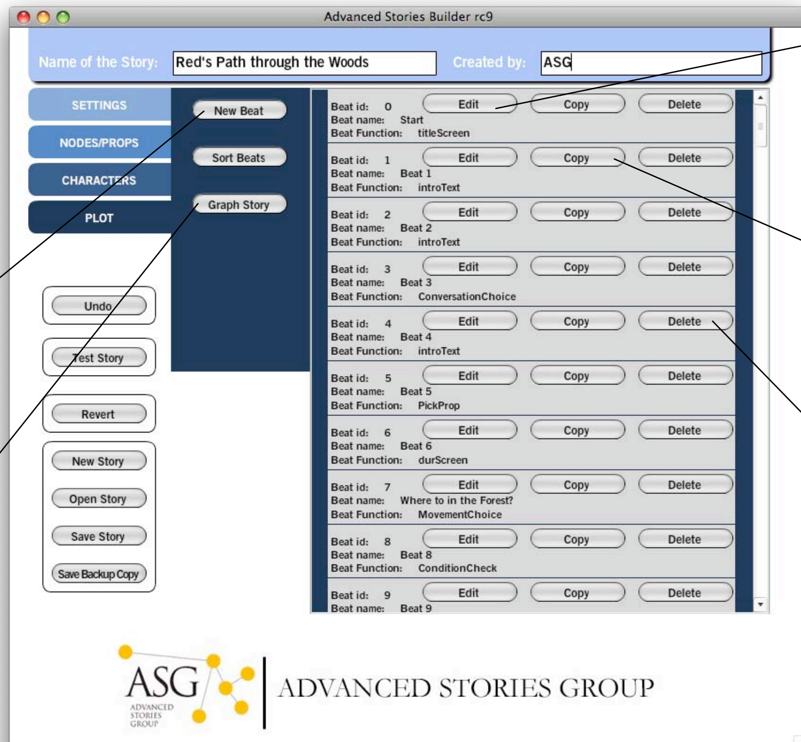
States
You add and delete states (different graphical representations of a character) here

Plot Screen

Beat
Each beat added to the story appears in a box like this.
Beat id: the identification number
unique to each beat; automatically added by system
Beat name: the name you give the beat

New Beat
Click this button to add a new beat to the story.

Graph Story
Click this button to generate a graph of the story.



Edit
Click this button to edit the beat, including the type of beat, adding text, and which beat should follow this one.

Copy
Click this button to copy this beat. A new beat with the same parameters and content will be added to the list

Delete
Click this button to delete this beat from the story.

Graph Story Screen

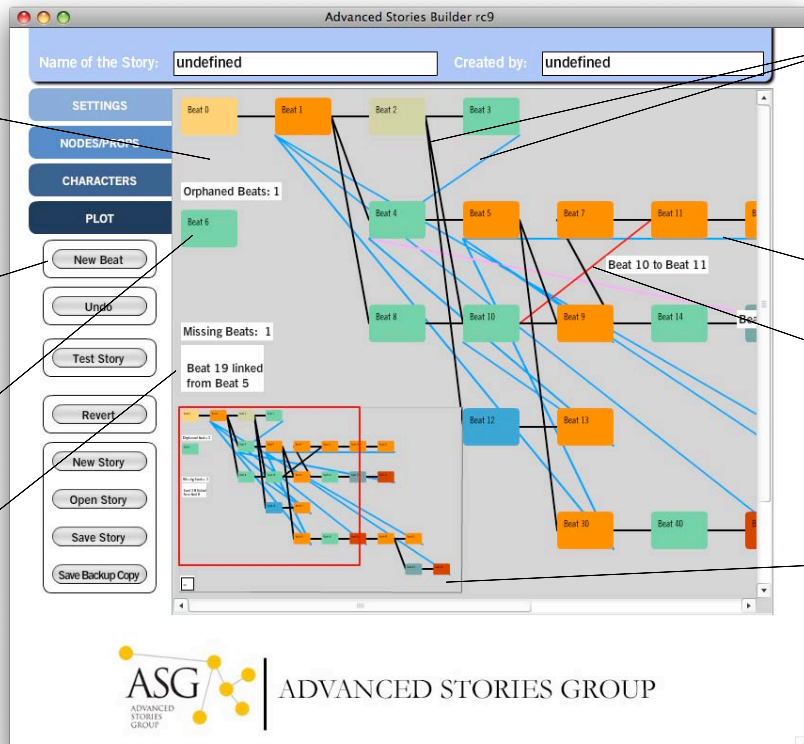
Beat Map
The ASB maps out the beats currently in your story. Different colors represent different beat functions like ConversationChoice or IntroText.

You can edit Beats by clicking the beat symbols

New Beat
Click this button to add a new beat to the story in the Story Graph view.

Orphaned Beats
This notifies you of any orphaned beats. These are beats that are not connected to any others.

Missing Beats
This notifies you of any missing beats. These happen when you specify a target beat, when that beat does not yet exist.



Beat Connections
These lines indicate connected beats. The incoming connection attaches at the left-hand, while the line coming out of the right-hand side leads to the target beat.

Blue connections mark returns

Mousing over connections result in a pop-up showing the names of the beats connected. Also the connection is highlighted

Navigation Map
This shows a miniature overview of the story graph. The red rectangle depicts your current location. Click the -/+ in the lower left corner to hide/show the map

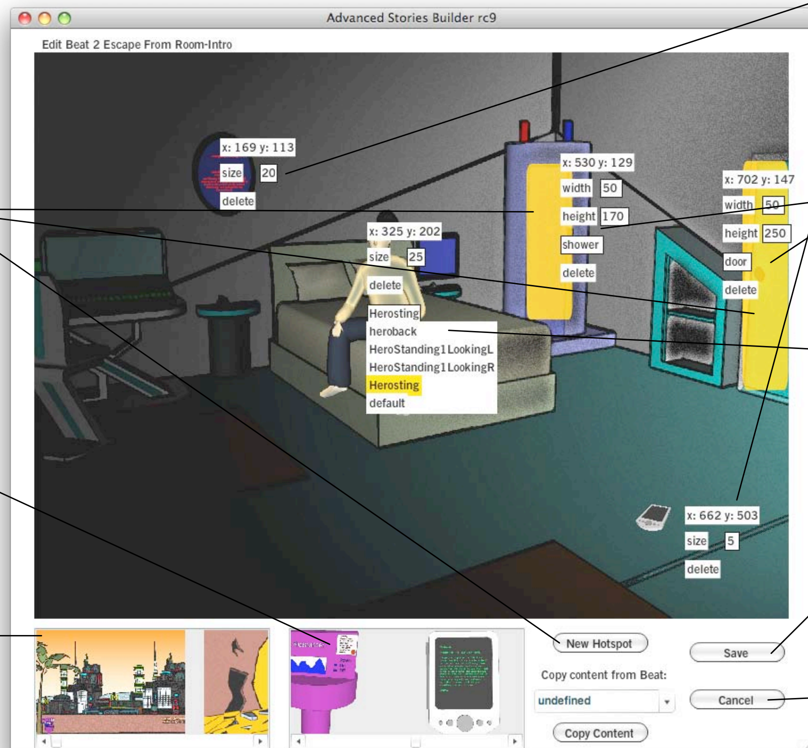
Graphics Editor Screen 1

Graphics Editor Screen
The Graphics Editor lets you arrange the visual elements of a beat. Move Props/Characters and Hotspots around to change their location

Interactive Hot Spots
You can place interactive fields over the background for PickProp and MovementChoice beats. New hotspots are created with the button below

Placing Props/Characters
You can view the available props/characters here. Click on the thumbnail image to place it on the beat screen. around on

Available Nodes
You can view the available nodes here. Click on the thumbnail image to place it on the beat screen.



Prop Control Options
You can control the size of a prop by typing in the size field. You can remove the prop by clicking the delete button.

Hotspot Control Options
Hotspots can also be named for easier referencing

Character Control Options
For a character, you can choose the state in a pop-up in addition to size and location

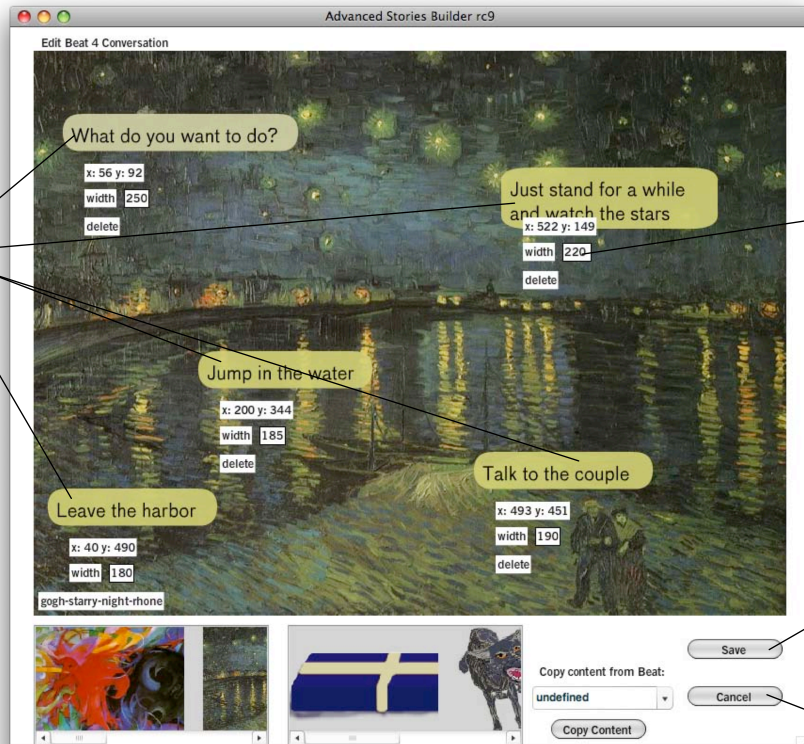
Save
Click the Save button when you are done editing your beat visuals.

Cancel
Click the Cancel button to go back to the beat without saving.

Graphics Editor Screen 2: Text Placement

Graphics Editor Screen Text Placement
The Graphics Editor lets you arrange text boxes on a node by dragging or changing the *X* and *Y* values. Also, you can change the width of textboxes. Text flow will automatically adjust to the new width.

Hint: You only adjust the look and placement of textboxes here. Text itself is entered the respective beat's Edit window (see next section)



TextBox Width
Change this number to adjust the width of the textbox.

Save
Click the Save button when you are done editing your beat visuals.

Cancel
Click the Cancel button to go back to the beat without saving.

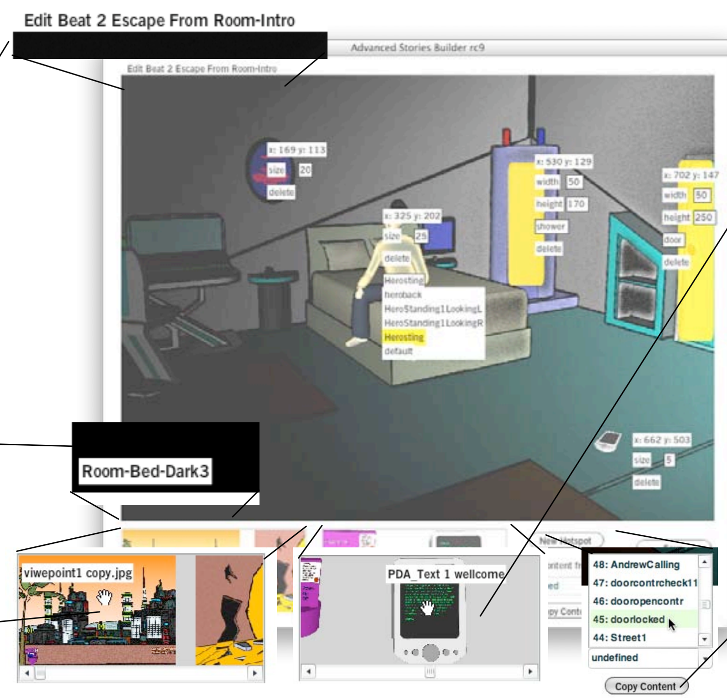
Graphics Editor Screen 3: Details

Graphics Editor Screen Details
The Graphics Editor displays useful information and lets you copy content from other beats

Current Beat ID und Name
The ID and name of the current Beat are displayed in the upper left corner.

Current Node
The name of the currently placed node is displayed in the lower left corner when you mouse over a node.

Node Name
Mousing over a node shows the name of the node.



Prop/Character Name
The name of a prop or character is displayed when you mouse over.

Copy Content
To copy content from another beat, select a beat in the pop up and click the button *Copy Content*

Beat Functions

AdvancedStory projects divide narrative and functional action into discrete units called "beats." When used as narrative structure, a beat contains one moment in time (such as a decision). A beat also performs one specific action, which may be hidden from the interactor. There are 12 different kinds of beats, or beat *functions*: TitleScreen, IntroText, durScreen, ConversationChoice, MovementChoice, PickProp, SetGlobal, ConditionCheck, VideoBeat, SWFBeat, randomTarget and EndScreen.

Each beat type has different variables and options that affect how it operates and appears in the story. There are two main types of Beats – visible ones and invisible ones. Visible beats are TitleScreen, IntroText, durScreen, ConversationChoice, MovementChoice, PickProp, VideoBeat, SWFBeat, and EndScreen. Invisible Beats are SetGlobal, randomTarget and ConditionCheck. The visible Beats present content to the user, while invisible beats perform behind the scene setting of variables and conditional branching.

General Beat Editing

New beats are created by clicking the *New Beat* button in the Plot screen. We recommend you change the default Beat Name for each beat. The options in the Beat window change depending on the type of the beat. Click on *Save New Beat* to add the beat to the list of beats on the right. You can edit beats by clicking the *Edit* button in the respective beat's box. This will open the *Edit Beat* window. The appearance of the *Edit Beat* window is different for each Beat type, the different windows are shown on the following pages.

Adding Visual Content

While you can build a text-based in ASB story without adding any graphics, visual content greatly enhances the expressive options available to you as the creator.

Size and File Formats

Before you import any graphics into ASB, take note of the following specifications for graphics, videos and animations. For props and characters, both file formats support transparency, so that your objects blend seamlessly with the background. Most modern image editor programs allow you to create PNGs with transparencies, for example Adobe Photoshop.

Nodes (Backgrounds):
Size: 800x600 pixels
File formats: JPEG, SWF (Flash animation), FLV (Flash video file)

Props/Characters:
Size: can be scaled in ASB, but should normally be smaller than 800x600 pixels
File formats: PNG with transparency, SWF (Flash animation)

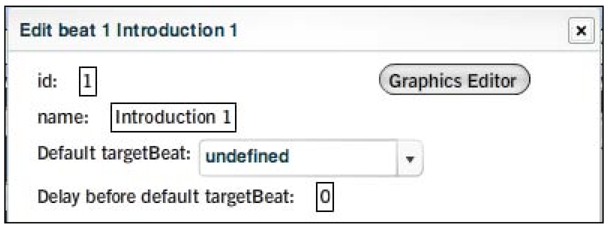
Editing visual beat content

Before you can add graphics to a beat, you need to bring it into ASB in the form of Props, Nodes, and Characters. Please refer to the tutorials on how to accomplish this. Once you have added graphics, you can click the *Graphics Editor* Button in any visual beat to add visual content to a beat – see tutorial 6.

Default targetBeats

Several beat types (*TitleScreen*, *introText*, *ConversationChoice*, *MovementChoice*, *PickProp, EndScreen*) can have a *default targetBeat*. A default target beat becomes active after a set time delay, which means the story will jump to this beat automatically. This creates interesting possibilities for the flow of your story. Essentially you can put the interactor under time pressure to make a decision. You can also make a story that runs on its own, as long as the interactor does not interrupt.

Note: The *default targetBeat* functionality is optional, if you don't want to use it, leave the standard values (undefined and 0) alone. You can define for each beat individually if you want a default beat or not.



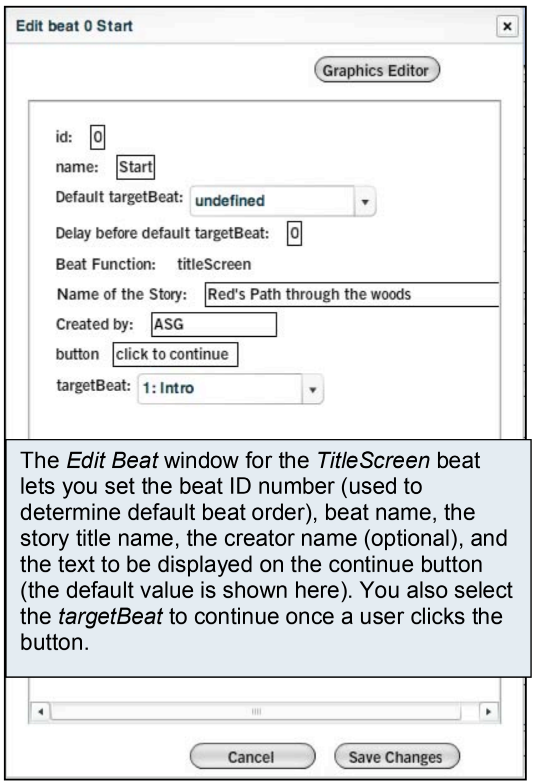
The upper part of an *Edit Beat* window with the *default targetBeat* section.

Select the destination for the default targetBeat from the pull-down menu.

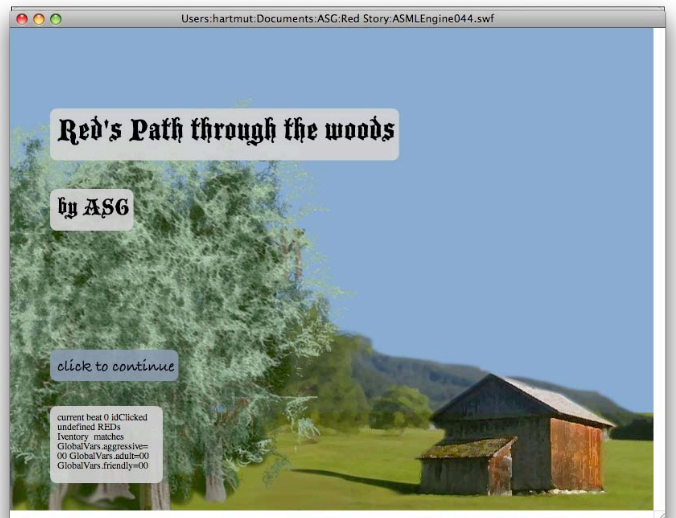
Change the delay to something other than *0.* This value is in milliseconds, so 1000 equals 1 second.

TitleScreen

The *TitleScreen* Beat automatically appears when you start a new story. It may be deleted if you do not want to start your story with a title screen. You can use the Graphics Editor to add images or video that you have uploaded as nodes or props. Title and creator font appearance is edited in the Settings screen.



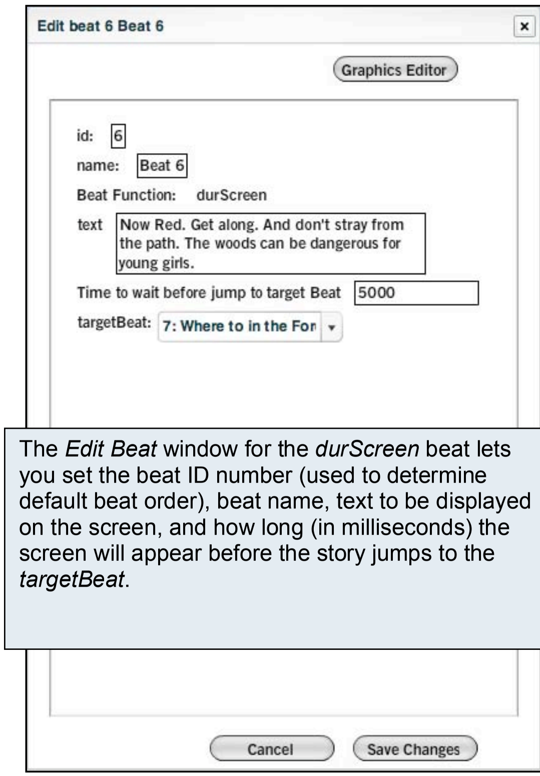
The *Edit Beat* window for the *TitleScreen* beat lets you set the beat ID number (used to determine default beat order), beat name, the story title name, the creator name (optional), and the text to be displayed on the continue button (the default value is shown here). You also select the *targetBeat* to continue once a user clicks the button.



This Title Screen displays the values entered in the TitleScreen beat window at left.

durScreen

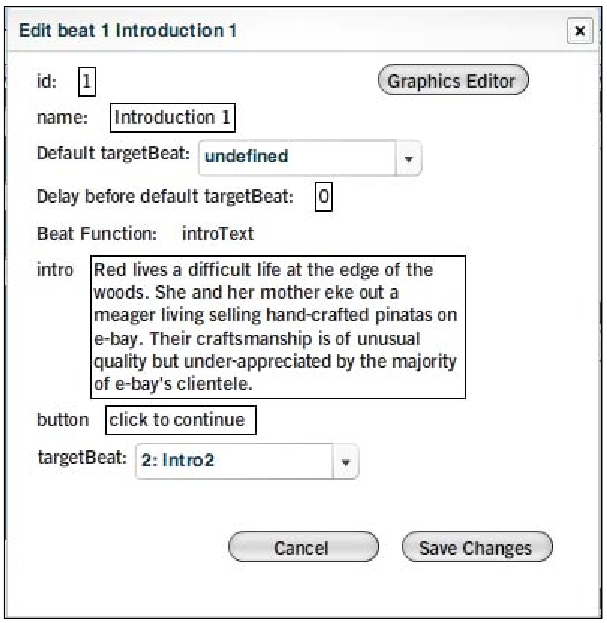
The *durScreen* beat function displays a screen for a set amount of time, after which the engine automatically moves to the target beat. You can place a node and props or characters in a *durScreen* beat using the Graphics Editor. The *durScreen* is useful to control the pace of the story, and to dislocate or interrupt the interactor's feeling of control over it.



The *Edit Beat* window for the *durScreen* beat lets you set the beat ID number (used to determine default beat order), beat name, text to be displayed on the screen, and how long (in milliseconds) the screen will appear before the story jumps to the *targetBeat*.

IntroText

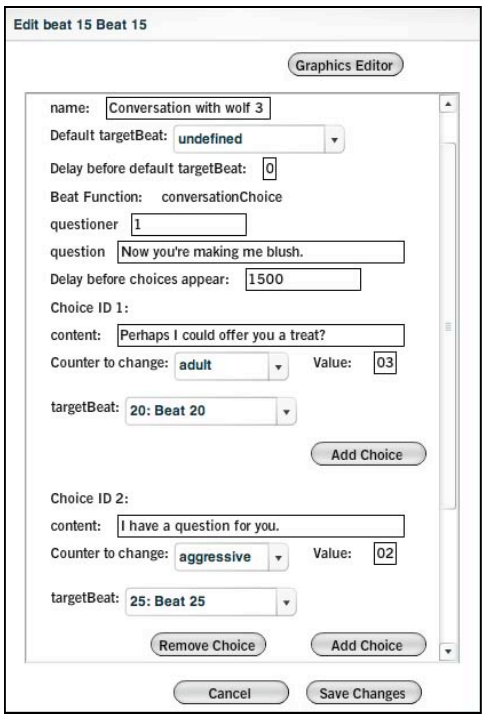
The *introText* beat function displays a screen with text. The story pauses until the interactor clicks the continue button, after which the story jumps to the next beat. You can place a node background and props or characters in an *introText* beat using the Graphics Editor. The *introText* function is useful for large sections of narrative text, and for maintaining the interactor's interactive relationship with the story.



