2 Background and Context

But all stories have this in common: they beckon us out of the visible, providing alternative lives, modes of possibility.

- Paul Zweig, from The Adventurer, 1974.

Sometimes one is obliged to take time out of time and to redefine, to set the time at another time. Or take things out of consequence, out of sequence. They become more consequential when you have the liberty to take them out of sequence.

- Maya Angelou, from Writer's Dreaming