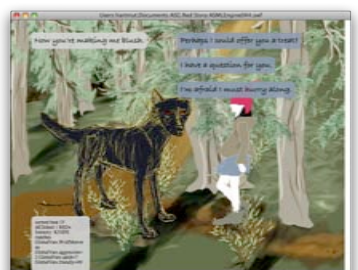
The *Edit Beat* window for the *introtext* beat lets you set the beat ID number (used to determine default beat order), beat name, a *Default targetBeat*, and the *Delay* before the default targetBeat will become active. The *intro* field contains the text displayed on the screen, and the text that appears in the continue button that jumps to the next beat. Additionally you need to select the targetBeat from the pull-down menu.

ConversationChoice

The *conversationChoice* beat function displays a screen with a question and up to three possible responses from which the interactor may choose. You can place a node background and props or characters in an *conversationChoice* beat using the Graphics Editor. This beat function implements powerful interactive elements that can affect the narrative in ways not obvious to the interactor. The response choices can lead to different beats, but each response can also change counters that determine conditions and thresholds connected to additional opportunities later in the narrative.

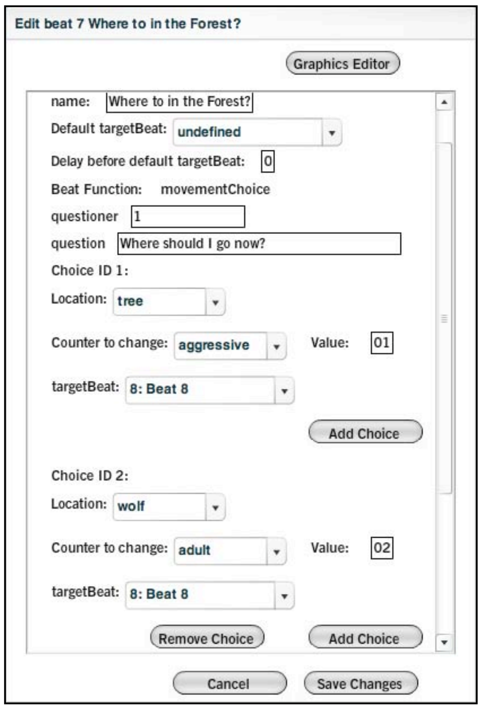


The *Edit Beat* window for the *conversationChoice* beat lets you set the beat ID number (used to determine default beat order), beat name, *defaulttarget* options, the ID of the character posing the question, the question text, the delay between when the question appears on the screen and when the answers appear (in milliseconds), and conversation choice(s).
You can add more choices or remove existing ones with the *Add Choice* and *Remove Choice* buttons. You can edit the content text for each response choice, as well as the counters and values they may affect and the different target beats to which they jump if selected by the interactor.

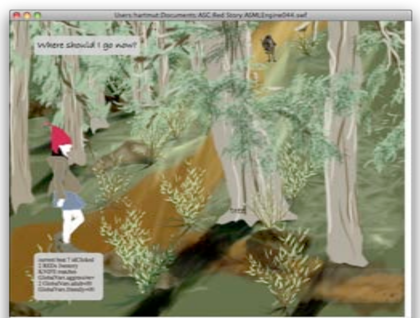


MovementChoice

The *MovementChoice* beat function displays a screen with up to three places (hotspots), props or characters, which the interactor may move to by clicking. A *MovementChoice* beat requires you to first use the Graphics Editor to place characters, props, or hotspots on the Node. To return to this window, click *Save* in the Node editor. Now your locations are available in the locations pulldowns.
Similar to *ConversationChoice*, a click on the different locations in *MovementChoice* can lead to different beats, but each response can also change counters that determine conditions and thresholds connected to additional opportunities later in the narrative.

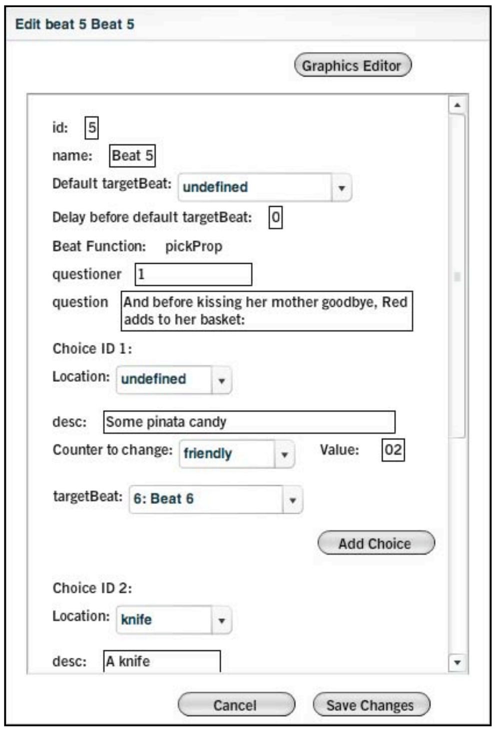


The *Edit Beat* window for the *MovementChoice* beat lets you set the beat ID number (used to determine default beat order), beat name, *defaulttarget* options, the character posing the question (leave at "1"), the question text, and the location choices (created in the Graphics Editor). You can also set counter changes and different target beats for each choice.
You add more choices or remove existing ones with the *Add Choice* and *Remove Choice* buttons. You create the location choices in the Graphics Editor. The name of each choice will appear in the *Location* dropdown menus.



PickProp

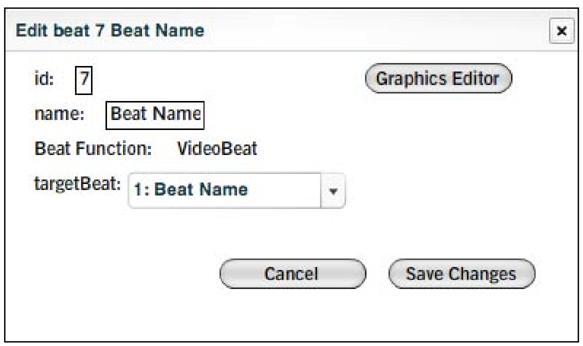
The *PickProp* beat function displays a screen with up to three props or characters, which the interactor may pick by clicking. A *PickProp* beat requires you to first use the Graphics Editor to place the props on the Node. To return to this window, click *Save* in the Node editor. Now your props are available in the locations pulldowns.
Similar to *ConversationChoice* and *MovementChoice*, a click on the different props in *PickProp* can lead to different beats, but each response can also change counters that determine conditions and thresholds connected to additional opportunities later in the narrative.



The *Edit Beat* window for the *PickProp* beat lets you set the beat ID number (used to determine default beat order), beat name, *defaulttarget* options, the character posing the question (leave at “1”), the *question*/description text, and the choices of props to pick (created in the Graphics Editor). The *desc* for each prop appears if the interactor mouses over that prop. You can also set counter changes and different target beats for each choice.
You can add more choices or remove existing ones with the *Add Choice* and *Remove Choice* buttons. You create the location choices in the Graphics Editor. The name of each choice will appear in the *Location* dropdown menus.

VideoBeat

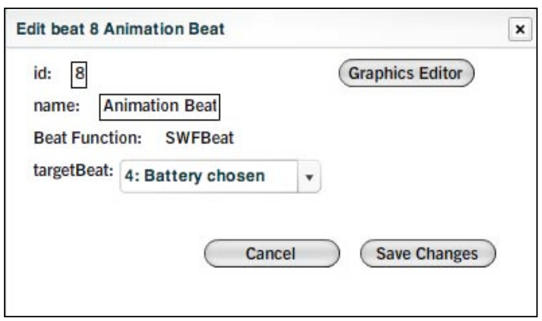
The *VideoBeat* beat function displays a screen running a video from start to end. Once the video has finished playing, the narration continues to the defined targetBeat.
Tip: Use this beat only if you only want to have a video running and no interactivity. Otherwise you should use any of the other visible beats with the video as the node (background).

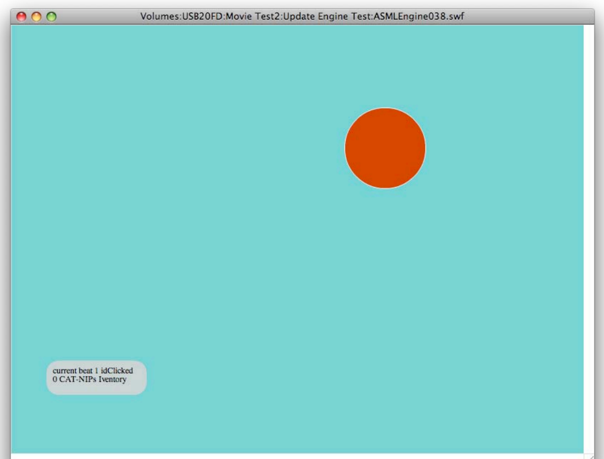


The *Edit Beat* window for the *VideoBeat* beat lets you set the beat ID number (used to determine default beat order), and beat name. The targetBeat will be branched to as soon as the video has finished playing.

SWFBeat

The *VideoBeat* beat function displays a screen running a Flash animation from start to end. Once the animation has finished playing, the narration continues to the defined targetBeat.
Tip: Use this beat only if you only want to have an animation running and no interactivity. Otherwise you should use any of the other visible beats with the animation as the node (background).

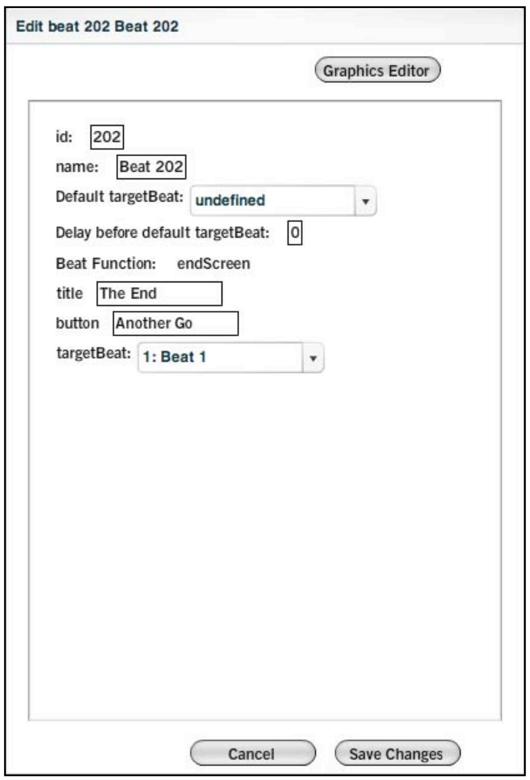




The *Edit Beat* window for the *SWFBeat* beat lets you set the beat ID number (used to determine default beat order), and beat name. The targetBeat will be branched to as soon as the animation has finished playing.

EndScreen

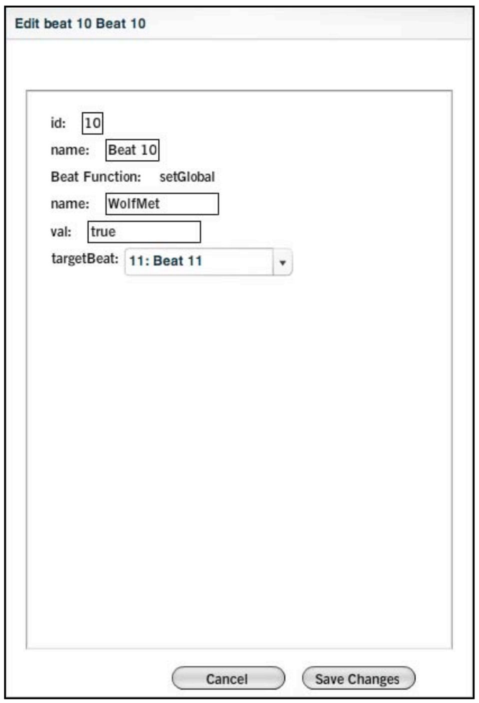
The *EndScreen* beat function displays a title (something like “The End”) and a button to replay the story. Clicking this button sends the interactor to the *targetBeat* and resets all variables and counters to their initial values.



The *Edit Beat* window for the *EndScreen* beat lets you set the beat ID number (used to determine default beat order), beat name, *default targetBeat*, *title*, a label for the button, and a *targetBeat*

SetGlobal

SetGlobal is an invisible beat function. It is used to set a variable to a specific value. The typical usage for this beat is to record actions taken by the interactor, eg when the interactor has found a certain prop or met a character. A ConditionsCheck function can then be used later to check if the variable has been set to specific value. Setting of a variable with this function is completely invisible to the interactor.



The *Edit Beat* window for the *SetGlobal* beat lets you set the beat ID number (used to determine default beat order), beat name, the *name* of the variable to be set, and the *val*ue that is assigned to the variable. You also need to set a *targetBeat.*

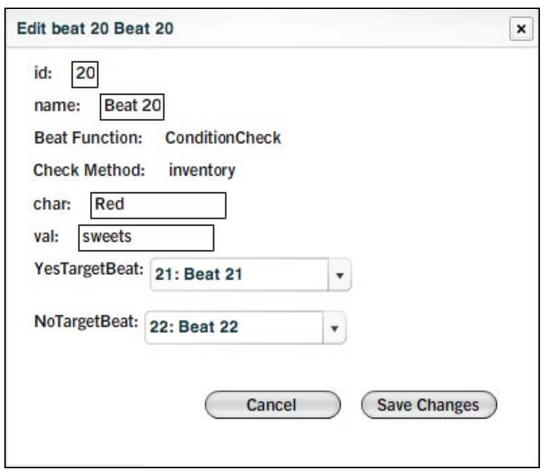
If the variable does not exist yet, it will be created for you.

ConditionCheck

ConditionCheck is another invisible beat function. This is a very flexible beat function, which is used to check a variety of values, and take different branching actions accordingly. *ConditionCheck* can check for inventory items, the id of the last Choice the interactor made, the value of variables set with *SetGlobal*, and counter values. Several *ConditionCheck* beats can follow each other, to create complex checks.

Inventory

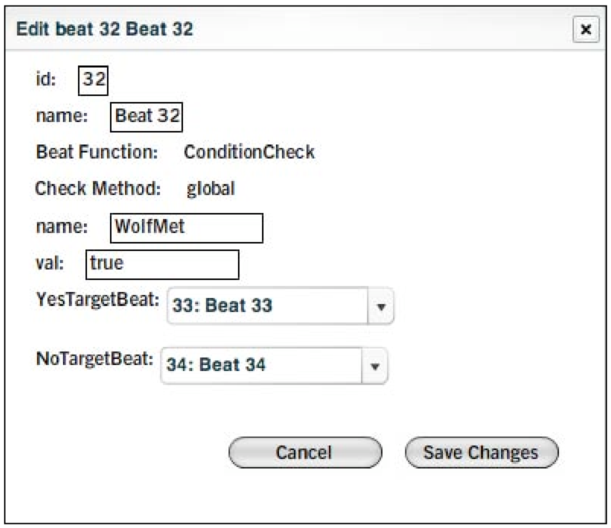
This *ConditionCheck* beat checks for the presence of items in a character's inventory.



The *Edit Beat* window for the *inventory ConditionCheck* beat lets you set the beat ID number (used to determine default beat order), beat name, the name of the *char*acter whose inventory will be checked. The name of the prop you want to check for must be entered in the *val* field.
Select the YesTargetBeat as the destination to branch to if the item is present, and the NoTargetBeat as the destination, if the item is not found.

Global

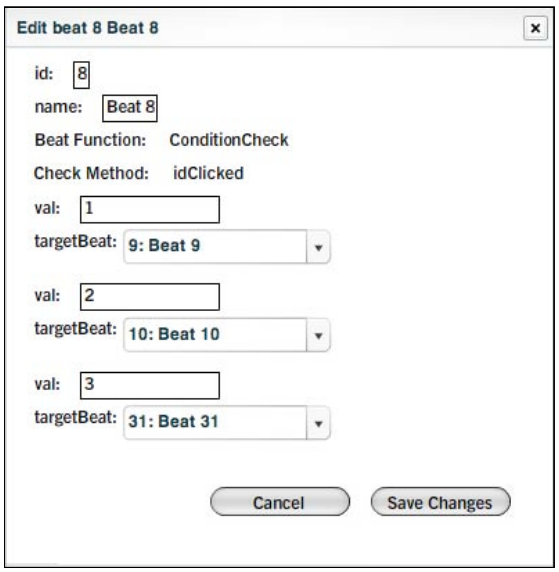
This *ConditionCheck* beat checks for the value of variable created with *SetGlobal*.



The *Edit Beat* window for the *global* *ConditionCheck* beat lets you set the beat ID number (used to determine default beat order), beat name, the *name* of the variable to be checked. The value to be checked must be entered in the *val* field.
Select the YesTargetBeat as the destination to branch to if the value exists, and the NoTargetBeat as the destination, if the value cannot not found.

idClicked

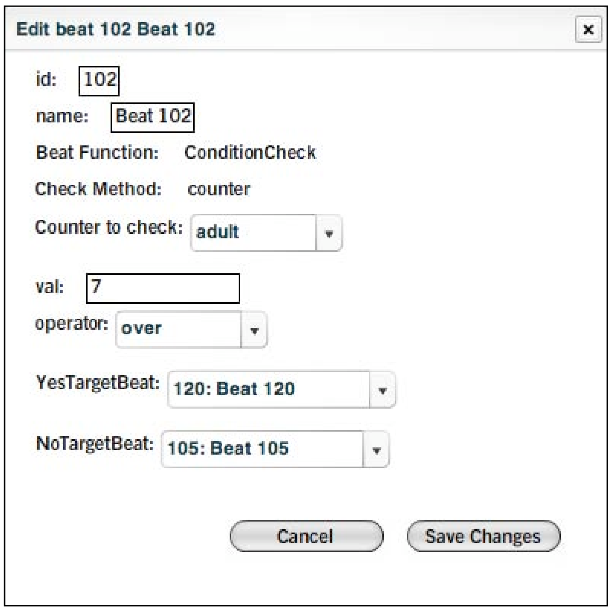
This *ConditionCheck* beat checks for the ID of the choice made by the interactor in the preceding beat. Every choice in *ConversationChoice*, *MovementChoice*, and *PickProp* beats has an associated id set in the EditBeat window. This *ConditionCheck* can be used to branch to different targets based on this id.



The *Edit Beat* window for the *idClicked ConditionCheck* beat lets you set the beat ID number (used to determine default beat order), and the beat name. The *val* fields correspond to the id of the choices in the preceding beat. Select the targetBeat as the destination to branch to for each choice.

Counter

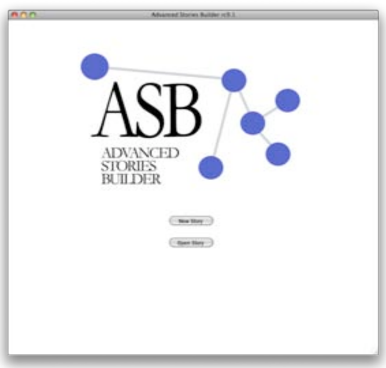
This *ConditionCheck* beat checks for the value of a counter used for tracking a character's development. The current value is evaluated with an operator against a pre-set number, eg is the counter xy higher (over) than 14.



The *Edit Beat* window for the *counter ConditionCheck* beat lets you set the beat ID number (used to determine default beat order), and the beat name.
Select the counter to change from the drop-down-menu. The *val* field holds the numeric value to compare against. You also need to select an operator, possible values are *over, equal,* and *under*. Select the YesTargetBeat as the destination to branch to if the equation is true, and the NoTargetBeat as the destination, if the equation is false.

Tutorials

Tutorial 1: Create a New Story

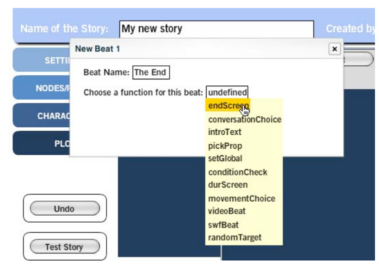


1. Open up the ASB software. On the splash screen, click the *New Story* button.

The dialogue box that pops up will ask you to pick a folder in which to save the new story. Be sure to pick one that does not have an existing ASML file, as it will be overwritten!

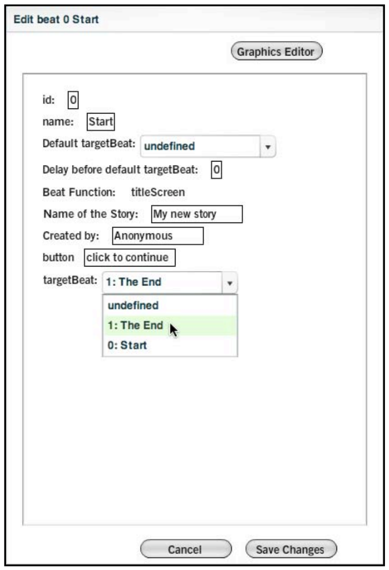
Once you've selected the destination folder, the Builder will save the ASML story file, as well as a copy of the current engine, at that location.

2. At the top of the screen, enter the name of your project in the text field at the left hand side, and the creator's name in the box at the right hand side.



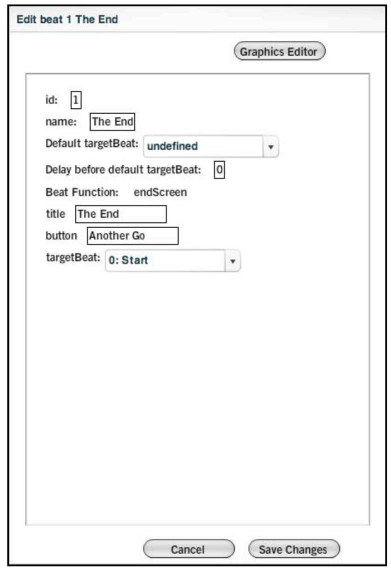
3. The Builder starts you out with a TitleScreen beat. This is the first beat of your story.

Let's add an EndScreen beat, to finish the story. Click the *PLOT* tab at the left of the screen. Now click the *New Beat* button. Select *EndScreen* from the dropdown list. Enter "The End" in the Beat Name text field. Then click the *Save New Beat* button.



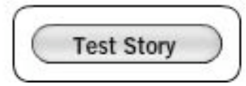
4. Now click the *Edit* button on the entry for the title Screen.

In the edit window select the endScreen beat with the name “The End” as the *targetBeat.* Then click the *Save Changes* button.



5. Click the *Edit* button for the endScreen beat.

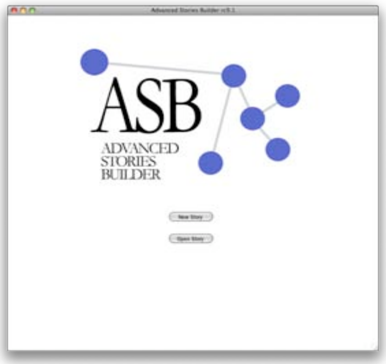
In the edit window select the titleScreen beat with the name “Start” as the *targetBeat.* Then click the *Save Changes* button.



6. You can test your story from the Builder. Just click the *Test Story* button. The Builder will automatically save your story before launching it in the engine. Congratulations! You just finished your first project.

Tutorial 1: Your completed story will have 2 connected beats. The button on the title screen goes to the next beat by default. The button on the end screen restarts the story from the first beat.

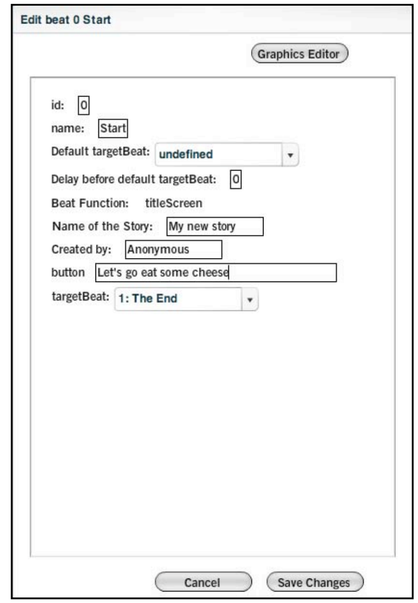
Tutorial 2: Edit Colors and Text Styles in a Saved Story



1. Open up the ASB software. On the splash screen, click the "Open Story" button. Select the file from Tutorial 1 in the dialogue box. It is called "Story.xml". Depending on your Settings you might not see the ".xml" ending.

2. When you click on the *PLOT* tab this time, you'll see the two beats you made previously.

Let's edit the title screen, at beat 0, by clicking on the *Edit* button in its box.



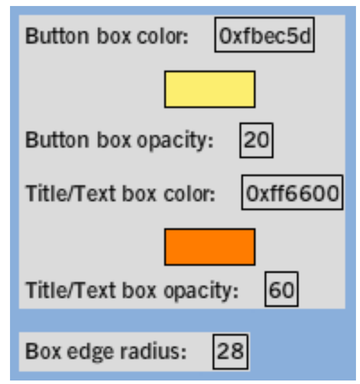
3. The *Edit Beat* dialogue box lets you change the text that appears in the Title box and the continue button. The default title and creator text is the title you entered in the field at the top of the Builder screen previously. The default button text is "Click to Continue."

Let's edit the button text. In that field, enter, "Let's go eat some cheese!" then click the *Save Changes* button.

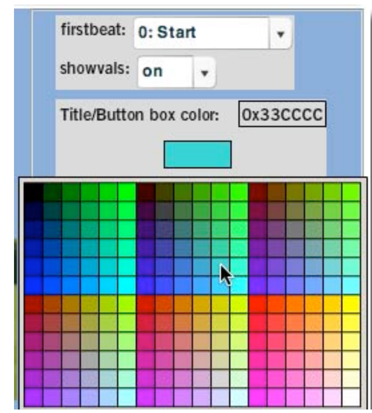
4. The Builder lets you customize the appearance of the text it generates as well as the content. You can specify the color, opacity and angle size of the boxes and buttons, as well as the font for the text inside.

Let's give a new look to our story text. Click the *SETTINGS* tab at the side of the screen. You'll see the default settings displayed.

Let's make the boxes for our title and buttons a rich cheddar orange with a little translucence, and really rounded edges. The *Title/Text box color* and *Title/Text box opacity* fields determine the display for these 2 elements.
Type in the new hex color value "ff6600" after the "0x" in the *Title/Text box color* field. Set the *Title/Text box opacity* value to "60". Set the *Box edge radius* value to "28".



5. The box that contains the expository text can also be customized, through the *Button box color* and *Button box opacity* values.
Let's make ours a pale yellow with lots of transparency. Change the value after the "0x" in the *Button box color* field to "fbec5d", and set the *Title/button box opacity* value to "20".



6. Alternatively you can change the color settings by clicking on the rectangle below the hex value field. A color picker appears and you select a color by clicking.

While this method is easier, it only gives you access to a limited amount of colors. Inputting a hex value gives you access to the full color range. You can find Hex color values by using a software like Adobe Photoshop, or the online service Kuler (http://kuler.adobe.com)

7. Click the *Test Story* button. Your story now has a whole new look..

8. The Builder includes several different fonts that can be rendered by the engine. You can set a different font to the 3 kinds of text (title, text, and button) that are generated.

Let's mix things up a bit. Pick a different font for each of the text types from their respective dropdown menus. (The example above uses "Traditional" for the title, "Modern" for the expository text, and "Handwriting" for the buttons.)

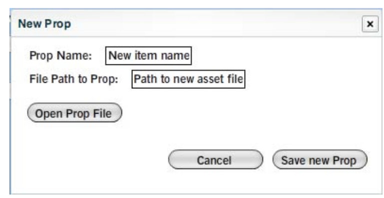
Run your story by clicking on the *Test Story* button to see how your changes look in action.

9. The result changes your story's look even more.

Changing color, fonts, and the shape of the boxes can dramatically alter the feel and tone of your work

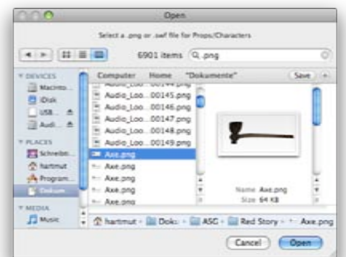
Tutorial 3: Adding Nodes and Props

1. Click the *Nodes/Props* tap in ASB. Then click on the *New Prop* Button.

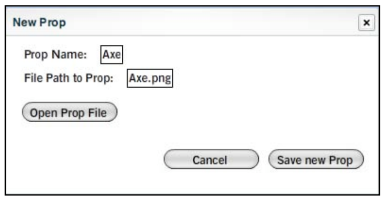


2. The *New Prop* dialogue appears. Click the *Open Prop File* Button here.

Tutorial 3: Nodes provide the backdrop against which the action in your story happens, while props and characters fill out the interactive elements of the story.



3. A file dialogue appears. Select either a PNG image or a SWF file. Click *Open*. ASB will copy the file for you to the current story folder automatically.



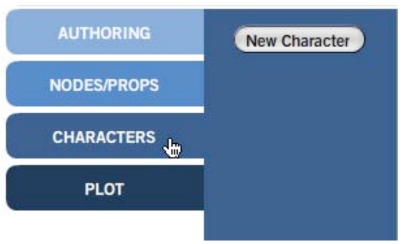
4. You can now change the name of the prop in the *New Prop* dialogue. **Do not change the file name**. Click the *Save new Prop* Button.

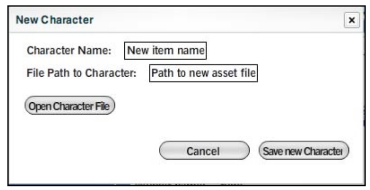
5. The new prop will appear in the list on the Nodes/Props screen.

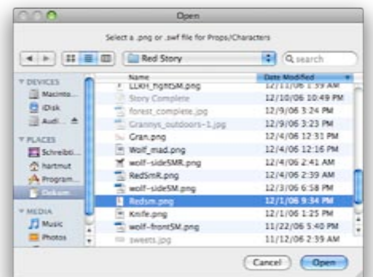
6. Adding a new node works pretty much the same way. Node images should fit the standard stage size of 800X600 pixels. Start by clicking the *New Node* button, then click *Open Prop File*. This time select either a JPG image, a SWF file, or a video file in the Flash Video format (.flv). Click *Open.* Change the name (and not the file path!) if you want. Click *Save new Node*. The new Node appears in the list.

Repeat this process for all your nodes and props. Then go to the next tutorial.

Tutorial 4: Adding Characters





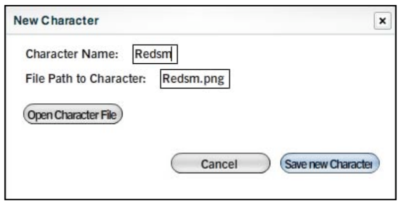


1. Click the *Characters* tap in ASB. Then click on the *New Char* Button.

2. The *New Character* dialogue appears. Click the *Open Character File* Button here.

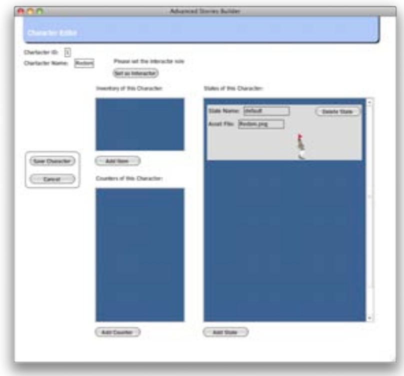
3. A file dialogue appears. Select either a PNG image or a SWF file. Click *Open*. ASB will copy the file for you to the current story folder automatically.

Tutorial 4: Adding characters makes your story more dramatic and expressive.



4. You can now change the name of the character in the *New Character* dialogue. **Do not change the file name**. Click the *Save new Character* Button.

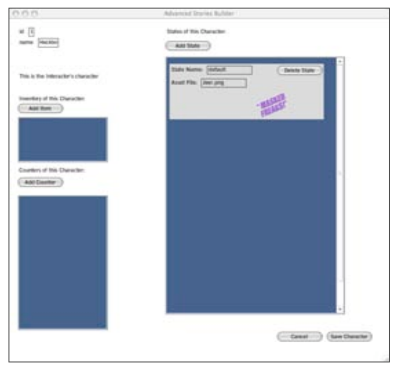
5. The new character will appear in the list on the characters screen.



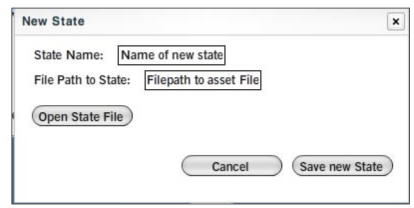
6. To add inventory items, counters, and states to your character, click the *Edit Character* Button. Refer to the *Character Editor* page in the *Features Overview* Section of this User Guide for a description of the *Character Editor*. The next tutorial shows you how to use these features.

Tutorial 5: Editing Characters

1. Click the *Character* tab in ASB. Then click on the *Edit Character* button in one of the character boxes to the right.

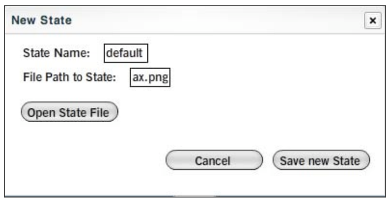


2. The *Character Editor* screen appears. Let's change the default image for this character. Click the *Delete State* button in the default character state box, and then click the *Add State* button at the bottom of the screen.



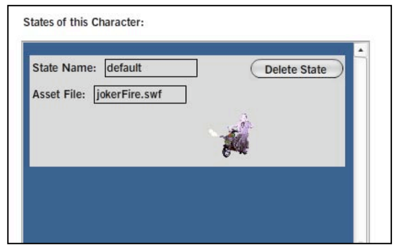
3. Click the *Add State* button at the bottom of the screen. The *New State* dialogue box pops up.

Tutorial 5: Additional character states make your characters more dramatic and expressive. Functions associated with characters can implement much interactivity to make your story more dynamic.



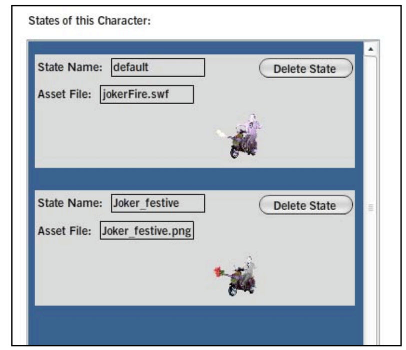
4. Click the *Open State File* button to select the image from your files. Since this will be the normal state for your character, change the name in the *State Name* box to *default*. Do not change the file path name.

Click *Save New State*.

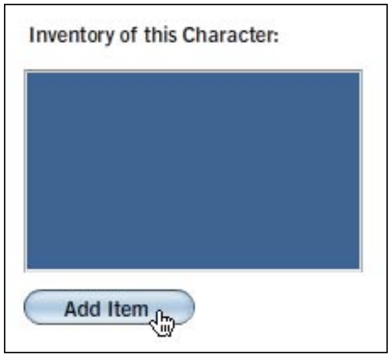


5. The new character state will appear in the character state list.

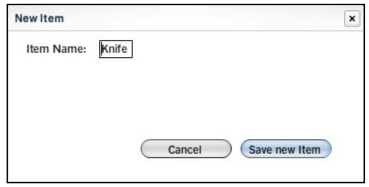
Let's add another state. Repeat steps 3 and 4, but this time name your character state anything except "default".



6. Additional states will appear in the list. You'll be able to select these states in the *Graphics Editor* (see next tutorial). For now, we will add inventory items and counters.

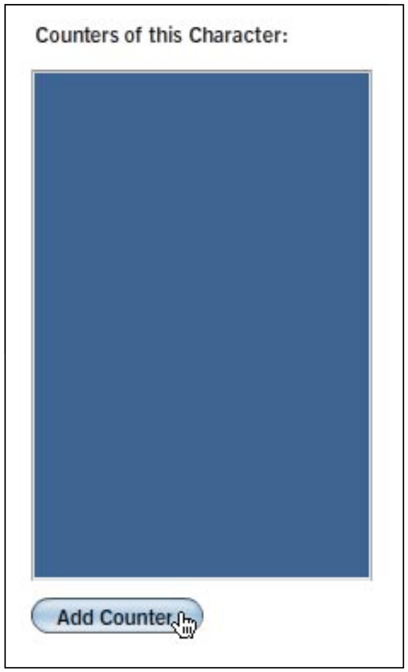


7. Click the *Add Item* button.

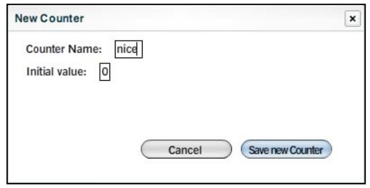


8. In the *New Item* Dialog, name your item, eg. *Knife*. Click the *Save new item* button.

9. The new item appears in the list. You can now add more items if you want to.



10. Click the *Add Counter* button



11. In the *New Counter* Dialog, name your counter, eg. *nice.* Click the *Save new Counter* button.

Counters are an important part of your story. You can understand them as trackers for the development of your characters or their progress towards are certain goal. For example your character could start out as "blank" and could become either nasty or nice depending on the interactor's choices that update the counters. You would implement this by having tow counters, named *nasty* and *nice.*

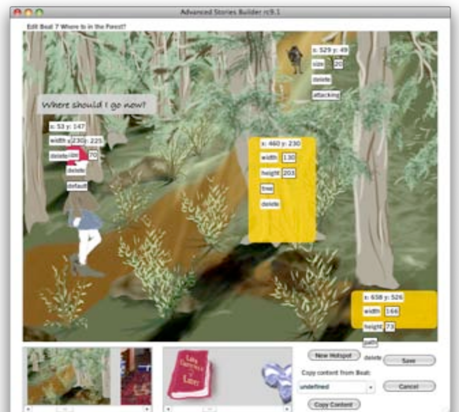
12. The new counter appears in the list. You can now add more counters if you want to.

Tutorial 6: Editing Visual Beat Content

1. Click the *Plot* tap in ASB.

2. Click the *Edit* button for the beat you want to work on.

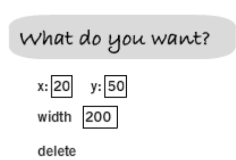
To use all aspects of the *Graphics Editor*, you need to add nodes, props, characters, and character states first – see tutorials 3,4, and 5. However, a story can work without any additional content. In this case, you can still use the *Graphics Editor* to place and adjust text boxes and hotspots.

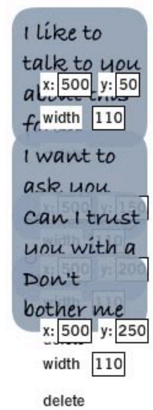


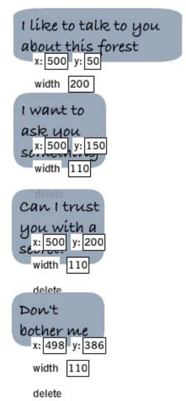
3. Click the *Graphics Editor* button in the Beat Edit window to open the graphics editor.

The image above shows a beat already filled with content. Initially you will only see textboxes (see next step).

4. Text boxes appear automatically in the graphics editor.
Depending on how much text you enter you need to change the *width* of a text box. Text will wrap automatically and thus adjust the height of a text box. If you want a single line of text, you need to make a text box wide enough to fit all text.

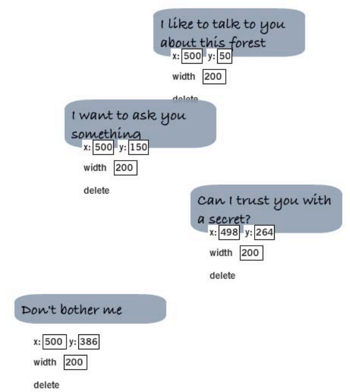






5. In *conversationChoice* beats, if you have several choices and/or enter longer texts in the choices, the text boxes might overlap.

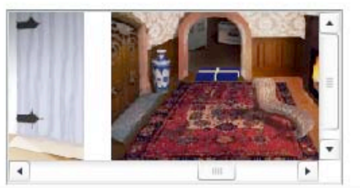
You need to adjust the *width* to fix this, as well as reposition the text boxes (see next step).



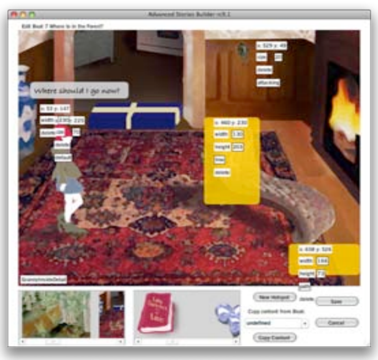
6. Click and drag to position a text box. You can also fill in values for *x* and *y* coordinates.

To remove a text box click the *delete* field.

Hint: Be aware that you can't bring back a deleted textbox other than using *undo* or *restore.*



7. Use the the lower left scroller to change the background (node) of the beat. To change the node, click on one of the thumbnail images.

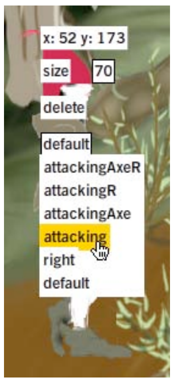


The beat from step 3 (previous page) with a different node.

8. Use the scroller in the lower middle of the Graphics Editor to add characters and props to the beat. To add a character or prop, click on one of the thumbnail images.

A prop on a node, resized to 30 percent.

9. Position a character or prop by clicking on it and dragging it around on the node. Click again to update x and y coordinates.
You can also fill in values for *x* and *y* coordinates in the respective text boxes.
Change the value in the *size* field to shrink or enlarge the character or prop.
If you want to remove a character or prop, click the *delete* field.



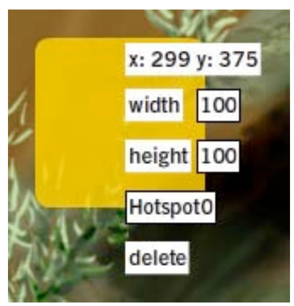
10. If a character has different states, you can change it by clicking on the state menu beneath the *delete* field and selecting a different state.

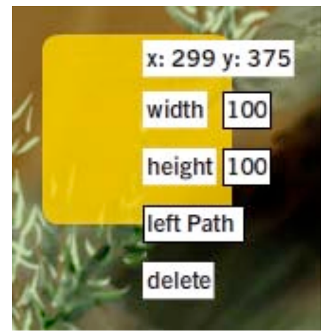
If you want to leave the menu without making changes, click again on the field.

11. In *MovementChoice* and *PickProp* beats, you can also add hotspots. These are clickable areas that overlay a node.

Click on the *Create Hotspot* button to create a hotspot.

Hint: The *Create Hotspot* button only appears in the two beat types mentioned above.





12. Click and drag to position the hotspot. You can also fill in values for *x* and *y* coordinates.
A new hotspot is named automatically (HotspotX). It is important to change this name in the text field, as the name is displayed when the user mouses over the field if *Hotspot Labels* is "on" in the settings. Hotspots are visible to the user if the *Hotspots Overlay* is set to "on".
Change the value in the *width* and *height* fields to adjust the size of the hotspot.
Click on *delete to* remove a hotspot.

13. If you want to create a beat with the same or similar visuals to an already existing beat, the most efficient way is to use the *Copy Content* function.

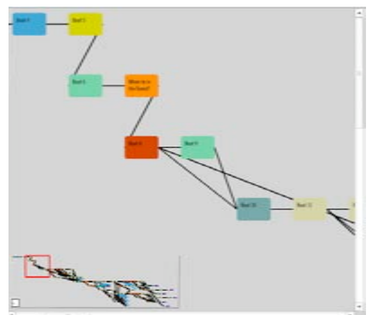
To use it, select a beat in the popup menu and click the *Copy Content* button.

Hint: Text boxes will not be copied between beats and hotspots will only copy between *movementChoice* and *conversationChoice* beats.

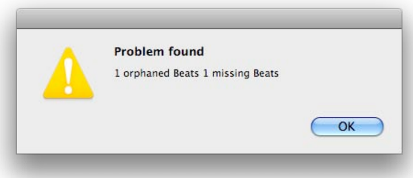
265

Tutorial 7: Working in Graph View

1. Click the *Graph Story* button in ASB.

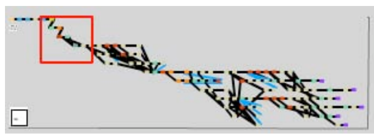


2. Calculating the Graph might take a little while, depending on the speed of your computer and the complexity of your story.

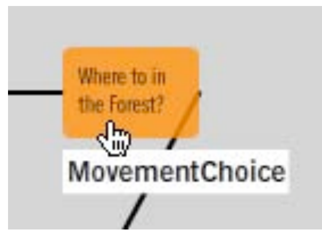


3. ASB warns you about orphaned (unconnected) and missing beats. Missing beats are referenced somewhere – for example as a targetBeat, but do not exist.

Orphaned and missing beats are listed on the left side of the story graph.



4. If the miniature view in the left lower corner gets in the way, you can hide it by clicking on the minus sign in the lower left corner. Clicking on the plus sign brings the miniature back.

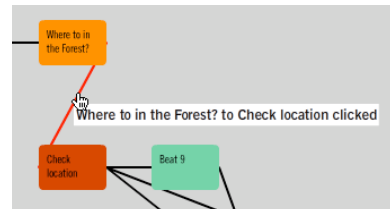


5. Each beat displays the Beat Name and you see the beat function by moving (not clicking) your mouse pointer over a beat.

Hint: Different colored beats represent different beat functions, eg. orange = *movementChoice*.

Clicking on a beat brings up the edit window for the beat.

You can also create new beats in graph view. The new beat button moves to the left in this view.



6. Move your mouse pointer over a connection line between beats, and let it rest there for a very short while. A label comes up, listing and the start and end point of the connection. This is really handy if you have a lot of crisscrossing connections, which would otherwise be hard to identify.

The label disappears again if you hover the mouse pointer again for a little while.

ASMLEngine Functions

The *ASMLEngine* presents your story to users. It does so in a way similar to a web browser, by reading the Story.xml file and putting the content together for any given beat.
Additionally, the *ASMLEngine* allows a user to save story and return later to the same beat in your story.

Pressing the "s" key on the keyboard saves the current state of a story. A dialog informs the user that the story has been saved

Reloading the same story now brings up this dialog, which offers a choice between *Start over* and *Restore Saved*.

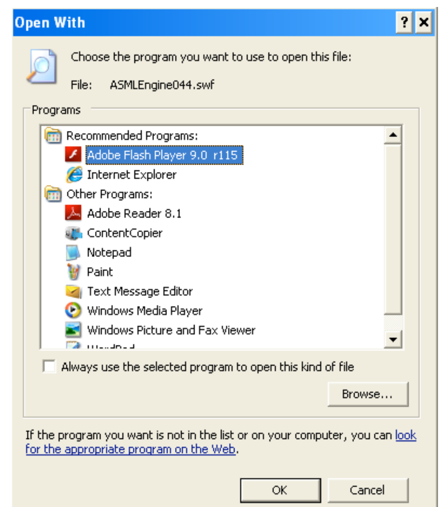
FAQs and Best Practices

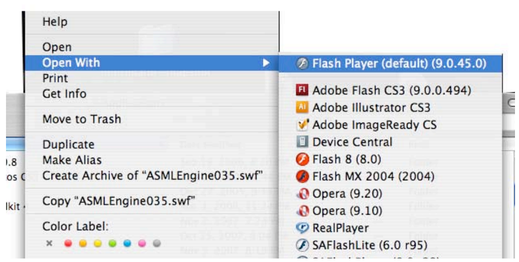
Q: Why does nothing happen when I hit the "Test Story" button?

A. First, check to see that you have the Stand-alone Flash Player installed. This is different from the Flash browser plug-in. You can download the free player at http://www.adobe.com/shockwave/download/download.cgi?P1_Prod_Version=ShockwaveFlash. If you've already installed the player and nothing happens when you try to test your story, then you may not have set it as the default software for opening AdvancedStories .swf files.

Setting the Stand-alone Player to open AdvancedStories Engine files Default (shown in OSX below and windows to the right):

2. Control-click (Mac) or Right-click (Win) the ASML Engine file
3. Click on "Open With" (Mac) or "Properties" (Win)
4. Select Flash Player from the list of suggested software. (Mac) or click on "Change…" (Win) and select the Flash Player from the list of suggested software.
5. (Win) if the player does not show up in the list, you need to click the "Browse" button and find the player on your hard drive





Q: Why does hitting the “Test Story” button cause the story to open in Flash as an editable file?
A. You need to set the Stand-alone Flash Player, not the Flash production environment, as the default application for .swf files. See above answer to solve this problem.

Q: Why did the builder put funny characters in my graphic file name when I uploaded it?
A. There was probably a space or another special character in the original file name. The builder escapes special characters (ie strips them out and replaces them with their ascii code characters) when it imports them into a story. There are technical reasons why the builder does this, but the ascii it inserts will not alter how your image file functions in your story.

Q: Why can’t I rename the ASML story file to something other than “Story.xml"?
A: The ASAPS Engine uses this file name to recognize data files it can read. This is hard-coded in the software. The engine cannot read other file names, even if they are XML files that follow the ASML data schema.

Q: Why does each story need its own folder?
A: The Builder exports the ASML file with a specific file name that the engine uses, so there can only be one “Story.xml” per folder. Another important reason is the Builder creates self-contained stories that contain all the components to run a story, including the ASML data file, the assets, and latest engine build. This makes it really easy to share the stories you create with others.

Q: Can I change the beat function for a beat I’ve already made?
A: No, the Builder assigns the beat function when you initially create a beat. If you want to change how a beat functions, the best thing to do is make a new beat that utilizes that function. Don’t forget to edit any beats that had led to or from that first beat. The Plot Story feature is enormously helpful for this sort of editing.

Q. Do I have to enter a story or creator name?
A. No. If you do not want the title screen to display a title and creator credit in dynamically generated text boxes, then delete the default contents in these text fields. However, if you leave one of these blank, they both must be blank. You cannot enter only a title or only a creator; in these cases the system will generate a text box on the title screen that reads "undefined."

Q: Do I have to have a Title Screen as my first beat?
A: No, you can start your story with any beat type. You can either set the first beat by setting the Beat ID field of any beat (in the Beat Editor screen) to "0", or you can use the firstbeat function (a pulldown menu in the Settings screen) to tell the engine which beat to start with.

Q: I changed the default character and uploaded a new image and renamed it. I see it in the Character Editor but not in the Graphics Editor. What is going on?
A: You can delete the original default character, but be aware that when you make a new character, the file name is used as the name unless you change it. In this case, you need to rename the normal character state to "default". You can name other states for this character anything you like, but at least one must be "default". Once you make this change and save, your new character should appear in the right-hand scroll box in the Graphics Editor.

Q: Can I use special characters in my file names?
A: You cannot use full stops (ie periods). You can use dashes and underscores, however.

Definitions

Beat: a beat is the unit of action in the AdvancedStories Narrative Model. Stories built in the ASB are broken out into a series of interconnected beats that vary by function.

Node: a node is the graphical backdrop for a beat. Nodes can be .flv, .swf, or .jpg files.

Hotspot: hotspots enable interactivity in MovementChoice. These are invisible and can be sized according to need.

Prop: a prop is any visual element that you place in a beat.

Character: characters can affect the path of the story. They can have different graphics associated with different states, as well as inventories of items and counters.

Target Beat: target beats continue the story path from a preceeding beat. A given beat may lead to multiple target beats, depending on its function. Beats that have not been assigned as targets will appear in the Plot Story screen as orphans.

Counter: counters are tied to characters and track specific values relating to user choice. They are a to model decision-making, consequences, relationships and causality with the ASB. You can create an unlimited number of counters. Counter values can be changed in individual beats.

Conditions: conditions include the different variables that change during a story. The ConditionCheck beat function evaluates the current story state for specific conditon status(es) and determines the target beat based on that information.

IdClicked: this condition checks to see if a specific prop or location has been chosen during the story play.

Counter: this condition checks for a specific counter value at that beat.

Inventory: the inventory stores items associated with a character. It can be pre-filled in the Character Editor, but a character can also add items to the inventory during story play using the PickProp function.

Global: globals have a similar function as counters, in that they can set thresholds and specific conditions for plot movement. Globals, however, are Booleans, and are not associated with a specific character.

Functions: functions are the mechanics of the story system. They determine what action can happen in a beat, and how that beat will be rendered. Some functions create “invisible” beats that are purely computational and have no visual assets associated with them. Invisible beats cannot be edited through the Graphics Editor.

IntroText: visual beat. This function creates a beat with a static text field at the top of the screen, and an interactive button at the lower right-hand side. The button moves the story to the target beat. Both field text and button text can be entered through the beat window.

MovementChoice: visual beat. This function provides spatial choice. You can place props or hotspots on the screen; each choice is assigned a target beat.

PickProp: visual beat. This function allows the player to select a prop on the screen. The prop then goes into the player’s inventory.

EndScreen: visual beat. This beat function lets your players know they’ve finished your story by including “The End” and provides a button to start a new session (with all variables and conditions reset to their initial values). You can customize the visual appearance of this beat in the Graphics Editor.

ConversationChoice: visual beat. This beat function simulates a conversation and creates provides interactivity through player response. The question text will appear on the same side of the screen as the designated Questioner. You can include up to 3 responses from which the player may choose. Each response can have a counter and value associated with it. Each response can also lead to a different target beat.

SetGlobal: invisible beat. This beat function establishes a global variable and value that can be checked throughout the story by means of the ConditionCheck beat function.

DAU: acronym. Stands for **D**ear **A**dvancedStories **U**ser. That's you. Go on, feel the love.

ConditionCheck: invisible beat. This function checks whether a specific condition has been met, and determines the next beat depending on the values you've provided. The possible conditions include idClicked, counter, global, and inventory.

> *idClicked:* This checks to see if a specific id (from a hotspot/location or prop) has been selected at any point during play. Up to 3 values (and 3 respective target beats) can be set.
>
> *Counter:* This checks for a specific counter and value. The threshold can be set for over, equal, or under that value. There are 2 possible target beats, reflecting whether that counter state has been satisfied or not.
>
> *Global:* This checks for the state of a global variable. It is a true/false Boolean value that determines the next beat from 2 possibilities you set.
>
> *Inventory:* This checks for the presence of a specific prop in any character's inventory. It is a true/false Boolean value that determines the next beat from 2 possibilities you set.

DurScreen: visual beat. This will display the beat for the chosen period of time before automatically proceeding to the target beat.

VideoBeat: visual beat. This function allows you to play a .vlf file automatically, without any input from the interactor. You upload the video file as a node. You can place props or characters on the screen; they will appear as static elements over the video background while the video plays. The story will automatically proceed to the target beat once the video clip has finished playing.

SWFBeat: visual beat. This function allows you to play a .swf file automatically, without any input from the interactor. You upload the .swf file as a node. You can place props or characters on the screen; they will appear as static elements over the background while the file plays. The story will automatically proceed to the target beat once the movie clip has finished playing.

Interactor: the player character. Any character in a story can be set as the interactor, but a story can only have 1 interactor. Choosing the interactor affects some of the engine functions, such as where conversation choices appear in a screen.

Questioner: which character asks the question in the ConversationChoice beat function. This determines where the question text and the response text appear in the screen; the question text will appear on the same side of the screen as the character designated the questioner.

State: the different graphic files representing a character. A character can appear in different states in addition to the default state set when created. States are one way to make your characters more expressive and lifelike. You can use different states to reflect emotions, gestures, or movement, for example. You can also have character states that reflect possible items they may pick up in their inventories.

Inventory: an array of props associated with a character. You can put pre-place props in any character's inventory so that they will be there at the start of a story. You can also add props throughout the story to the interactor's inventory, using the PickProp function. The ConditionCheck beat function can trigger narrative choices and story events based on the presence (or absence) of a particular prop.

Story.xml: the file name for the ASML document that contains the story data. The ASB automatically gives this file name to any story it creates, so each story must reside in its own folder.

Contact the ASG

On the Web
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Email
Hartmut.koenitz at gatech dot edu

APPENDIX B:

ASML STORY FILE: RED’S PATH THROUGH THE WOODS

```
<story>
<settings>
<debug firstbeat="0" showvals="off"/>
<colors pcolor="0x7D8DA3" palpha="90" nonpcolor="0xCCCCCC" nonpalpha="90"/>
<textbox radius="10"/>
<hotspots visible="on" labels="on"/>
<fonts titleFont="Gothic" textFont="Handwriting2" btnFont="Handwriting2"/>
<copyright notice="Copyright Â© 2007-2008 ASG All Rights Reserved"/>
</settings>
<environment>
<prop id="3" name="sweets" fPath="Sweets.png"/>
<prop id="4" name="book" fPath="Book.png"/>
<prop id="5" name="gift" fPath="Present.png"/>
<prop id="6" name="axe" fPath="Axe.png"/>
<prop id="9" name="knife" fPath="knife.png"/>
<node id="1" name="titleNode" fPath="Hut_ext.jpg"/>
<node id="2" name="hutInterior" fPath="Hut_interior_new.jpg"/>
<node id="3" name="forest" fPath="forest_complete.jpg"/>
<node id="4" name="GrannyOutside" fPath="Grannys_outdoors-1.jpg"/>
<node id="5" name="GrannyInside" fPath="Grannys_indoors-1.jpg"/>
<node id="6" name="GrannyInsideDetail" fPath="Grannys_indoors-detail.jpg"/>
<node id="7" name="forestDetail" fPath="forest_detail.jpg"/>
<node id="8" name="wolfBelly" fPath="Belly.jpg"/>
<node id="0" name="GrannyInsideKitchen" fPath="kitchen.jpg"/>
</environment>
<chars>
<char>
<id>0</id>
<name>Red</name>
<graphics>
<state kind="default" fPath="Redsm.png"/>
<state kind="right" fPath="RedSmR.png"/>
<state kind="attacking" fPath="LLRH_fightSM.png"/>
<state kind="attackingAxe" fPath="LLRH_fightAxe.png"/>
<state kind="attackingR" fPath="LLRH_fightSMR.png"/>
<state kind="attackingAxeR" fPath="LLRH_fightAxeR.png"/>
</graphics>
<charloc x="200" y="400"/>
<role kind="interactor"/>
<counter name="friendly" val="00"/>
<counter name="adult" val="00"/>
<counter name="aggressive" val="00"/>
<inventory item1="matches"/>
</char>
<char>
<id>1</id>
<name>Wolf</name>
<graphics>
<state kind="default" fPath="Wolf-sideSM.png"/>
<state kind="right" fPath="Wolf-sideSMR.png"/>
<state kind="attacking" fPath="Wolf-frontSM.png"/>
```

```xml
<state kind="asgran" fPath="Wolf_gran.png"/>
<state kind="asgranmad" fPath="Wolf_mad_gran.png"/>
<state kind="mad" fPath="Wolf_mad1.png"/>
<state kind="asgrandead" fPath="Wolf_gran_dead.png"/>
<state kind="maddead" fPath="Wolf-mad-dead.png"/>
</graphics>
<charloc x="500" y="400"/>
</char>
<char>
<id>2</id>
<name>Gran</name>
<graphics>
<state kind="default" fPath="Gran.png"/>
<state kind="standing" fPath="GranStandingSM.png"/>
</graphics>
</char>
<char>
<id>3</id>
<name>Mom</name>
<graphics>
<state kind="default" fPath="MomSM.png"/>
</graphics>
</char>
<char>
<id>4</id>
<name>Woodsman</name>
<graphics>
<state kind="default" fPath="WoodsmanSM.png"/>
<state kind="gun" fPath="WoodmanGunSM.png"/>
</graphics>
</char>
</chars>
<plot>
<beat>
<id id="0" name="Start"/>
<node>titleNode</node>
<locs>
<loc kind="text" name="button1" x="541" y="356" width="180" height="38.9"/>
<loc kind="text" name="author" x="49" y="212" width="160" height="64.55"/>
<loc kind="text" name="title" x="49" y="49" width="450" height="64.55"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="titleScreen">
<title>Red's Path through the woods</title>
<author>ASG</author>
<button>click to continue</button>
<target targetBeat="1"/>
</function>
</beat>
<beat>
<id id="1" name="Beat 1"/>
```

```
<node>titleNode</node>
<locs>
<loc kind="text" name="text" x="49" y="51" width="690" height="129.25"/>
<loc kind="text" name="button1" x="560" y="345" width="175" height="129.25"/>
<loc kind="char" name="RED" state="default" size="90" x="320" y="250"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="introText">
<intro>
Red lives a difficult life at the edge of the woods. She and her mother eke out a meager living selling hand-crafted pinatas on e-bay. Their craftsmanship is of unusual quality but under-appreciated by the majority of e-bay's clientele.
</intro>
<button>click to continue</button>
<target targetBeat="2"/>
</function>
</beat>
<beat>
<id id="2" name="Beat 2"/>
<node>titleNode</node>
<locs>
<loc kind="text" name="text" x="46" y="46" width="690" height="188.3"/>
<loc kind="text" name="button1" x="560" y="345" width="175" height="129.25"/>
<loc kind="char" name="RED" state="default" size="90" x="320" y="250"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="introText">
<intro>
Red enjoys all her classes at the newly established progressive school. Red particularly enjoys Mz. Madden's Health class. Mz. Madden delivers frank discussions on "anatomical gender difference" and "reproductive issues." In the school library Red finds an illustrated version of Lady Chatterley's Lovers. She isn't impressed with the plot but several pictures piqued her curiosity. She brings the book home hoping to hear her mother's explanation of the drawings.
</intro>
<button>click to continue</button>
<target targetBeat="3"/>
</function>
</beat>
<beat>
<id id="3" name="Beat 3"/>
<node>hutInterior</node>
<locs>
<loc kind="text" name="text" x="81" y="73" width="310" height="129.25"/>
<loc kind="text" name="button1" x="465" y="131" width="310" height="129.25"/>
<loc kind="char" name="MOM" state="default" size="100" x="147" y="196"/>
<loc kind="char" name="RED" state="right" size="100" x="477" y="239"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>
```

Red, darling, you've made enough pinatas for today. You should visit your Grandmama. We'll make her a nice basket
</question>
<delay>1500</delay>
<choice id="1" content="Mother, before I go, I'd like to ask you some questions about I book I found in the library." counter="undefined,00" targetBeat="4"/>
</function>
</beat>
<beat>
<id id="4" name="Beat 4"/>
<node>hutInterior</node>
<locs>
<loc kind="text" name="text" x="49" y="41" width="690" height="188.3"/>
<loc kind="text" name="button1" x="529" y="418" width="175" height="129.25"/>
<loc kind="char" name="RED" state="right" size="100" x="477" y="239"/>
<loc kind="char" name="MOM" state="default" size="100" x="147" y="196"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="introText">
<intro>
Red, darling, I was a perfectly dreadful student. Your Grandmama no doubt surpasses my skill.

Now remember, we need to stay in your Grandmama's good graces. If you're especially sweet, she may remember us in her will.

Now here's the basket.
</intro>
<button>click to continue</button>
<target targetBeat="5"/>
</function>
</beat>
<beat>
<id id="5" name="Beat 5"/>
<node>hutInterior</node>
<locs>
<loc kind="text" name="text" x="50" y="51" width="580" height="129.25"/>
<loc kind="prop" name="knife" size="100" x="313" y="270"/>
<loc kind="prop" name="book" size="100" x="565" y="319"/>
<loc kind="prop" name="sweets" size="100" x="29" y="342"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="pickProp">
<questioner>1</questioner>
<question>
And before kissing her mother goodbye, Red adds to her basket:
</question>
<choice id="1" loc="sweets" desc="Some pinata candy" counter="friendly,02" targetBeat="6"/>
<choice id="2" loc="knife" desc="A knife" counter="aggressive,02" targetBeat="6"/>
<choice id="3" loc="book" desc="Her illustrated Lady Chatterley's Lover" counter="adult,02" targetBeat="6"/>
</function>

```xml
</beat>
<beat>
<id id="6" name="Beat 6"/>
<node>hutInterior</node>
<locs>
<loc kind="text" name="text" x="41" y="94" width="690" height="129.25"/>
<loc kind="char" name="MOM" state="default" size="100" x="52" y="168"/>
<loc kind="char" name="RED" state="right" size="100" x="420" y="250"/>
</locs>
<function kind="durScreen">
<text>
Now Red. Get along. And don't stray from the path. The woods can be dangerous for young girls.
</text>
<duration>5000</duration>
<target targetBeat="7"/>
</function>
</beat>
<beat>
<id id="7" name="Where to in the Forest?"/>
<node>forest</node>
<locs>
<loc kind="text" name="text" x="28" y="122" width="230" height="38.9"/>
<loc kind="hotspot" name="tree" x="435" y="205" width="130" height="203"/>
<loc kind="hotspot" name="path" x="633" y="501" width="166" height="73"/>
<loc kind="char" name="wolf" state="attacking" size="20" x="504" y="24"/>
<loc kind="char" name="Red" state="default" size="70" x="31" y="200"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="movementChoice">
<questioner>1</questioner>
<question>Where should I go now?</question>
<choice id="1" loc="tree" counter="aggressive,01" targetBeat="8"/>
<choice id="2" loc="wolf" counter="adult,02" targetBeat="8"/>
<choice id="3" loc="path" counter="friendly,02" targetBeat="8"/>
</function>
</beat>
<beat>
<id id="8" name="Beat 8"/>
<function kind="conditionCheck">
<method val="idClicked"/>
<cond val="1" targetBeat="9"/>
<cond val="2" targetBeat="10"/>
<cond val="3" targetBeat="31"/>
</function>
</beat>
<beat>
<id id="9" name="Beat 9"/>
<node>forestDetail</node>
<locs>
<loc kind="text" name="text" x="170" y="126" width="300" height="39.45"/>
<loc kind="char" name="Red" x="445" y="50" width="100" height="100" size="90"/>
```

```
</locs>
<function kind="durScreen">
<text>I should be safe here. The wolf won't find me...</text>
<duration>5000</duration>
<target targetBeat="10"/>
</function>
</beat>
<beat>
<id id="10" name="Beat 10"/>
<function kind="setGlobal">
<global name="WolfMet" val="true"/>
<target targetBeat="11"/>
</function>
</beat>
<beat>
<id id="11" name="Beat 11"/>
<node>forestDetail</node>
<locs>
<loc kind="text" name="text" x="208" y="118" width="250" height="129.25"/>
<loc kind="text" name="button1" x="496" y="201" width="260" height="129.25"/>
<loc kind="text" name="button2" x="496" y="44" width="260" height="129.25"/>
<loc kind="text" name="button3" x="496" y="109" width="260" height="129.25"/>
<loc kind="char" name="WOLF" state="right" size="80" x="67" y="190"/>
<loc kind="char" name="RED" state="right" size="90" x="434" y="213"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>Hello there. What a pretty red hat you have.</question>
<delay>1500</delay>
<choice id="1" content="Thank you. My name is Red. What is yours?" counter="friendly,02"
targetBeat="12"/>
<choice id="2" content="What pretty eyes you have." counter="adult,02" targetBeat="14"/>
<choice id="3" content="I'm not supposed to talk to wolves." counter="aggressive,02"
targetBeat="16"/>
</function>
</beat>
<beat>
<id id="12" name="Beat 12"/>
<node>forestDetail</node>
<locs>
<loc kind="text" name="text" x="190" y="129" width="250" height="129.25"/>
<loc kind="text" name="button1" x="490" y="165" width="230" height="129.25"/>
<loc kind="char" name="WOLF" state="right" size="80" x="67" y="190"/>
<loc kind="char" name="RED" state="right" size="90" x="434" y="213"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>Seymour. Seymour Whiskers.</question>
<delay>1500</delay>
```

<choice id="1" content="That's a strange name" counter="aggressive,03" targetBeat="13"/>
</function>
</beat>
<beat>
<id id="13" name="Beat 13"/>
<node>forestDetail</node>
<locs>
<loc kind="text" name="text" x="200" y="98" width="250" height="129.25"/>
<loc kind="text" name="button1" x="482" y="48" width="305" height="129.25"/>
<loc kind="text" name="button2" x="481" y="112" width="305" height="129.25"/>
<loc kind="text" name="button3" x="482" y="178" width="305" height="129.25"/>
<loc kind="char" name="WOLF" state="right" size="80" x="67" y="190"/>
<loc kind="char" name="RED" state="right" size="90" x="434" y="213"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>
Perhaps, but it's my given name, and I have no compunction to change it.
</question>
<delay>1500</delay>
<choice id="1" content="Perhaps I could offer you a treat?" counter="adult,03"
targetBeat="20"/>
<choice id="2" content="I have a question for you." counter="aggressive,02" targetBeat="25"/>
<choice id="3" content="I'm afraid I must hurry along." counter="friendly,02" targetBeat="31"/>
</function>
</beat>
<beat>
<id id="14" name="Beat 14"/>
<node>forestDetail</node>
<locs>
<loc kind="text" name="text" x="199" y="124" width="250" height="129.25"/>
<loc kind="text" name="button1" x="513" y="124" width="190" height="129.25"/>
<loc kind="char" name="WOLF" state="right" size="80" x="67" y="190"/>
<loc kind="char" name="RED" state="right" size="90" x="434" y="213"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>Well I've been told they're my finest feature. </question>
<delay>1500</delay>
<choice id="1" content="And your fur, so bright and fresh." counter="adult,03"
targetBeat="15"/>
</function>
</beat>
<beat>
<id id="15" name="Beat 15"/>
<node>forestDetail</node>
<locs>
<loc kind="text" name="text" x="193" y="126" width="250" height="129.25"/>
<loc kind="text" name="button1" x="477" y="51" width="305" height="129.25"/>

```
<loc kind="text" name="button2" x="477" y="125" width="290" height="129.25"/>
<loc kind="text" name="button3" x="477" y="195" width="290" height="129.25"/>
<loc kind="char" name="WOLF" state="right" size="80" x="67" y="190"/>
<loc kind="char" name="RED" state="right" size="90" x="434" y="213"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>Now you're making me blush.</question>
<delay>1500</delay>
<choice id="1" content="Perhaps I could offer you a treat?" counter="adult,03"
targetBeat="20"/>
<choice id="2" content="I have a question for you." counter="aggressive,02" targetBeat="25"/>
<choice id="3" content="I'm afraid I must hurry along." counter="friendly,02" targetBeat="31"/>
</function>
</beat>
<beat>
<id id="16" name="Beat 16"/>
<node>forestDetail</node>
<locs>
<loc kind="text" name="text" x="202" y="103" width="250" height="129.25"/>
<loc kind="text" name="button1" x="507" y="128" width="240" height="129.25"/>
<loc kind="char" name="WOLF" state="right" size="80" x="67" y="190"/>
<loc kind="char" name="RED" state="right" size="90" x="434" y="213"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>Wolves like to chat as much as any other creature.</question>
<delay>1500</delay>
<choice id="1" content="I doubt chatting is your primary motive." counter="adult,03"
targetBeat="17"/>
</function>
</beat>
<beat>
<id id="17" name="Beat 17"/>
<node>forestDetail</node>
<locs>
<loc kind="text" name="text" x="199" y="127" width="250" height="129.25"/>
<loc kind="text" name="button1" x="493" y="32" width="240" height="129.25"/>
<loc kind="text" name="button2" x="492" y="131" width="240" height="129.25"/>
<loc kind="text" name="button3" x="493" y="200" width="240" height="129.25"/>
<loc kind="char" name="WOLF" state="right" size="80" x="67" y="190"/>
<loc kind="char" name="RED" state="right" size="90" x="434" y="213"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>
One should never speculate about another's motives.
</question>
```

```xml
<delay>1500</delay>
<choice id="1" content="Perhaps I could offer you a treat?" counter="adult,03"
targetBeat="20"/>
<choice id="2" content="I have a question for you." counter="aggressive,02" targetBeat="25"/>
<choice id="3" content="I'm afraid I must hurry along." counter="friendly,02" targetBeat="31"/>
</function>
</beat>
<beat>
<id id="20" name="Beat 20"/>
<function kind="conditionCheck">
<method val="inventory"/>
<cond char="Red" val="sweets" YesTargetBeat="21" NoTargetBeat="22"/>
</function>
</beat>
<beat>
<id id="21" name="Beat 21"/>
<node>forestDetail</node>
<locs>
<loc kind="text" name="text" x="318" y="149" width="110.15" height="129.25"/>
<loc kind="text" name="button1" x="497" y="142" width="190" height="129.25"/>
<loc kind="char" name="WOLF" state="right" size="80" x="67" y="190"/>
<loc kind="char" name="RED" state="right" size="90" x="434" y="213"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>Well?</question>
<delay>1500</delay>
<choice id="1" content="Would you like some candy?" counter="adult,03" targetBeat="23"/>
</function>
</beat>
<beat>
<id id="22" name="Beat 22"/>
<node>forestDetail</node>
<locs>
<loc kind="text" name="text" x="336" y="147" width="110.15" height="129.25"/>
<loc kind="text" name="button1" x="493" y="144" width="230" height="129.25"/>
<loc kind="char" name="WOLF" state="right" size="80" x="67" y="190"/>
<loc kind="char" name="RED" state="right" size="90" x="434" y="213"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>Well?</question>
<delay>1500</delay>
<choice id="1" content="I have a can of pickled pears in my basket." counter="adult,03"
targetBeat="24"/>
</function>
</beat>
<beat>
<id id="23" name="Beat 23"/>
```

```
<node>forestDetail</node>
<locs>
<loc kind="text" name="text" x="199" y="102" width="250" height="129.25"/>
<loc kind="text" name="button1" x="479" y="136" width="250" height="129.25"/>
<loc kind="char" name="WOLF" state="right" size="80" x="67" y="190"/>
<loc kind="char" name="RED" state="right" size="90" x="434" y="213"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>
Delighted. I'm quite a connoisseur of confection. And those look delicious.
</question>
<delay>1500</delay>
<choice id="1" content="Well, I must hurry along to Grandmama's house." counter="adult,03"
targetBeat="31"/>
</function>
</beat>
<beat>
<id id="24" name="Beat 24"/>
<node>forestDetail</node>
<locs>
<loc kind="text" name="text" x="179" y="127" width="270" height="129.25"/>
<loc kind="text" name="button1" x="476" y="142" width="250" height="129.25"/>
<loc kind="char" name="WOLF" state="right" size="80" x="67" y="190"/>
<loc kind="char" name="RED" state="right" size="90" x="434" y="213"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>
Not exactly to my taste. But I appreciate the thought.
</question>
<delay>1500</delay>
<choice id="1" content="Well, I must hurry along to Grandmama's house." counter="adult,03"
targetBeat="31"/>
</function>
</beat>
<beat>
<id id="25" name="Beat 25"/>
<function kind="conditionCheck">
<method val="inventory"/>
<cond char="Red" val="book" YesTargetBeat="27" NoTargetBeat="26"/>
</function>
</beat>
<beat>
<id id="26" name="Beat 26"/>
<function kind="conditionCheck">
<method val="inventory"/>
<cond char="Red" val="knife" YesTargetBeat="40" NoTargetBeat="28"/>
</function>
```

```
</beat>
<beat>
<id id="27" name="Beat 27"/>
<node>forestDetail</node>
<locs>
<loc kind="text" name="text" x="336" y="147" width="101.9" height="129.25"/>
<loc kind="text" name="button1" x="494" y="121" width="230" height="129.25"/>
<loc kind="char" name="WOLF" state="right" size="80" x="67" y="190"/>
<loc kind="char" name="RED" state="right" size="90" x="434" y="213"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>Yes?</question>
<delay>1500</delay>
<choice id="1" content="Could you tell me something about this picture book I have?"
counter="adult,03" targetBeat="29"/>
</function>
</beat>
<beat>
<id id="28" name="Beat 28"/>
<node>forestDetail</node>
<locs>
<loc kind="text" name="text" x="352" y="152" width="87.35" height="129.25"/>
<loc kind="text" name="button1" x="483" y="122" width="250" height="129.25"/>
<loc kind="char" name="WOLF" state="right" size="80" x="67" y="190"/>
<loc kind="char" name="RED" state="right" size="90" x="434" y="213"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>Yes?</question>
<delay>1500</delay>
<choice id="1" content="Could you show me the quickest path to my Grandmama's house?"
counter="adult,03" targetBeat="30"/>
</function>
</beat>
<beat>
<id id="29" name="Beat 29"/>
<node>forestDetail</node>
<locs>
<loc kind="text" name="text" x="192" y="107" width="250" height="129.25"/>
<loc kind="text" name="button1" x="487" y="112" width="250" height="129.25"/>
<loc kind="char" name="WOLF" state="right" size="80" x="67" y="190"/>
<loc kind="char" name="RED" state="right" size="90" x="434" y="213"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>
Oh, my dear, I shouldn't delay your journey any longer. Good bye.
```

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</question>
<delay>1500</delay>
<choice id="1" content="Perhaps on my way back from Grandmama's house, we can chat again."
counter="adult,03" targetBeat="31"/>
</function>
</beat>
<beat>
<id id="30" name="Beat 30"/>
<node>forestDetail</node>
<locs>
<loc kind="text" name="text" x="289" y="114" width="150" height="129.25"/>
<loc kind="char" name="WOLF" state="right" size="80" x="63" y="155"/>
<loc kind="char" name="RED" state="right" size="90" x="433" y="137"/>
</locs>
<function kind="durScreen">
<text>With Pleasure.</text>
<duration>3000</duration>
<target targetBeat="31"/>
</function>
</beat>
<beat>
<id id="31" name="Beat 31"/>
<node>forestDetail</node>
<locs>
<loc kind="text" name="text" x="272" y="102" width="330" height="129.25"/>
<loc kind="char" name="RED" state="default" size="80" x="337" y="172"/>
</locs>
<function kind="durScreen">
<text>
I need to hurry along. Grandmama will be so happy to see me.
</text>
<duration>4000</duration>
<target targetBeat="32"/>
</function>
</beat>
<beat>
<id id="32" name="Beat 32"/>
<function kind="conditionCheck">
<method val="global"/>
<cond name="WolfMet" val="true" YesTargetBeat="33" NoTargetBeat="34"/>
</function>
</beat>
<beat>
<id id="33" name="Beat 33"/>
<node>GrannyOutside</node>
<locs>
<loc kind="text" name="text" x="170" y="126" width="300" height="129.25"/>
<loc kind="hotspot" name="door" x="396" y="230" width="60" height="101"/>
<loc kind="char" name="RED" state="default" size="70" x="238" y="374"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
```

```
<function kind="movementChoice">
<questioner>1</questioner>
<question>
That's strange. I've never known Grandmama to leave the door ajar.
</question>
<delay>1500</delay>
<choice id="1" loc="door" counter="aggressive,00" targetBeat="36"/>
</function>
</beat>
<beat>
<id id="34" name="Beat 34"/>
<node>GrannyOutside</node>
<locs>
<loc kind="text" name="text" x="143" y="364" width="280" height="129.25"/>
<loc kind="hotspot" name="door" x="396" y="230" width="63" height="104"/>
<loc kind="char" name="RED" state="default" size="70" x="243" y="390"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="movementChoice">
<questioner>1</questioner>
<question>At last, Grandmama's house</question>
<choice id="1" loc="door" counter="aggressive,00" targetBeat="35"/>
</function>
</beat>
<beat>
<id id="35" name="Beat 35"/>
<node>GrannyInside</node>
<locs>
<loc kind="text" name="text" x="19" y="81" width="240" height="38.9"/>
<loc kind="hotspot" name="gift" x="317" y="215" width="168" height="53"/>
<loc kind="char" name="Red" state="default" size="70" x="20" y="139"/>
<loc kind="char" name="gran" state="default" size="90" x="523" y="242"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="movementChoice">
<questioner>1</questioner>
<question>Where should I go now?</question>
<choice id="1" loc="gift" counter="aggressive,00" targetBeat="45"/>
<choice id="2" loc="gran" counter="aggressive,00" targetBeat="50"/>
</function>
</beat>
<beat>
<id id="36" name="Beat 36"/>
<node>GrannyInside</node>
<locs>
<loc kind="text" name="text" x="170" y="126" width="300" height="39.45"/>
<loc kind="hotspot" name="gift" x="317" y="215" width="165" height="50"/>
<loc kind="char" name="wolf" state="asgran" x="506" y="236" width="100" height="100"
size="90"/>
<loc kind="char" name="Red" x="20" y="139" width="100" height="100" size="70"/>
</locs>
```

```
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="movementChoice">
<questioner>1</questioner>
<question>Where should I go now?</question>
<choice id="1" loc="gift" counter="aggressive,00" targetBeat="45"/>
<choice id="2" loc="wolf" counter="aggressive,00" targetBeat="37"/>
</function>
</beat>
<beat>
<id id="37" name="Beat 37"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="432" y="123" width="250" height="129.25"/>
<loc kind="text" name="button1" x="146" y="192" width="235" height="129.25"/>
<loc kind="text" name="button2" x="149" y="103" width="235" height="129.25"/>
<loc kind="text" name="button3" x="149" y="21" width="235" height="129.25"/>
<loc kind="char" name="WOLF" state="asgran" size="115" x="427" y="201"/>
<loc kind="char" name="RED" state="default" size="90" x="182" y="166"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>So good to see you my dear...</question>
<delay>1500</delay>
<choice id="1" content="What a lovely dress, Grandmama" counter="adult,03"
targetBeat="80"/>
<choice id="2" content="I've brought you a basket, Grandmama" counter="friendly,01"
targetBeat="85"/>
<choice id="3" content="Perhaps I could help you tidy up, Grandmama" counter="friendly,02"
targetBeat="87"/>
</function>
</beat>
<beat>
<id id="40" name="Beat 40"/>
<node>forestDetail</node>
<locs>
<loc kind="text" name="text" x="371" y="157" width="110.15" height="129.25"/>
<loc kind="text" name="button1" x="486" y="123" width="250" height="129.25"/>
<loc kind="char" name="WOLF" state="right" size="80" x="67" y="190"/>
<loc kind="char" name="RED" state="right" size="90" x="434" y="213"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>So?</question>
<delay>1500</delay>
<choice id="1" content="If wolves as clever as they say, why would you come so close to a sharp
knife?" counter="adult,03" targetBeat="41"/>
</function>
</beat>
<beat>
```

```
<id id="41" name="Beat 41"/>
<node>forestDetail</node>
<locs>
<loc kind="text" name="text" x="246" y="127" width="200" height="129.25"/>
<loc kind="text" name="button1" x="486" y="131" width="190" height="129.25"/>
<loc kind="char" name="WOLF" state="right" size="80" x="67" y="190"/>
<loc kind="char" name="RED" state="right" size="90" x="434" y="213"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>My dear, I meant you no harm</question>
<delay>1500</delay>
<choice id="1" content="Then keep your distance" counter="aggressive,03" targetBeat="31"/>
</function>
</beat>
<beat>
<id id="45" name="Beat 45"/>
<node>GrannyInsideKitchen</node>
<locs>
<loc kind="text" name="text" x="266" y="104" width="300" height="129.25"/>
<loc kind="char" name="RED" state="default" size="90" x="322" y="184"/>
</locs>
<function kind="durScreen">
<text>
I wonder if this present is for me. I'll just take a peek inside.
</text>
<duration>4000</duration>
<target targetBeat="46"/>
</function>
</beat>
<beat>
<id id="46" name="Beat 46"/>
<node>GrannyInsideKitchen</node>
<locs>
<loc kind="text" name="text" x="308" y="121" width="210" height="129.25"/>
<loc kind="prop" name="axe" size="100" x="478" y="345"/>
<loc kind="char" name="RED" state="default" size="90" x="332" y="184"/>
</locs>
<function kind="durScreen">
<text>Strange, it's an axe</text>
<duration>3000</duration>
<target targetBeat="47"/>
</function>
</beat>
<beat>
<id id="47" name="Beat 47"/>
<function kind="setGlobal">
<global name="AxeFound" val="true"/>
<target targetBeat="48"/>
</function>
```

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</beat>
<beat>
<id id="48" name="Beat 48"/>
<function kind="conditionCheck">
<method val="global"/>
<cond name="WolfMet" val="true" YesTargetBeat="36" NoTargetBeat="35"/>
</function>
</beat>
<beat>
<id id="50" name="Beat 50"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="420" y="129" width="250" height="129.25"/>
<loc kind="text" name="button1" x="158" y="12" width="235" height="129.25"/>
<loc kind="text" name="button2" x="158" y="98" width="235" height="129.25"/>
<loc kind="text" name="button3" x="158" y="188" width="235" height="129.25"/>
<loc kind="char" name="RED" state="default" size="90" x="182" y="166"/>
<loc kind="char" name="GRAN" state="default" size="115" x="427" y="201"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>Hello...this is such a surprise</question>
<delay>1500</delay>
<choice id="1" content="What a lovely dress, Grandmama." counter="adult,01"
targetBeat="51"/>
<choice id="2" content="I've brought you a basket, Grandmama." counter="friendly,01"
targetBeat="55"/>
<choice id="3" content="Perhaps I could help you tidy up, Grandmama" counter="aggressive,01"
targetBeat="57"/>
</function>
</beat>
<beat>
<id id="51" name="Beat 51"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="407" y="146" width="180" height="129.25"/>
<loc kind="text" name="button1" x="195" y="105" width="190" height="129.25"/>
<loc kind="char" name="RED" state="default" size="90" x="182" y="166"/>
<loc kind="char" name="GRAN" state="default" size="115" x="427" y="201"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>Oh do you like it?</question>
<delay>1500</delay>
<choice id="1" content="Yes it's very nice" counter="friendly,00" targetBeat="60"/>
</function>
</beat>
<beat>
<id id="55" name="Beat 55"/>
```

```
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="433" y="107" width="290" height="129.25"/>
<loc kind="text" name="button1" x="236" y="121" width="111.1" height="129.25"/>
<loc kind="char" name="RED" state="default" size="90" x="182" y="166"/>
<loc kind="char" name="GRAN" state="default" size="115" x="427" y="201"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>
Perhaps you could help Grandmama by putting the basket's contents in the pantry.
</question>
<delay>1500</delay>
<choice id="1" content="I will" counter="friendly,00" targetBeat="56"/>
</function>
</beat>
<beat>
<id id="56" name="Beat 56"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="436" y="165" width="120" height="129.25"/>
<loc kind="text" name="button1" x="175" y="101" width="235" height="129.25"/>
<loc kind="text" name="button2" x="175" y="186" width="235" height="129.25"/>
<loc kind="text" name="button3" x="177" y="18" width="235" height="129.25"/>
<loc kind="char" name="RED" state="default" size="90" x="182" y="166"/>
<loc kind="char" name="GRAN" state="default" size="115" x="427" y="201"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>Thank you</question>
<delay>1500</delay>
<choice id="1" content="Shall we have lunch Grandmama?" counter="friendly,01"
targetBeat="62"/>
<choice id="2" content="Perhaps we could chat, Grandmama?" counter="adult,01"
targetBeat="65"/>
<choice id="3" content="Is everything alright, Grandmama?" counter="aggressive,01"
targetBeat="70"/>
</function>
</beat>
<beat>
<id id="57" name="Beat 57"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="428" y="139" width="210" height="129.25"/>
<loc kind="text" name="button1" x="175" y="101" width="235" height="129.25"/>
<loc kind="text" name="button2" x="175" y="186" width="235" height="129.25"/>
<loc kind="text" name="button3" x="177" y="18" width="235" height="129.25"/>
<loc kind="char" name="RED" state="default" size="90" x="182" y="166"/>
<loc kind="char" name="GRAN" state="default" size="115" x="427" y="201"/>
```

```
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>Perhaps another time</question>
<delay>1500</delay>
<choice id="1" content="Shall we have lunch Grandmama?" counter="friendly,01"
targetBeat="62"/>
<choice id="2" content="Perhaps we could chat, Grandmama?" counter="adult,01"
targetBeat="65"/>
<choice id="3" content="Is everything alright, Grandmama?" counter="aggressive,01"
targetBeat="70"/>
</function>
</beat>
<beat>
<id id="60" name="Beat 60"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="406" y="143" width="250" height="129.25"/>
<loc kind="text" name="button1" x="175" y="101" width="235" height="129.25"/>
<loc kind="text" name="button2" x="175" y="186" width="235" height="129.25"/>
<loc kind="text" name="button3" x="177" y="18" width="235" height="129.25"/>
<loc kind="char" name="GRAN" state="default" size="115" x="427" y="201"/>
<loc kind="char" name="RED" state="default" size="90" x="182" y="166"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>I hope it's enthusiastically received</question>
<delay>1500</delay>
<choice id="1" content="Shall we have lunch Grandmama?" counter="friendly,01"
targetBeat="62"/>
<choice id="2" content="Perhaps we could chat, Grandmama?" counter="adult,01"
targetBeat="65"/>
<choice id="3" content="Is everything alright, Grandmama?" counter="aggressive,01"
targetBeat="70"/>
</function>
</beat>
<beat>
<id id="62" name="Beat 62"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="402" y="153" width="180" height="129.25"/>
<loc kind="text" name="button1" x="202" y="123" width="140" height="129.25"/>
<loc kind="char" name="GRAN" state="default" size="115" x="427" y="201"/>
<loc kind="char" name="RED" state="default" size="90" x="182" y="166"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>I'm afraid I'm expecting a visitor</question>
```

```
<delay>1500</delay>
<choice id="1" content="Oh, I'm sorry" counter="friendly,01" targetBeat="63"/>
</function>
</beat>
<beat>
<id id="63" name="Beat 63"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="5" y="204" width="220" height="129.25"/>
<loc kind="char" name="GRAN" state="default" size="115" x="427" y="201"/>
<loc kind="char" name="RED" state="default" size="90" x="182" y="166"/>
<loc kind="char" name="WOLF" state="mad" size="90" x="-20" y="265"/>
</locs>
<function kind="durScreen">
<text>What a feast: two to eat. And I'm so hungry...</text>
<duration>4000</duration>
<target targetBeat="64"/>
</function>
</beat>
<beat>
<id id="64" name="Beat 64"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="285" y="119" width="170" height="129.25"/>
<loc kind="text" name="button1" x="658" y="94" width="135" height="129.25"/>
<loc kind="char" name="WOLF" state="mad" size="90" x="246" y="166"/>
<loc kind="char" name="RED" state="right" size="90" x="617" y="166"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>That was tasty...</question>
<delay>1500</delay>
<choice id="1" content="You've eaten Grandmama" counter="friendly,00" targetBeat="300"/>
</function>
</beat>
<beat>
<id id="65" name="Beat 65"/>
<function kind="conditionCheck">
<method val="inventory"/>
<cond char="Red" val="book" YesTargetBeat="66" NoTargetBeat="68"/>
</function>
</beat>
<beat>
<id id="66" name="Beat 66"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="389" y="162" width="230" height="129.25"/>
<loc kind="text" name="button1" x="125" y="78" width="255" height="129.25"/>
<loc kind="char" name="RED" state="default" size="90" x="182" y="166"/>
<loc kind="char" name="GRAN" state="default" size="115" x="427" y="201"/>
```

</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>I have very little time...</question>
<delay>1500</delay>
<choice id="1" content="I'm a little confused about some passages in this book. Perhaps you could help." counter="friendly,01" targetBeat="67"/>
</function>
</beat>
<beat>
<id id="67" name="Beat 67"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="394" y="134" width="290" height="129.25"/>
<loc kind="text" name="button1" x="221" y="117" width="111.1" height="129.25"/>
<loc kind="char" name="RED" state="default" size="90" x="182" y="166"/>
<loc kind="char" name="GRAN" state="default" size="115" x="427" y="201"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>
Oh Red, darling. I'm not much of a teacher. You should head home and ask your mother
</question>
<delay>1500</delay>
<choice id="1" content="Oh, I see" counter="friendly,01" targetBeat="63"/>
</function>
</beat>
<beat>
<id id="68" name="Beat 68"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="383" y="153" width="290" height="129.25"/>
<loc kind="text" name="button1" x="196" y="118" width="145" height="129.25"/>
<loc kind="char" name="RED" state="default" size="90" x="182" y="166"/>
<loc kind="char" name="GRAN" state="default" size="115" x="427" y="201"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>
I'm sorry dear, but you've caught me at an awkward time
</question>
<delay>1500</delay>
<choice id="1" content="Oh, I'm sorry" counter="friendly,01" targetBeat="63"/>
</function>
</beat>
<beat>
<id id="70" name="Beat 70"/>
<node>GrannyInsideDetail</node>

<locs>
<loc kind="text" name="text" x="396" y="149" width="290" height="129.25"/>
<loc kind="text" name="button1" x="200" y="94" width="135" height="129.25"/>
<loc kind="char" name="RED" state="default" size="90" x="182" y="166"/>
<loc kind="char" name="GRAN" state="default" size="115" x="427" y="201"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>
Some days I'm busier than others. But I'm quite well, dear
</question>
<delay>1500</delay>
<choice id="1" content="You seem a little agitated" counter="friendly,01" targetBeat="63"/>
</function>
</beat>
<beat>
<id id="80" name="Beat 80"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="399" y="135" width="210" height="129.25"/>
<loc kind="text" name="button1" x="154" y="80" width="230" height="129.25"/>
<loc kind="char" name="WOLF" state="asgran" size="115" x="427" y="201"/>
<loc kind="char" name="RED" state="default" size="90" x="182" y="166"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>Oh it's just something I threw on</question>
<delay>1500</delay>
<choice id="1" content="Well it's very becoming. It's make you look a like a new person."
counter="adult,03" targetBeat="81"/>
</function>
</beat>
<beat>
<id id="81" name="Beat 81"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="398" y="133" width="280" height="129.25"/>
<loc kind="text" name="button1" x="180" y="10" width="200" height="129.25"/>
<loc kind="text" name="button2" x="180" y="164" width="200" height="129.25"/>
<loc kind="text" name="button3" x="180" y="87" width="200" height="129.25"/>
<loc kind="char" name="RED" state="default" size="90" x="182" y="166"/>
<loc kind="char" name="WOLF" state="asgran" size="115" x="427" y="201"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>Why, thank you. What would you like to do my dear?</question>
<delay>1500</delay>

```
<choice id="1" content="Shall we have lunch Grandmama?" counter="adult,03"
targetBeat="82"/>
<choice id="2" content="Perhaps we could chat, Grandmama?" counter="friendly,01"
targetBeat="90"/>
<choice id="3" content="Is everything alright, Grandmama?" counter="friendly,02"
targetBeat="95"/>
</function>
</beat>
<beat>
<id id="82" name="Beat 82 new"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="394" y="97" width="200" height="129.25"/>
<loc kind="char" name="WOLF" state="asgranmad" size="115" x="411" y="172"/>
<loc kind="char" name="RED" state="default" size="90" x="182" y="166"/>
</locs>
<function kind="durScreen">
<text>Yes, that's exactly what I was thinking.</text>
<duration>4000</duration>
<target targetBeat="100"/>
</function>
</beat>
<beat>
<id id="85" name="Beat 85"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="392" y="159" width="220" height="129.25"/>
<loc kind="text" name="button1" x="158" y="78" width="230" height="129.25"/>
<loc kind="char" name="WOLF" state="asgran" size="115" x="427" y="201"/>
<loc kind="char" name="RED" state="default" size="90" x="182" y="166"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>I do love rustic baskets</question>
<delay>1500</delay>
<choice id="1" content="I guess I should say I brought you some food; pickled pairs and prunes"
counter="friendly,01" targetBeat="81"/>
</function>
</beat>
<beat>
<id id="87" name="Beat 87"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="390" y="129" width="250" height="129.25"/>
<loc kind="text" name="button1" x="180" y="10" width="200" height="129.25"/>
<loc kind="text" name="button2" x="180" y="87" width="200" height="129.25"/>
<loc kind="text" name="button3" x="180" y="164" width="200" height="129.25"/>
<loc kind="char" name="RED" state="default" size="90" x="182" y="166"/>
<loc kind="char" name="WOLF" state="asgran" size="115" x="427" y="201"/>
</locs>
```

```
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>Nonsense. Why not relax after you long journey</question>
<delay>1500</delay>
<choice id="1" content="Shall we have lunch Grandmama?" counter="adult,03"
targetBeat="82"/>
<choice id="2" content="Perhaps we could chat, Grandmama?" counter="friendly,01"
targetBeat="90"/>
<choice id="3" content="Is everything alright, Grandmama?" counter="friendly,02"
targetBeat="95"/>
</function>
</beat>
<beat>
<id id="90" name="Beat 90"/>
<function kind="conditionCheck">
<method val="inventory"/>
<cond char="Red" val="book" YesTargetBeat="91" NoTargetBeat="95"/>
</function>
</beat>
<beat>
<id id="91" name="Beat 91"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="404" y="130" width="220" height="129.25"/>
<loc kind="text" name="button1" x="138" y="79" width="260" height="129.25"/>
<loc kind="char" name="RED" state="default" size="90" x="182" y="166"/>
<loc kind="char" name="WOLF" state="asgran" size="115" x="427" y="201"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>What would you like to chat about my dear?</question>
<delay>1500</delay>
<choice id="1" content="I'm a little confused about some passages in this book. Perhaps you
could help" counter="adult,03" targetBeat="92"/>
</function>
</beat>
<beat>
<id id="92" name="Beat 92"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="390" y="108" width="250" height="129.25"/>
<loc kind="text" name="button1" x="164" y="97" width="210" height="129.25"/>
<loc kind="char" name="RED" state="default" size="90" x="182" y="166"/>
<loc kind="char" name="WOLF" state="asgran" size="115" x="427" y="201"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>
```

Let's just say the book suggests there's a little bit of the animal in all of us...
</question>
<delay>1500</delay>
<choice id="1" content="There is an animal in you, Grandmama?" counter="adult,03" targetBeat="93"/>
</function>
</beat>
<beat>
<id id="93" name="Beat 93 new"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="461" y="136" width="111" height="129.25"/>
<loc kind="char" name="WOLF" state="asgranmad" size="115" x="422" y="185"/>
<loc kind="char" name="RED" state="default" size="90" x="279" y="173"/>
</locs>
<function kind="durScreen">
<text>Oh,yes...</text>
<duration>4000</duration>
<target targetBeat="100"/>
</function>
</beat>
<beat>
<id id="95" name="Beat 95"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="381" y="127" width="285" height="129.25"/>
<loc kind="text" name="button1" x="157" y="135" width="215" height="129.25"/>
<loc kind="char" name="WOLF" state="asgran" size="115" x="427" y="201"/>
<loc kind="char" name="RED" state="default" size="90" x="182" y="166"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>
Certainly. Come closer so I can hear you clearly, my dear
</question>
<delay>1500</delay>
<choice id="1" content="Of course, Granmama" counter="adult,03" targetBeat="96"/>
</function>
</beat>
<beat>
<id id="96" name="Beat 96 new"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="449" y="149" width="140" height="129.25"/>
<loc kind="char" name="WOLF" state="asgranmad" size="115" x="427" y="201"/>
<loc kind="char" name="RED" state="default" size="90" x="301" y="178"/>
</locs>
<function kind="durScreen">
<text>Come closer...</text>
<duration>4000</duration>

```
<target targetBeat="100"/>
</function>
</beat>
<beat>
<id id="100" name="Beat 100"/>
<function kind="conditionCheck">
<method val="inventory"/>
<cond char="Red" val="knife" YesTargetBeat="210" NoTargetBeat="101"/>
</function>
</beat>
<beat>
<id id="101" name="Beat 101"/>
<function kind="conditionCheck">
<method val="global"/>
<cond name="AxeFound" val="true" YesTargetBeat="103" NoTargetBeat="102"/>
</function>
</beat>
<beat>
<id id="102" name="Beat 102"/>
<function kind="conditionCheck">
<method val="counter"/>
<cond name="adult" val="7" operator="over" YesTargetBeat="120" NoTargetBeat="105"/>
</function>
</beat>
<beat>
<id id="103" name="Beat 103"/>
<function kind="conditionCheck">
<method val="counter"/>
<cond name="adult" val="7" operator="over" YesTargetBeat="130" NoTargetBeat="110"/>
</function>
</beat>
<beat>
<id id="105" name="Beat 105"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="418" y="157" width="150" height="129.25"/>
<loc kind="text" name="button1" x="192" y="95" width="170" height="129.25"/>
<loc kind="char" name="RED" state="default" size="90" x="182" y="166"/>
<loc kind="char" name="WOLF" state="asgran" size="115" x="427" y="201"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>I'm so hungry</question>
<delay>1500</delay>
<choice id="1" content="This might be a good time to run" counter="friendly,03"
targetBeat="200"/>
</function>
</beat>
<beat>
<id id="110" name="Beat 110"/>
```

```
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="421" y="159" width="150" height="129.25"/>
<loc kind="text" name="button1" x="180" y="7" width="200" height="129.25"/>
<loc kind="text" name="button2" x="180" y="90" width="200" height="129.25"/>
<loc kind="char" name="RED" state="default" size="90" x="182" y="166"/>
<loc kind="char" name="WOLF" state="asgran" size="115" x="427" y="201"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>I'm so hungry</question>
<delay>1500</delay>
<choice id="1" content="This might be a good time to run" counter="friendly,03"
targetBeat="200"/>
<choice id="2" content="Perhaps I should open Grandmama's present now"
counter="aggressive,01" targetBeat="209"/>
</function>
</beat>
<beat>
<id id="120" name="Beat 120"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="401" y="163" width="190" height="129.25"/>
<loc kind="text" name="button1" x="180" y="13" width="200" height="129.25"/>
<loc kind="text" name="button2" x="180" y="94" width="200" height="129.25"/>
<loc kind="char" name="RED" state="default" size="90" x="182" y="166"/>
<loc kind="char" name="WOLF" state="asgran" size="115" x="427" y="201"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>You will be so tasty</question>
<delay>1500</delay>
<choice id="1" content="This might be a good time to run" counter="friendly,03"
targetBeat="200"/>
<choice id="2" content="Maybe I can talk my way out of that" counter="friendly,02"
targetBeat="150"/>
</function>
</beat>
<beat>
<id id="130" name="Beat 130"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="395" y="159" width="250" height="129.25"/>
<loc kind="text" name="button1" x="180" y="9" width="200" height="129.25"/>
<loc kind="text" name="button2" x="180" y="85" width="200" height="129.25"/>
<loc kind="text" name="button3" x="180" y="185" width="200" height="129.25"/>
<loc kind="char" name="WOLF" state="asgran" size="115" x="427" y="201"/>
<loc kind="char" name="RED" state="default" size="90" x="182" y="166"/>
</locs>
```

```
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>Finally something to eat...</question>
<delay>1500</delay>
<choice id="1" content="This might be a good time to run" counter="friendly,03"
targetBeat="200"/>
<choice id="2" content="Perhaps I should open Grandmama's present now"
counter="aggressive,01" targetBeat="209"/>
<choice id="3" content="Maybe I can talk my way out of that" counter="friendly,02"
targetBeat="150"/>
</function>
</beat>
<beat>
<id id="150" name="Beat 150"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="425" y="165" width="160" height="129.25"/>
<loc kind="text" name="button1" x="180" y="67" width="190" height="129.25"/>
<loc kind="char" name="RED" state="default" size="90" x="182" y="166"/>
<loc kind="char" name="WOLF" state="asgran" size="115" x="427" y="201"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>You don't run?</question>
<delay>1500</delay>
<choice id="1" content="No need to be so aggressive. Let me cook you a meal."
counter="adult,03" targetBeat="151"/>
</function>
</beat>
<beat>
<id id="151" name="Beat 151"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="403" y="132" width="200" height="129.25"/>
<loc kind="text" name="button1" x="205" y="95" width="150" height="129.25"/>
<loc kind="char" name="RED" state="default" size="90" x="182" y="166"/>
<loc kind="char" name="WOLF" state="asgran" size="115" x="427" y="201"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>Thank you, but I prefer my food raw.</question>
<delay>1500</delay>
<choice id="1" content="What was that? A shot?" counter="adult,03" targetBeat="152"/>
</function>
</beat>
<beat>
<id id="152" name="Beat 152"/>
<node>GrannyInsideDetail</node>
```

```
<locs>
<loc kind="text" name="text" x="18" y="59" width="170" height="129.25"/>
<loc kind="text" name="button1" x="204" y="70" width="150" height="129.25"/>
<loc kind="char" name="WOODSMAN" state="gun" size="90" x="12" y="126"/>
<loc kind="char" name="RED" state="default" size="90" x="173" y="111"/>
<loc kind="char" name="WOLF" state="asgrandead" size="115" x="282" y="369"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>That was a close call, I must say</question>
<delay>1500</delay>
<choice id="1" content="You saved me!" counter="friendly,03" targetBeat="221"/>
</function>
</beat>
<beat>
<id id="200" name="Beat 200"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="482" y="39" width="103.15" height="129.25"/>
<loc kind="char" name="RED" state="default" size="90" x="182" y="166"/>
<loc kind="char" name="WOLF" state="asgranmad" size="250" x="293" y="28"/>
</locs>
<function kind="durScreen">
<text>Got you</text>
<duration>4000</duration>
<target targetBeat="201"/>
</function>
</beat>
<beat>
<id id="201" name="Beat 201"/>
<node>wolfBelly</node>
<locs>
<loc kind="text" name="text" x="187" y="107" width="180" height="129.25"/>
<loc kind="char" name="RED" state="default" size="90" x="182" y="166"/>
</locs>
<function kind="durScreen">
<text>It's so dark here..</text>
<duration>5000</duration>
<target targetBeat="202"/>
</function>
</beat>
<beat>
<id id="202" name="Beat 202"/>
<node>wolfBelly</node>
<locs>
<loc kind="text" name="title" x="314" y="49" width="150" height="129.25"/>
<loc kind="text" name="button1" x="530" y="402" width="130" height="129.25"/>
<loc kind="char" name="RED" state="default" size="90" x="182" y="166"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
```

```
<function kind="endScreen">
<title>The End</title>
<button>Another Go</button>
<target targetBeat="1"/>
</function>
</beat>
<beat>
<id id="209" name="Beat 209 new"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="179" y="121" width="120" height="129.25"/>
<loc kind="char" name="WOLF" state="asgranmad" size="115" x="411" y="172"/>
<loc kind="char" name="RED" state="attackingAxe" size="90" x="99" y="151"/>
</locs>
<function kind="durScreen">
<text>Take this...</text>
<duration>4000</duration>
<target targetBeat="211"/>
</function>
</beat>
<beat>
<id id="210" name="Beat 210"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="190" y="121" width="130" height="129.25"/>
<loc kind="char" name="WOLF" state="asgranmad" size="115" x="411" y="172"/>
<loc kind="char" name="RED" state="attacking" size="90" x="97" y="146"/>
</locs>
<function kind="durScreen">
<text>Take this...</text>
<duration>4000</duration>
<target targetBeat="211"/>
</function>
</beat>
<beat>
<id id="211" name="Beat 211"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="249" y="100" width="270" height="129.25"/>
<loc kind="char" name="WOLF" state="asgrandead" size="115" x="282" y="369"/>
<loc kind="char" name="RED" state="default" size="90" x="276" y="165"/>
</locs>
<function kind="durScreen">
<text>
I wonder why his belly is so swollen, I should cut it open
</text>
<duration>4000</duration>
<target targetBeat="212"/>
</function>
</beat>
<beat>
```

```xml
<id id="212" name="Beat 212"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="206" y="87" width="150" height="129.25"/>
<loc kind="text" name="button1" x="47" y="101" width="130" height="129.25"/>
<loc kind="char" name="RED" state="default" size="90" x="28" y="168"/>
<loc kind="char" name="GRAN" state="standing" size="115" x="168" y="167"/>
<loc kind="char" name="WOLF" state="asgrandead" size="115" x="282" y="369"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>Thank you so much my dear</question>
<delay>1500</delay>
<choice id="1" content="I'm so happy you're alive" counter="friendly,03" targetBeat="213"/>
</function>
</beat>
<beat>
<id id="213" name="Beat 213"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="title" x="318" y="33" width="150" height="129.25"/>
<loc kind="text" name="button1" x="564" y="309" width="130" height="129.25"/>
<loc kind="char" name="GRAN" state="standing" size="115" x="168" y="167"/>
<loc kind="char" name="RED" state="default" size="90" x="28" y="168"/>
<loc kind="char" name="WOLF" state="asgrandead" size="115" x="282" y="369"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="endScreen">
<title>The End</title>
<button>Another Go</button>
<target targetBeat="1"/>
</function>
</beat>
<beat>
<id id="221" name="Beat 221"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="152" y="91" width="280" height="129.25"/>
<loc kind="char" name="WOLF" state="asgrandead" size="115" x="282" y="369"/>
<loc kind="char" name="RED" state="default" size="90" x="182" y="166"/>
<loc kind="char" name="WOODSMAN" state="default" size="90" x="12" y="124"/>
</locs>
<function kind="durScreen">
<text>
I wonder why his belly is so swollen, we should cut it open
</text>
<duration>4000</duration>
<target targetBeat="222"/>
</function>
</beat>
```

```
<beat>
<id id="222" name="Beat 222"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="373" y="100" width="170" height="129.25"/>
<loc kind="text" name="button1" x="197" y="93" width="130" height="129.25"/>
<loc kind="char" name="RED" state="default" size="90" x="182" y="166"/>
<loc kind="char" name="WOODSMAN" state="default" size="90" x="12" y="124"/>
<loc kind="char" name="GRAN" state="standing" size="115" x="340" y="166"/>
<loc kind="char" name="WOLF" state="asgrandead" size="115" x="282" y="369"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>You are my hero</question>
<delay>1500</delay>
<choice id="1" content="I'm so happy you're alive" counter="friendly,03" targetBeat="223"/>
</function>
</beat>
<beat>
<id id="223" name="Beat 223"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="title" x="327" y="24" width="150" height="129.25"/>
<loc kind="text" name="button1" x="600" y="303" width="130" height="129.25"/>
<loc kind="char" name="WOODSMAN" state="default" size="90" x="12" y="124"/>
<loc kind="char" name="RED" state="default" size="90" x="182" y="166"/>
<loc kind="char" name="WOLF" state="asgrandead" size="115" x="282" y="369"/>
<loc kind="char" name="GRAN" state="standing" size="115" x="340" y="166"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="endScreen">
<title>The End</title>
<button>Another Go</button>
<target targetBeat="1"/>
</function>
</beat>
<beat>
<id id="300" name="Beat 300"/>
<function kind="conditionCheck">
<method val="inventory"/>
<cond char="Red" val="knife" YesTargetBeat="410" NoTargetBeat="301"/>
</function>
</beat>
<beat>
<id id="301" name="Beat 301"/>
<function kind="conditionCheck">
<method val="global"/>
<cond name="AxeFound" val="true" YesTargetBeat="303" NoTargetBeat="302"/>
</function>
</beat>
```

```
<beat>
<id id="302" name="Beat 302"/>
<function kind="conditionCheck">
<method val="counter"/>
<cond name="adult" val="7" operator="over" YesTargetBeat="320" NoTargetBeat="305"/>
</function>
</beat>
<beat>
<id id="303" name="Beat 303"/>
<function kind="conditionCheck">
<method val="counter"/>
<cond name="adult" val="7" operator="over" YesTargetBeat="330" NoTargetBeat="310"/>
</function>
</beat>
<beat>
<id id="305" name="Beat 305"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="258" y="119" width="200" height="129.25"/>
<loc kind="text" name="button1" x="622" y="100" width="170" height="129.25"/>
<loc kind="char" name="WOLF" state="mad" size="90" x="250" y="166"/>
<loc kind="char" name="RED" state="right" size="90" x="617" y="166"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>And now for desert...</question>
<delay>1500</delay>
<choice id="1" content="This might be a good time to run" counter="friendly,03"
targetBeat="400"/>
</function>
</beat>
<beat>
<id id="310" name="Beat 310"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="252" y="126" width="200" height="129.25"/>
<loc kind="text" name="button1" x="590" y="9" width="200" height="129.25"/>
<loc kind="text" name="button2" x="590" y="86" width="200" height="129.25"/>
<loc kind="char" name="WOLF" state="mad" size="90" x="250" y="166"/>
<loc kind="char" name="RED" state="right" size="90" x="617" y="166"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>And now for desert...</question>
<delay>1500</delay>
<choice id="1" content="This might be a good time to run" counter="friendly,03"
targetBeat="400"/>
<choice id="2" content="Perhaps I should open Grandmama's present now"
counter="aggressive,01" targetBeat="409"/>
```

```
</function>
</beat>
<beat>
<id id="320" name="Beat 320"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="264" y="129" width="200" height="129.25"/>
<loc kind="text" name="button1" x="590" y="11" width="200" height="129.25"/>
<loc kind="text" name="button2" x="590" y="90" width="200" height="129.25"/>
<loc kind="char" name="RED" state="right" size="90" x="617" y="166"/>
<loc kind="char" name="WOLF" state="mad" size="90" x="250" y="166"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>You will be so tasty</question>
<delay>1500</delay>
<choice id="1" content="This might be a good time to run" counter="friendly,03"
targetBeat="400"/>
<choice id="2" content="Maybe I can talk my way out of that" counter="friendly,02"
targetBeat="350"/>
</function>
</beat>
<beat>
<id id="330" name="Beat 330"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="246" y="125" width="220" height="129.25"/>
<loc kind="text" name="button1" x="590" y="13" width="200" height="129.25"/>
<loc kind="text" name="button2" x="590" y="87" width="200" height="129.25"/>
<loc kind="text" name="button3" x="590" y="185" width="200" height="129.25"/>
<loc kind="char" name="WOLF" state="mad" size="90" x="250" y="166"/>
<loc kind="char" name="RED" state="right" size="90" x="617" y="166"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>And now for desert.....</question>
<delay>1500</delay>
<choice id="1" content="This might be a good time to run" counter="friendly,03"
targetBeat="400"/>
<choice id="2" content="Perhaps I should open Grandmama's present now"
counter="aggressive,01" targetBeat="409"/>
<choice id="3" content="Maybe I can talk my way out of that" counter="friendly,02"
targetBeat="350"/>
</function>
</beat>
<beat>
<id id="350" name="Beat 350"/>
<node>GrannyInsideDetail</node>
<locs>
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<loc kind="text" name="text" x="276" y="128" width="160" height="129.25"/>
<loc kind="text" name="button1" x="604" y="74" width="190" height="129.25"/>
<loc kind="char" name="WOLF" state="mad" size="90" x="250" y="166"/>
<loc kind="char" name="RED" state="right" size="90" x="617" y="166"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>You don't run?</question>
<delay>1500</delay>
<choice id="1" content="No need to be so aggressive. Let me cook you a meal."
counter="adult,03" targetBeat="351"/>
</function>
</beat>
<beat>
<id id="351" name="Beat 351"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="230" y="99" width="200" height="129.25"/>
<loc kind="text" name="button1" x="643" y="105" width="150" height="129.25"/>
<loc kind="char" name="WOLF" state="mad" size="90" x="250" y="166"/>
<loc kind="char" name="RED" state="right" size="90" x="617" y="166"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>Thank you, but I prefer my food raw.</question>
<delay>1500</delay>
<choice id="1" content="What was that? A shot?" counter="adult,03" targetBeat="352"/>
</function>
</beat>
<beat>
<id id="352" name="Beat 352"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="57" y="60" width="160" height="129.25"/>
<loc kind="text" name="button1" x="643" y="120" width="150" height="129.25"/>
<loc kind="char" name="WOLF" state="mad" size="90" x="250" y="166"/>
<loc kind="char" name="WOODSMAN" state="default" size="90" x="42" y="131"/>
<loc kind="char" name="RED" state="right" size="90" x="617" y="166"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>That was a close call, I must say</question>
<delay>1500</delay>
<choice id="1" content="You saved me!" counter="friendly,03" targetBeat="421"/>
</function>
</beat>
<beat>
<id id="400" name="Beat 400"/>

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<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="515" y="124" width="110.65" height="129.25"/>
<loc kind="char" name="WOLF" state="mad" size="200" x="250" y="166"/>
<loc kind="char" name="RED" state="right" size="90" x="617" y="166"/>
</locs>
<function kind="durScreen">
<text>Got you</text>
<duration>4000</duration>
<target targetBeat="401"/>
</function>
</beat>
<beat>
<id id="401" name="Beat 401"/>
<node>wolfBelly</node>
<locs>
<loc kind="text" name="text" x="177" y="102" width="180" height="129.25"/>
<loc kind="char" name="RED" state="default" size="90" x="182" y="166"/>
</locs>
<function kind="durScreen">
<text>It's so dark here..</text>
<duration>5000</duration>
<target targetBeat="402"/>
</function>
</beat>
<beat>
<id id="402" name="Beat 402"/>
<node>wolfBelly</node>
<locs>
<loc kind="text" name="title" x="302" y="41" width="150" height="129.25"/>
<loc kind="text" name="button1" x="562" y="403" width="130" height="129.25"/>
<loc kind="char" name="RED" state="default" size="90" x="182" y="166"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="endScreen">
<title>The End</title>
<button>Another Go</button>
<target targetBeat="1"/>
</function>
</beat>
<beat>
<id id="409" name="Beat 409 new"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="567" y="159" width="130" height="129.25"/>
<loc kind="char" name="RED" state="attackingAxeR" size="90" x="482" y="207"/>
<loc kind="char" name="WOLF" state="mad" size="90" x="250" y="166"/>
</locs>
<function kind="durScreen">
<text>Take this...</text>
<duration>4000</duration>
```

```
<target targetBeat="411"/>
</function>
</beat>
<beat>
<id id="410" name="Beat 410"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="571" y="153" width="130" height="38.9"/>
<loc kind="char" name="wolf" state="mad" size="90" x="250" y="166"/>
<loc kind="char" name="Red" state="attackingR" size="90" x="482" y="212"/>
</locs>
<function kind="durScreen">
<text>Take this...</text>
<duration>4000</duration>
<target targetBeat="411"/>
</function>
</beat>
<beat>
<id id="411" name="Beat 411"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="471" y="91" width="300" height="129.25"/>
<loc kind="char" name="RED" state="right" size="90" x="482" y="166"/>
<loc kind="char" name="WOLF" state="maddead" size="75" x="130" y="190"/>
</locs>
<function kind="durScreen">
<text>
Perhaps I can save Grandmama if I cut open the belly
</text>
<duration>4000</duration>
<target targetBeat="412"/>
</function>
</beat>
<beat>
<id id="412" name="Beat 412"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="367" y="97" width="150" height="129.25"/>
<loc kind="text" name="button1" x="563" y="96" width="130" height="129.25"/>
<loc kind="char" name="WOLF" state="maddead" size="75" x="130" y="190"/>
<loc kind="char" name="GRAN" state="standing" size="115" x="335" y="166"/>
<loc kind="char" name="RED" state="right" size="90" x="482" y="166"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>Thank you so much my dear</question>
<delay>1500</delay>
<choice id="1" content="I'm so happy you're alive" counter="friendly,03" targetBeat="413"/>
</function>
</beat>
```

```
<beat>
<id id="413" name="Beat 413"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="title" x="327" y="33" width="150" height="129.25"/>
<loc kind="text" name="button1" x="605" y="457" width="130" height="129.25"/>
<loc kind="char" name="GRAN" state="standing" size="115" x="335" y="166"/>
<loc kind="char" name="WOLF" state="maddead" size="75" x="130" y="190"/>
<loc kind="char" name="RED" state="right" size="90" x="482" y="166"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="endScreen">
<title>The End</title>
<button>Another Go</button>
<target targetBeat="1"/>
</function>
</beat>
<beat>
<id id="421" name="Beat 421"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="15" y="60" width="280" height="129.25"/>
<loc kind="char" name="WOLF" state="maddead" size="90" x="130" y="190"/>
<loc kind="char" name="RED" state="right" size="90" x="482" y="166"/>
<loc kind="char" name="WOODSMAN" state="default" size="90" x="41" y="137"/>
</locs>
<function kind="durScreen">
<text>
I wonder why his belly is so swollen, we should cut it open
</text>
<duration>4000</duration>
<target targetBeat="422"/>
</function>
</beat>
<beat>
<id id="422" name="Beat 422"/>
<node>GrannyInsideDetail</node>
<locs>
<loc kind="text" name="text" x="359" y="115" width="160" height="129.25"/>
<loc kind="text" name="button1" x="567" y="94" width="130" height="129.25"/>
<loc kind="char" name="WOLF" state="maddead" size="90" x="130" y="190"/>
<loc kind="char" name="GRAN" state="standing" size="115" x="335" y="166"/>
<loc kind="char" name="WOODSMAN" state="default" size="90" x="41" y="137"/>
<loc kind="char" name="RED" state="right" size="90" x="482" y="166"/>
</locs>
<defaulttarget targetBeat="undefined" val="0"/>
<function kind="conversationChoice">
<questioner>1</questioner>
<question>You are my hero</question>
<delay>1500</delay>
<choice id="1" content="I'm so happy you're alive" counter="friendly,03" targetBeat="423"/>
```

```
&lt;/function&gt;
&lt;/beat&gt;
&lt;beat&gt;
&lt;id id="423" name="Beat 423"/&gt;
&lt;node&gt;GrannyInsideDetail&lt;/node&gt;
&lt;locs&gt;
&lt;loc kind="text" name="title" x="319" y="35" width="150" height="129.25"/&gt;
&lt;loc kind="text" name="button1" x="597" y="417" width="130" height="129.25"/&gt;
&lt;loc kind="char" name="WOLF" state="maddead" size="90" x="130" y="190"/&gt;
&lt;loc kind="char" name="RED" state="right" size="90" x="482" y="166"/&gt;
&lt;loc kind="char" name="GRAN" state="standing" size="115" x="335" y="166"/&gt;
&lt;loc kind="char" name="WOODSMAN" state="default" size="90" x="41" y="137"/&gt;
&lt;/locs&gt;
&lt;defaulttarget targetBeat="undefined" val="0"/&gt;
&lt;function kind="endScreen"&gt;
&lt;title&gt;The End&lt;/title&gt;
&lt;button&gt;Another Go&lt;/button&gt;
&lt;target targetBeat="1"/&gt;
&lt;/function&gt;
&lt;/beat&gt;
&lt;/plot&gt;
&lt;/story&gt;
```

REFERENCES

17 Life Fables. (2005). [Interactive movie experiment]. Retrieved March 2, 2009 from http://www.17lifefables.com/

Aarseth, E. (1997). *Cybertext: Perspectives on ergodic literature*. Baltimore, Maryland: Johns Hopkins University Press.

Adobe Director. (2010, February 18). In Wikipedia, The Free Encyclopedia. Retrieved July 15, 2010, from http://en.wikipedia.org/w/index.php?title=Adobe_Director &oldid=344850889

Adobe Flash. (2010, June 28). In Wikipedia, The Free Encyclopedia. Retrieved June 29, 2010, from http://en.wikipedia.org/w/index.php?title=Adobe_Flash&oldi d=370626276The Hitchhiker's Guide to the Galaxy (1984).

Albert, T., & Ramis, H. (Producer). Ramis, H. (Director). (1993). *Groundhog Day* [Motion picture]. Columbia Pictures.

Alvy. (2005). [Figure showing feelies from interactive fiction Hitchkiker's Guide Through the Galaxy]. Retrieved March 5, 2009 from http://www.flickr.com/photos/48600106280@N01/57635031/

Apollonio, U. (Ed.). (1973). *Documents of 20th century art: Futurist manifestos*. (R. Brain, R.W. Flint, J.C. Higgitt, & C. Tisdall, Trans.). New York: Viking Press.

Arndt, S. (Producer). Tykwer, T. (Director). (1998). *Run Lola Run* [Motion picture]. Germany: Sony Pictures Classics.

Art manifesto. (2010, May 4). In Wikipedia, The Free Encyclopedia. Retrieved June 20, 2010, from http://en.wikipedia.org/w/index.php?title=Art_manifesto &oldid=359969459

Ascott, R. & Shanken, E. (Ed.). (2003). *Telematic embrace: Visionary theories of art, technology, and consciousness*. Berkeley: University Of California Press.

Ascott, R. (1964). The construction of change. *Cambridge Opinion*, 41, 37-42.

Ascott, R. (1990). Is there love in the telematic embrace? *Art Journal* 49(3), 241.

Ayckbourn, A. (1975). *The Norman conquests*. London; New York: French.

Bad Mojo. (1996). [Computer game]. Glen Cove: Acclaim Entertainment.

Bal, M. (1997). *Narratology: Introduction to the theory of narrative* (2nd ed.). Toronto: University of Toronto Press.

Balet, O. (2007). Inscape: An authoring platform for interactive storytelling. In Cavazza, M. & Dinikian, S. (Eds.). *Proceedings of the 4th International conference on virtual storytelling* (pp. 176-177). Berlin: Springer.

Barthes, R. (1973). *Mythologies (selections from this and other works)*. New York: Noonday Press.

Barthes, R. (1974). *S/Z*. (R. Miller, Trans.). New York: Hill and Wang,

Barthes, R. (1975). An introduction to the structural analysis of narrative. *New Literary History,* 6(2), 237-272.

Barthes, R. (1977).The death of the author. (R. Howard, Trans.). In *Image, Music, Text*. New York: Hill

Barthes, R. (1979). From work to text. In Harari, J. (Ed.), *Textual strategies: Perspectives in poststructuralist criticism* (pp. 73-81). Ithaca: Cornell UP.

Bates, J. (1992). *The nature of characters in interactive worlds and the Oz project* (Technical Report CMU-CS-92-200, Department of Computer Science). Pittsburgh, PA: Carnegie Mellon University. Retrieved from http://www.cs.cmu.edu/afs/cs/project/oz/web/papers/loeffler.ps

Bates, J. (1994): The role of emotions in believable agents. *Communications of the ACM*, 37(7), 122-125.

Bates, J., Loyall, A.B., & Reilly, W.S. (1992).Integrating reactivity, goals, and emotion in a broad agent. *Proceedings of the fourteenth annual conference of the Cognitive Science Society* (pp. 696-701). New York: Lawrence Erlbaum.

Baudrillard, J. (1983). *Simulations*. New York: Semiotext.

Baudrillard, J. (1987). *The ecstasy of communication*. New York: Semiotext.

Baudrillard, J. (1993). *System of objects*. New York: Verso.

Bellatti, A. (1999, October 25). Roberta Williams: Sierra On-Line. Retrieved April 13, 2009 from http://www.adventureclassicgaming.com/index.php/site/interviews/127

Benford, S., Magerkurth, C., Ljungstrand, P. (2005). Bridging the physical and digital in pervasive gaming, *Communications of the ACM*, 48(3), 54-57. doi:10.1145/1047671.1047704

Benjamin, W. (1978). *Das Kunstwerk im Zeitalter seiner technischen Reproduzierbarkeit*. Frankfurt: Suhrkamp.

Berners-Lee, T. (1989).*Information Management: A Proposal*. Retrieved September 19, 2009 from http://www.w3.org/History/1989/proposal.html

Bernstein, M. (1998). Patterns of hypertext. In Gronbaek, K., Mylonas, E. & Shipman, F. M. (Eds.), *Proceedings of the ninth ACM conference on Hypertext and hypermedia: Hypertext ‘98* (pp. 21– 29). New York: ACM Press.

Bernstein, M., Joyce, M., Levine, D. (1992). Contours of constructive hypertexts. In Lucarella, D., Nanard, J., Nanard, M. & Paolini, P. (Eds.), *Proceedings of the European Conference on Hypertext '92* (pp. 161-170). New York, NY: ACM. doi:10.1145/168466.168517]

Bevan, T., Fellner, E., & Webster, P. (Producer). Wright, J. (Director). (2007). *Atonement* [Motion picture]. USA: Focus Features.

Black Dahlia. (1998). [Computer game]. Beverly Hills: Interplay Entertainment.

Blade Runner. (1997). [Computer game]. London: Virgin Interactive.

Blank, M. & Lebling, D. (1980). Zork I. [Interactive fiction]. Cambridge: Infocom.

Blank, M. (1982). Deadline. [Interactive fiction]. Cambridge, Infocom.

Blumenthal, H. (2009). Reflections. [Interactive narrative].

Bolter, J. D. & Grusin, R. (1999). *Remediation: Understanding new media*. Cambridge, MA: The MIT Press.

Bolter, J. D. & Joyce, M. (1987). Hypertext and creative writing. In *Proceedings of Hypertext '87 the ACM conference on Hypertext* (pp.41-50). New York, NY: ACM. doi:10.1145/317426.317431

Bolter, J. D. ([1991] 2001). *Writing space: Computers, hypertext, and remediation of print*. Hillsdale, NJ: L. Erlbaum Associates.

Bolter, J. D. (1996). *Degrees of Freedom*. Retrieved May 17, 2009 from http://www.uv.es/~fores/programa/bolter_freedom.html

Bolter, J. D. (2008). Digital Media and the Future of Filmic Narrative. In Kolker, R. (Ed.), *The Oxford Handbook of Film and Media Studies*. New York: Oxford University Press.

Bolter, J. D., MacIntyre, B., Gandy, M. & Schweitzer, P. (2006), New media and the permanent crisis of aura, *Convergence*, 12(1), 21–39.

Bonin, V. (2001). Toni Dove. Retrieved March 12, 2009 from http://www.fondation-langlois.org/html/e/page.php?NumPage=226

Bookchin, N. (1999). *The Intruder* [Interactive narrative]. Retrieved February 10, 2010 from http://bookchin.net/projects/intruder.html

Bordwell, D. (1985). *Narration in the Fiction Film*. Madison: University of Wisconsin Press.

Borges, J. L. (1964). The garden of forking paths. In *Labyrinths: Selected stories and other writings*. New Directions, New York.

Bouchardon S., Clément J., Réty, J.-H., Szilas N., Angé C. (2008). Rencontre: an experimental tool for digital literature, In *Proceedings of the Conference Electronic Literature in Europe 13 Sept. 11-13, 2008, Bergen University*, Bergen, Norway.

Bremond, C. (1980). The logic of narrative possibilities. *New Literary History*, 11, 387-411.

Breton, A. (1972). *Manifestoes of surrealism by André Breton*. (R. Seaver & H. R. Lane, Trans.). Ann Arbor, University of Michigan Press.

Brooks, K. M. (1999). *Metalinear Cinematic Narrative: Theory, Process, and Tool*, (Ph.D. Diss). MIT Media Lab, Boston. MA, USA.

Buñuel, L. (Director). (1929). *Un Chien Andalou* [Motion picture]. Les Grands Films Classiques

Bush, V. (1945). As we may think. *Atlantic Monthly*. 176(1), 101-108.

Butcher, S. H. (Ed.). (1922). *The poetics of Aristotle, with critical notes and a translation*. London: Macmillan. Retrieved March 2, 2009 from http://www.fordham.edu/halsall/ancient/aristotle-poeticsi.txt

Cadre, A. (1998). *Photopia* [Interactive fiction]. Retrieved February 9, 2010 from http://adamcadre.ac/if.html

Capra, F. (Director). (1946). *It's a Wonderful Life* [Motion picture]. USA: RKO Radio Pictures.

Cavazza, M. Charles, F. & Mead, S.J. (2001). Characters in search of an author: ai-based virtual storytelling. In Balet, O., Subsol, G., Torguet, P. (Eds.), *Proceedings of the First International Conference on Virtual Storytelling ICVS 2001* (pp. 145-154). Berlin: Springer.

Cavazza, M. O., Charles, F. & Mead, S. J. (2004). Developing re-usable interactive storytelling technologies. In Jacquart, R. (Eds), *Building the information society, IFIP international federation for information processing* (pp.39-44). Norwell, MA: Kluwer.

Cern. (2008). [Figure of line browser]. Retrieved June 4, 2010 from http://info.cern.ch/LMBrowser.html

Chadmattandrob. (2008, November 11), The Time Machine: An Interactive Adventure! [YouTube video]. Retrieved March 3, 2009 from http://www.youtube.com/watch?v=l8rJ1WML60Y

Chainmail. (1971). [Role playing game]. Evansville: Guidon Games.

Chapman, S. (1980). *Story and discourse: Narrative structure in fiction and film*. Ithaca: Cornell. University Press.

Clay, P. (1978). Surrogate travel via optical videodisc, Thesis Urb.Stud B.S., Massachusetts Institute of Technology.

Colossal Cave Adventure. (2010, June 29). In Wikipedia, The Free Encyclopedia. Retrieved July 1, 2010, from http://en.wikipedia.org/w/index.php ?title=Colossal_Cave_Adventure&oldid=370813732

Cooper, Sarah (2001, August, 12-17). *Reliving Last night: A prototype for interactive television*. Paper presented at SIGGRAPH 2001, Los Angeles, USA.

Coover, R, (1992, June 21). The End of Books. *New York Times Book Review,* pp. 1, 23-25.

Crawford, C. (2004). *Chris Crawford on interactive narrative*. Berkely: New Riders.

Crawford, C. (2009a). SWAT (Storytron authoring tool). [Software]. Available from http://www.storytron.com

Crawford, C. (2009b). *Balance of Power: 21st Century* [Interactive narrative]. Retrieved March 2009 from http://www.swatbugs.com/play-bop2k.php

Crowther, W. (1976). *Adventure* [Interactive fiction].

Culler, J. (1981). *The pursuit of signs, semiotics, literature, deconstruction*. New York: Cornell University Press.

CVG (n. d.). [Figure depicting computer game blade runner]. Retrieved May 19, 2009 from http://www.computerandvideogames.com/game.php?id=327

Davenport, D. & Brondmo, H. P. (1989). Creating and viewing the elastic Charles. In McAleese, R., Green, C. (Eds.), *Hypertext: state of the art* (pp. 43-51). Oxford: Intellect.

Davenport, G. & Friedlander, L. (1995). Interactive transformational environments: wheel of life. In Barrett, E. & Redmond, M. (Eds.), *Contextual media: Multimedia and interpretation*. Cambridge, MA. MIT Press. Retrieved May 7, 2009 from http://mf.media.mit.edu/pubs/other/WheelOfLife.pdf

Davenport, G. (1987). New Orleans in transition, 1983-1986: The interactive delivery of a cinematic case study. In *The international congress for design planning and theory, education group conference proceedings* (pp. 1-7). Boston, MA.

Davenport, G. (1997). Extending the documentary tradition (Speech at the Oberhausen International Film Festival) [PDF document]. Retrieved May 9, 2009 from http://mf.media.mit.edu/pubs/conference/OberhausenExtending.pdf

Davenport, G. (2002). *People often ask "what is interactive cinema?"*. Retrieved May 19, 2009 from http://ic.media.mit.edu/people/gid/research.html

Derrida, J. (1982). *Margins of philosophy*. Chicago: University of Chicago Press.

Deus Ex. (2000). [Computer game]. Wimbledon, UK: Eidos Interactive.

Döblin, A. ([1929] 2002). *Berlin Alexanderplatz*, München: DTV.

Donikian, S., Portugal, J.-N. (2004). Writing interactive fiction scenarii with DraMachina, In Göbel, S., Spierling, U., Hoffmann, A., Iurgel, I., Schneider, O., Dechau, J. & Feix, A. (Eds.), *Proceedings of TIDSE'04, 2nd International Conference on Technologies for Interactive Digital Storytelling and Entertainment* (pp. 101-112). Berlin: Springer.

Dos Passos, J. (1925). *Manhattan transfer*. New York: Houghton Mifflin.

Dove, T. (1990). *Mesmer: Secret of the human frame* [interactive installation].

Dove, T. (1993). *Archeology of a mother tongue* [Interactive installation].

Dove, T. (n. d.). [Project description of "Archeology of a mother tongue"]. Retrieved March 12, 2009 from http://www.tonidove.com/

Dragon's Lair. (2010, June 29). In Wikipedia, The Free Encyclopedia. Retrieved June 29, 2010, from http://en.wikipedia.org/w/index.php?title=Dragon%27s_Lair&oldid=370722906

Dungeons & Dragons. (1974). [Role playing game]. Lake Geneva: Tactical Studies Rules

Eagleton T. (1983). *Literary theory, An introduction*. Oxford: Blackwell Publishers Ltd.

Eclipse (software). (2010, June 10). In Wikipedia, The Free Encyclopedia. Retrieved June 17, 2010, from http://en.wikipedia.org/w/index.php?title=Eclipse_(software)&oldid=367099602

Eco, U. (1984). The Role of the Reader. In *Explorations in the semiotics of texts*. Bloomington: Indiana University Press.

Eco, U. (1997). *The open text*. Cambridge: Cambridge University Press.

Eisenstein, S. (Director). Bliokh, J. (Producer). (1926). *Battleship Potemkin* [Motion picture]. Soviet Union: Goskino.

Eisenstein, S. M. (1924), The montage of film attractions. In Lehmann, Peter (Ed.). (1997), *Defining cinema*. New Brunswick: Rutgers University Press.

eText (1995). *The eText Project: Publishing Hypermedia Textbooks*. Retrieved June 5, 2010 from http://www.xent.com/~rohit/Paper.htmld/index.html

Fable II. (2008). [Computer game]. Redmont: Microsoft Game Studios.

Façade, (n. d.). [Façade interactive drama home page], retrieved April 10, 2009 from http://www.interactivestory.net/

Fauth, J. (1995). Poles in your face: The promises and pitfalls of hyperfiction. *Mississippi Review*, 6, Retrieved from http://www.mississippireview.com/1995/06-jurge.html

Field, S. (1998). *Screenplay: The foundations of screenwriting; a step-by-step guide from concept to finished script*. New York: MJF Books.

Fletcher, K. (2007). *Jingle Bells*. [Interactive narrative]. Unpublished.

Forster, E. M. (1963). *Aspects of the Novel*. Harmondsworth: Penguin.

Foucault, M. (1972). *Archeology of Knowledge*. New York: Pantheon.

Foucault, M. (1977). What is an Author? (D. F. Bouchard & S. Simon, Trans.). In Bouchard, D. F. (Ed.). *Language, Counter-Memory, Practice* (pp. 124-127). Ithaca, New York: Cornell University Press.

Freytag, G. (1863). *Die Technik des Dramas*. Retrieved October 13, 2009 from http://www.matoni.de/technik/tec_inh.htm

Full motion video based game. (2010, June 8). In Wikipedia, The Free Encyclopedia. Retrieved June 12, 2010, from http://en.wikipedia.org/w/index.php?title =Full_motion_video_based_game&oldid=366793552

Gartland-Jones, T. (2005). Artist as researcher: Understanding the tools. *YLEM*: *Artists Using Science and Technology*, 25(6 & 8), 11-12.

Genette, G. (1980). *Narrative discourse: An essay in method*. Oxford: Blackwell.

Genette, G. (1983). *Narrative discourse revisited* (J. E. Lewin, Trans.). Ithaca, NY: Cornell University Press.

Griffith, D. W. (Director). Aitken, H. (Producer). (1915). *The Birth of a Nation* [Motion picture]. USA: Epoch Film Co.

Güzeldere G. & Franchi S. (1995). *Dialogues with colorful personalities of early AI*. Retrieved May 7, 2009 from http://www.stanford.edu/group/SHR/4-2/text/dialogues.html

Harrell, D. F. (2007). GRIOT's Tales of Haints and Seraphs: A Computational Narrative Generation System. In Wardrip-Fruin, N. & Harrigan, P. (Eds.). *Second person: Role-Playing and story in games and playable media*, Cambridge, MIT Press. Retrieved March 6, 2009 from http://www.electronicbookreview.com /thread/firstperson/generational

Harrell, D. F. (2009). Toward a Theory of Phantasmal Media: An Imaginative Cognition- and Computation- Based Approach to Digital Media. *CTheory*, rt006. Retrieved from http://www.ctheory.net/articles.aspx?id=610

Hawthorn, J. (1992). *A concise glossary of contemporary literary theory*. London: Edward Arnold.

Herman, D. (2000). Narratology as a Cognitive Science. *Image & Narrative*, 1(1). Retrieved June 16, 2010 from http://www.imageandnarrative.be/inarchive/narratology/davidherman.htm

Herman, D. (2002). *Story logic: Problems and possibilities of narrative*. Lincoln, Nebraska: U of Nebraska Press.

Hershman, L. (n. d.). [Lorna Project description web page]. Retrieved March 10, 2009 from http://www.lynnhershman.com/investigations/voyeurism/lorna/lorna.html

Horowitz, K. (2005). *The Rise & Fall of Full Motion Video*. Retrieved April 12, 2009 from http://www.sega-16.com/feature_page.php?id=149&title =The%20Rise%20&%20Fall%20of%20Full%20Motion%20Video

Hotel Dusk: Room 215. (2007). [Computer game]. Kyoto: Nintendo.

HyperCard. (2010, June 10). In Wikipedia, The Free Encyclopedia. Retrieved June 14, 2010, from http://en.wikipedia.org/w/index.php?title=HyperCard &oldid=367141610

Ico. (2001). [Computer game]. Tokyo: Sony Computer Entertainment.

Indigo Prophecy. (2005). [Computer game]. Lyon, France: Atari.

Infocom. (2010, May 26). In Wikipedia, The Free Encyclopedia. Retrieved June 4, 2010, from http://en.wikipedia.org/w/index.php?title=Infocom&oldid=364369413

Inscape. (2006). *State-of-the-art on interactive storytelling* (Inscape project deliverable D3.1.1). Retrieved March 5, 2009 from http://www.inscapers.com

Iser, W. & van Oort, R. (1997), The use of fiction in literary and generative anthropology: An interview with Wolfgang Iser. *Anthropoetics III*, 2, 1-10.

Iser, W. (1976). *Der Akt des Lesens. Theorie ästhetischer Wirkung*. München; Jauß.

Iurgel, I. (2004). From another point of view: art-E-fact. In: Göbel, S., Spierling, U., Hoffmann, A., Iurgel, I., Schneider, O., Dechau, J., Feix, A. (Eds.), Technologies for Interactive Digital Storytelling and Entertainment: Second International Conference, TIDSE 2004, Darmstadt, Germany, June 24-26, Springer, Berlin, Heidelberg. pp. 26-35.

Jackson, S. (1995). Patchwork Girl [Hyperfiction]. Watertown: Eastgate Systems

Jennings, P. (1995). Interpretation on the electronic landscape: a conversation with Toni Dove. *Felix: a Journal of Media Arts and Communication*, 2(10). Retrieved May6, 2009 from http://www.e-felix.org/issue4/electronic.html

Jennings, P. (1996a): Narrative structures for new media: Towards a new definition, *Leonardo*, 29(5), 345-350.

Jennings, P. (1996b). *The Book of Ruins and Desire* [Description of Interactive installation]. Retrieved August 3, 2009 from http://www.pamelajennings.org/PDF/Jennings-ruins%20and%20desire.pdf

Jeppemh (2000). [User comment on IMDB.com website]. Retrieved March 13, 2009 from http://www.imdb.com/title/tt0229322/usercomments

Johnson, U. (1983). *Mutmaßungen über jakob*. Frankfurt: Suhrkamp.

Johnson, U. (1984). *Jahrestage. aus dem leben von gesine cresspahl*. Frankfurt: Suhrkamp.

Joyce, J. (1939). *Finnegans wake*. New York: Viking.

Joyce, M. (1991). *Afternoon, a story.* [Hypertext fiction]. Watertown: Eastgate Systems

Joyce, M. (1995). *Of Two Minds: Hypertext Pedagogy and Poetics*. Ann Arbor, University of Michigan Press

Joyce, M. (2000). One on One with Camille Renshaw. *Pif Magazine*. 32. Retrieved September 10, 2009 from at http://mural.uv.es/egalja/mijoyce.html

Kafno, P. (2007, September 7-11). *Authoring for the interactive content generation*. Paper presented at the International International Broadcasting Convention 2007, Amsterdam, The Netherlands.

Kantel, J. (2001). [Figure depicting HyperCard message flow]. Retrieved June 12, 2010 from http://www.kantel.de/hc/hypertalk1.html

Kelso, M. T., Weyhrauch, P., & Bates, J. (1993). Dramatic presence. *Presence: The Journal of Teleoperators and Virtual Environments*, 2(1).

Kirchmann, Kay (1994). Umschalten erwünscht? Wenn ja, von wem? Ergebnisse einer Studie zu Ästhetik und Rezeption des ersten interaktiven TV-Spiels des deutschen Fernsehens im Dezember 1991. *Arbeitshefte Bildschirmmedien*, 48, 23-60.

Koenitz, H. (2008). [Advanced Stories Group website], Retrieved June 20, 2010 from http://lcc/gatech.edu/~hkoenitz/ASG

Koenitz, H. (2010). ASAPS [Software]. Available from http://lcc.gatech.edu/~hkoenitz/ASG/

Korsakow (2010). [Software]. Available from http://www.korsakow.org

Kragh-Jacobsen, S., Levring, K., Vinterberg, T., & von Trier, L. (Director). Ehrhardt, B. (Producer). (2000). *D-Dag* [Interactive movie].

Kriegel, M., Aylett, R., Dias, J., & Paiva, A. (2007). *An authoring tool for an emergent narrative storytelling system*. Paper presented at the AAAI Fall Symposium on Intelligent Narrative Technologies. Arlington, USA

Kurosawa, A. (Director). Jingo, M. (Producer). (1950). *Rashomon* [Motion picture]. Japan: Daiei.

Lacan, J. (1977). *Écrits: A selection* (A. Sheridan, Trans.). New York: W.W. Norton & Co.

Landow, G. (1992). *Hypertext: the convergence of contemporary critical theory and technology*. Baltimore: Johns Hopkins University Press.

Landow, G. (1997). *Hypertext 2.0*. Baltimore: Johns Hopkins University Press.

Landow, G. (2006). *Hypertext 3.0: Critical theory and new media in an era of globalization*. Baltimore: Johns Hopkins University Press.

Langton, C. (Ed.). (1989). *Artificial life*, Redwood City, Addison-Wesley.

Laurel, B. (1986). Toward the Design of a Computer-Based Interactive Fantasy System. Doctoral Thesis. Drama Department, Ohio State University.

Laurel, B. (1991). *Computers as theater*. Reading: Addison-Wesley

Laurel, B. (1993). *Computers as theater* (2nd ed.). Reading: Addison-Wesley

Laurel, B., Strickland, R. & Tow, R. (1994). Placeholder: Landscape and narrative in virtual environments. *Computer Graphics*, 28. Retrieved May 10, 2009 from http://www.tauzero.com/Brenda_Laurel/Placeholder/CGQ_Placeholder.html

Lawton, C, (2009, February 4). *Video Sites Entice Users To Stay and Play*. Retrieved from http://online.wsj.com/article/SB123370933597245913.html

Left 4 Dead. (2008). [Computer game]. Bellevue: Valve.

Legrady, G. (1998). Intersecting the Virtual and the Real: Space in Interactive Media Installations, presentation given at art.image conference in Graz, Austria, November 1998, retrieved March 10, 2009 from http://www.mat.ucsb.edu/~g.legrady/glWeb/publications/p/intersecting.html, later version published in Wide Angle, 21(1), 105-113.

List of best-selling video games. (2010, June 29). In Wikipedia, The Free Encyclopedia. Retrieved June 29, 2010, from http://en.wikipedia.org/w/index.php?title =List_of_best-selling_video_games&oldid=370826007

Logan, B., Benford, S., & Koleva, B. (2005). *New narrative techniques for persistent storytelling experiences* (Inscape project deliverable D3.1.1). Retrieved March 5, 2009 from http://www.inscapers.com

Loyall, A. B., & Bates, J. (1993). Real-time control of animated broad agents. In *Proceedings of the Fifteenth Annual Conference of the Cognitive Science Society* (pp. 664-669). Boulder CO: Lawrence Erlbaum.

Loyall, A. B., & Bates, J. (1997). Personality-rich believable agents that use language. In Johnson, L. W. (Ed.), *Proceedings of the First International Conference on Autonomous Agents* (pp. 106-113). New York: ACM Press.

ludosophist. (2007, June 1). Chris Crawford's speech at the 1992 Game Developers Conference [Video file]. Retrieved from http://www.youtube.com/watch?v=_04PLBdhqZ4

Lyotard (n. d.). [Demo trace from Lyotard project]. Retrieved April 4, 2009 from http://www.cs.cmu.edu/afs/cs.cmu.edu/project/oz/web/lyotard2.html

Lyotard, J.-F. (1979). *The postmodern condition: A report on knowledge*. Minneapolis: University of Minnesota Press.

Mackay, W. & Davenport, G. (1989). Virtual Video Editing in Interactive Multi-Media. *Communications of the ACM*, 32(7), 802-810.

Macromedia Authorware. (2010, April 27). In Wikipedia, The Free Encyclopedia. Retrieved June 15, 2010, from http://en.wikipedia.org/w/index.php ?title=Macromedia_Authorware&oldid=358531800

Magerko, B. (2006). *Incorporating User Modeling into an Interactive Drama Architecture* (Ph.D. Thesis). University of Michigan, Ann Arbor, MI, USA.

Manovich, Lev (2001). *The language of new media*. Cambridge: MIT Press.

Marinetti, F. T. (1909). *The Futurist Manifesto*, Retrieved October, 20, http://www.cscs.umich.edu/~crshalizi/T4PM/futurist-manifesto.html

Marshall, D. (2001a). [Figure depicting the timeline in Macromedia Director]. Retrieved June 14, 2010 from http://www.cs.cf.ac.uk/Dave/Multimedia/node51.html

Marshall, D. (2001b). [Figure depicting Authorware]. Retrieved June 14, 2010 from http://www.cs.cf.ac.uk/Dave/Multimedia/node24.html

Mateas, M. & Stern, A. (2003). Façade: an experiment in building a fully-realized interactive drama, *Game Developers Conference (GDC '03), San Jose, CA, USA, March 4 – 8, 2003*. Retrieved May 10, 2009 from http://www.interactivestory.net/papers/MateasSternGDC03.pdf

Mateas, M. & Stern, A. (2005a). Structuring Content in the Facade Interactive Drama Architecture In Young, R. M. & Laird, J. (Eds.), *Proceedings Of The First Artificial Intelligence And Interactive Digital Entertainment Conference* (AIIDE 2005) (pp. 93-98). Menlo Park, CA: AAAI Press.

Mateas, M. & Stern, A. (2005b). Façade (Interactive drama) [Software]. Available from http://www.interactivestory.net/

Mateas, M. (1997). *An Oz-centric review of interactive drama and believable agents* (Technical Report CMU-CS-97-156, Department of Computer Science). Pittsburgh, PA: Carnegie Mellon University. Retrieved from http://www.cs.cmu.edu/afs/cs/project/oz/web/papers/CMU-CS-97-156.html

Mateas, M. (2004). A preliminary poetics for interactive drama and games. In Wardrip-Fruin, N., & Harrigan, P. (Eds.), *First person: New media as story, performance, and game*, Cambridge: MIT Press. Retrieved August 10, 2009 from http://www.electronicbookreview.com/thread/firstperson/aristotelean

Max (software). (2010, June 28). In Wikipedia, The Free Encyclopedia. Retrieved June 16, 2010, from http://en.wikipedia.org/w/index.php?title =Max_(software)&oldid=370576507

Mechner, J. (1997). The last express [Computer game]. Eugene, Brøderbund.

Media Fabrics (n. d.). [Definition of Media Fabrics]. Retrieved March 5, 2007 from http://mf.media.mit.edu/

Medler, B. & Magerko, B. (2006). Scribe: A General Tool for Authoring Interactive Drama. In Göbel, S., Iurgel, I, & Malkewitz, R. (Eds.), *Technologies for Interactive Digital Storytelling and Entertainment: Third International Conference, TIDSE 2006* (pp. 139-150). Berlin: Springer.

MetaCard. (2010, May 20). In Wikipedia, The Free Encyclopedia. Retrieved June 14, 2010, from http://en.wikipedia.org/w/index.php?title=MetaCard &oldid=363195824

Miller, L. (1998, March 15). Bookend. *New York Times Book Review*.

Miller, R. (1993). *Myst* [Computer game]. Spokane, Cyan.

MindGym. (1996). [Computer game]. New York: Simon & Schuster.

Mine, M. (2003). Towards virtual reality for the masses: 10 years of research at Disney's VR studio. *EGVE*, 39, 11-17.

Montfort, N. (2003a). *Twisty little passages: An approach to interactive fiction*. Cambridge: The MIT Press.

Montfort, N. (2003b). *Toward a Theory of Interactive Fiction*. Retrieved September 10, 2009 from http://nickm.com/if/toward.html

Moritz, N. H. (Producer). Travis, P. (Director). (2008). *Vantage Point* [Motion picture]. United States: Columbia Pictures.

Moulthrop, S. (1991). You say you want a revolution? Hypertext and the laws of media. *Postmodern Culture*, 1(3). Retrieved July 10, 2009 from http://pmc.iath.virginia.edu/text-only/issue.591/moulthro.591

Moulthrop, S. (1992). *Victory garden* [Hypertext fiction]. Watertown: Eastgate Systems.

MTropolis. (2009, December 10). In Wikipedia, The Free Encyclopedia. Retrieved June 16, 2010, from http://en.wikipedia.org/w/index.php?title=MTropolis &oldid=330938327

Murray, J. (1997). *Hamlet on the holodeck: The future of narrative in cyberspace*. New York: The Free Press.

Murray, J. (Forthcoming). *Inventing the medium: Principles of design for digital environments*. Cambridge: The MIT Press.

Naimark, M. (1991). EAT - A Virtual Dining Environment. In *Tomorrow's Realities catalog*, Siggraph, Las Vegas.

Naimark, M. (1998). Interactive Art - Maybe It's a Bad Idea. In Leopoldseder, H., Schöpf, & C. (Eds.), *Cyber Arts 1998 – International Compendium Prix. Ars Electronica* (pp. 66–106). Wien: Springer,.

Naimark, M. (n.d.). [Video of Aspen Movie map demonstration] Retrieved, march 16, 2009 from http://www.naimark.net/projects/aspen/aspen_v1.html

Nelson, G. (2007). Inform: Authoring tool for interactive fiction [Software]. Available online from http://inform7.com/.

Nelson, T. (1981). *Literary machines*. Swarthmore, PA: T. H. Nelson.

Nelson, T. (1987). *Computer lib: Dream machines*. Redmond: Tempus Books of Microsoft Press.

Newell, G. (2008). Gabe Newell Writes for Edge. *Edge Magazine*. Retrieved from http://www.edge-online.com/blogs/gabe-newell-writes-edge

Night Trap. (1992). [Computer game]. Tokyo: Sega.

Nisi, V. & Haahr, M. (2004). Weird Vview: Interactive multilinear narratives and real-life community stories. *Crossings: eJournal of Art and Technology*, 4 (1).

Noble, J., Taivalsaari, A., Moore, I. (eds.). (1999). *Prototype-based programming: Concepts, languages and applications*. Berlin: Springer-Verlag.

Obsidian. (1996). [Computer game]. Redwood City: Segasoft.

Pajitnov, A. (1985). *Tetris* [Computer game]. Kyoto, Nintendo.

Penny, S. (1997), The virtualization of art practice: Body knowledge and the engineering worldview. *Art Journal,* 56(3). Retrieved March 9, 2010 from http://ace.uci.edu/penny/texts/virtualization.html

Peterson, D. (1983). *Genesis II: Creation and recreation with computers*. Reston, VA: Reston Publishing Co.

Phantasmagoira (2010, June 1). In Wikipedia, the free encyclopedia. Retrieved June 2, 2010, from http://en.wikipedia.org/wiki/Phantasmagoria_(video_game)

Phantasmagoria. (1995). [Computer game]. Sierra On-Line, Los Angeles.

Planetfall. (1983). [Interactive fiction]. Cambridge: Infocom.

Pollack, S., & Braithwaite, P. (Producer). Howitt, P. (Director). (1998). *Sliding Doors* [Motion picture]. United Kingdom: Miramax Films.

Prince, G. (1982). *Narratology: The form and functioning of narrative*. Amsterdam: Mouton Publishers.

Prince, G. (1987). *A dictionary of narratology*. Lincoln: University of Nebraska Press.

Prince, G. (2003). *A dictionary of narratology* (2nd ed.). Lincoln: University of Nebraska Press.

Ramming, A., Hirschler, M. (2005). *Scarlett und Dean* [online novel] Retrieved October 5, 2009 from http://www.scarlettunddean.de/

Rand, A. (1971). *Night of January 16th*. New York: New American Library.

Red's Path Through the Woods. (2006). [Interactive narrative]. Available from http://lcc.gatech.edu/~hkoenitz/ASG/stories/RedStory/Redstory.html

Rettberg, S, (2002). *Kind of blue* [online novel]. Retrieved September 28, 2009 from http://tracearchive.ntu.ac.uk:80/frame/kOb/index.html

Riedl, M., Saretto, C. J., & Young, R. M. (2003). Managing interaction between users and agents in a multi-agent storytelling environment. In *Proceedings of the Second international Joint Conference on Autonomous Agents and Multiagent Systems (Melbourne, Australia, July 14 - 18, 2003). AAMAS '03*. (pp. 741-748). New York: NY, ACM. doi:10.1145/860575.860694

Robertson, J. and Nicholson, K. 2007. Adventure Author: a learning environment to support creative design. In Bekker, T. Judy Robertson, J. & Mikael B. Skov, M. B. (Eds.), *Proceedings of the 6th international Conference on interaction Design and Children (Aalborg, Denmark, June 06 - 08, 2007). IDC '07* (pp. 37-44). New York, NY: ACM, doi:10.1145/1297277.1297285

Rowling, J.K. (1997). *Harry Potter and the philosopher's stone*. London: Bloomsbury.

Rubin, Mike (2008, September 8). Day Three (at the AGDC): Stern on Linear Storytelling [Web log comment]. Retrieved September 9, 2009 from http://orangeriverstudio.com/monksbrew/2008/09/day-three-at-the-agdc-stern-on-linear-storytelling/

Ryan M.-L. (2008). Interactive Narrative, Plot types and interpersonal relations. In Spierling, U. & Szilas, N. (Eds.). *Proceedings of the First Joint International Conference on Interactive Digital Storytelling (ICIDS 2008), 26-29 November 2008, Erfurt, Germany*. (pp. 6-13). Berlin: Springer.

Ryan, M. (2005). Narrative and the split condition of digital textuality. *Dichtung-digital: Journal für digitale Ästhetik*, 5(34). Available: http://www.brown.edu/Research/dichtung-digital/2005/1/Ryan/

Ryan, M.-L. (2001). *Narrative as virtual reality: Immersion and interactivity in literature and electronic media*. Baltimore: Johns Hopkins University Press

Ryan, M.-L. (2006). *Avatars of story: Narrative modes in old and new media*. Minneapolis: University of Minnesota Press.

SamsungCanadaFilms. (2008). Follow your instinct [YouTube video]. Retrieved March 3, 2009 from http://www.youtube.com/watch?v=HoOCiaxIZF4

Second Life. (2003). [Computer game]. San Francisco: Linden Lab.

Sengers, P. (1998). *Anti-Boxology: Agent Design in Cultural Context* (PhD Thesis). Carnegie Mellon University. Pittsburgh, PA. USA.

Sewer Shark. (1993). [Computer game]. Santa Monica: Sony Imagesoft.

Sezen, D. & Sezen, T. (2008). *The Multilingual Bus* [Interactive narrative].

Sezen, T. (2009). *Tears* [Interactive narrative].

Signapese (2009, February 2). Interactive Video on Youtube - deja vu? [Web log comment]. Retrieved from http://singapese.wordpress.com/2009/02/04 /interactive-video-on-youtube-deja-vu/

Skorupski, J., Jayapalan, L., Marquez, S., & Mateas. M. (2007). Wide Ruled: A Friendly Interface to Author-Goal Based Story Generation. In Cavazza, M. & Dinikian, S. (Eds.). *Proceedings of the 4th International conference on virtual storytelling* (pp. 26-37). Berlin: Springer.

Star Trek: Borg. (1996). [Computer game]. New York: Simon & Schuster.

Star Wars: Rebel Assault. (1993). [Computer game]. San Francisco: LucasArts.

Start Wars. (2009). [Figure depicting Star Wars computer game]. Retrieved March 1, 2009 from http://bothanspynet.wordpress.com/2009/02/10/los-mejores-9-juegos-basados-en-stawars/

Supercard. (2009, January 22). In Wikipedia, The Free Encyclopedia. Retrieved June 13, 2010, from http://en.wikipedia.org/w/index.php?title=Supercard &oldid=265605629

Tallyn, E. & Benford, S. (2005). *Applying narrative theory to the process of authoring interactive narrative* (Inscape project deliverable D3.1.1). Retrieved March 5, 2009 from http://www.inscapers.com

The 25 Dumbest Moments in Gaming. (2003). [Online article]. *Gamespy.* Retrieved from http://archive.gamespy.com/articles/june03/dumbestmoments/index6.shtml

The 7th Guest. (1992). [Computer game] London: Virgin Interactive.

The Dark Eye, (1995). [Computer game]. Milpitas: Time Warner Interactive.

The Rise of the Dragon. (1990). [Computer game]. Los Angeles: Sierra On-line.

The Secret of Monkey Island. (1990). [Computer game]. Marine County: Lucasfilm Games.

The X-Files Game. (1998). [Computer game]. Los Angeles: Fox Interactive.

Thomas, J. M. & Young, R. M. (2006). Elicitation and Application of Narrative Constraints Through Mixed-Initiative Planning, In *Proceedings of the ICAPS-06 Workshop on AI Planning for Computer Games and Synthetic Characters*. Cumbria, UK.

ToolBook. (n. d.). [Web page]. Retrieved June 13, 2010 from http://www.sumtotalsystems.com/products/toolbook-elearning-content.html

Utterback, C. & Achituv, R. (1999). *Text rain* [Interactive installation piece.]

Utterback. C. (2001-2002). *Liquid Time* [Series of interactive installations].

Utterback. C. (2003). *Potent Objects* [Interactive installation piece].

Utterback. C. (n. d. a). [Text Rain project description]. Retrieved March 14, 2009 from http://www.camilleutterback.com/textrain.html

Utterback. C. (n. d. b). [Figure depicting Liquid Time interactive installation]. Retrieved March 14, 2009 from http://www.camilleutterback.com/liquidtime.html

Van Velsen, M., (2008, May 15-17). *Narratoria, an Authoring Suite for Digital Interactive Narrative*. Poster presented at 21st International Florida Artificial Intelligence Research Society Conference, Coconut Grove, FL, USA

Vonnegut, K. (1969). *Slaughterhouse-Five, or the children's crusade*. New York: Delacorte/Seymour Lawrence.

Vonnegut, K. (1997). *Timequake*, New York City. Putnam.

Voyeur. (1993). [Computer game]. Amsterdam: Philips Interactive.

Walsh, R. (2001). Fabula and Fictionality in Narrative Theory. *Style*, 35(4), 592-606.

Wardrip-Fruin, N. & Harrigan, P. (2004). *First person - new media as story, performance, and game*. Massachusetts: MIT Press.

Wardrip-Fruin, N. (2009). *Expressive processing*. Cambridge: MIT Press.

Weiberg, B. (2002). *Beyond Interactive Cinema*. Retrieved April 9 2009 from http://keyframe.org/txt/interact/

Weiß, A., Müller, W., Spierling, U. & Steimle, F. (2005). Scenejo: An interactive storytelling platform. In Subsol, G. (Ed.): *Virtual Storytelling. Using Virtual Reality Technologies for Storytelling: Third International Conference, VS 2005* (pp. 77-82). Berlin: Springer.

Weizenbaum, J. (1966). Eliza — A computer program for the study of natural language communication between man and machine. *Communications of the ACM*. 9(1), 36-45.

Welles, O. (Director). (1941). *Citizen Kane* [Motion picture]. USA: RKO Pictures.

Werneroi. (2008, June 3), Interactive card trick [YouTube video]. Retrieved from http://www.youtube.com/watch?v=tbEei0I3kMQ

Wiener, N. (1948). *Cybernetics, or, control and communication in the animal and the machine*. Cambridge (MA): MIT Press.

Wiesner. (2009). [Screenshot of web page]. Retrieved April 27, 2009 from http://ic.media.mit.edu/projects/JBW/JBWJava.html

Wolf, G. (1995). The curse of Xanadu. *Wired*, archive 3.06. Retrieved from http://www.wired.com/wired/archive/3.06/xanadu.html

World of Warcraft. (2004). [Computer game]. Irvine: Blizzard Entertainment.

Worlds (n. d.). [Description of Oz project worlds]. Retrieved April 5, 2009 from http://www.cs.cmu.edu/afs/cs.cmu.edu/project/oz/web/worlds.html

Wright, W. (1989). *Sim City*. [Computer game]. Emeryville: Maxis.

Wright, W. (2000). *The Sims*. [Computer game]. Emeryville: Maxis.

Xanadu. (2009). [Description on web page]. Retrieved May 2, 2009 from http://www.xanadu.net/.

Yakal, K. (1983). Nonviolent games. *Compute!,* 41. 40-51.

Young, M. R. & ,Riedl, M. (2003). Towards an architecture for intelligent control of narrative in interactive virtual worlds, In Johnson, L.W., Andre, E., & Domingue, J. (Eds.), *Proceedings of the 8th International Conference on Intelligent User Interfaces* (pp. 310-312). New York, NY:ACM. doi:10.1145/604045.604108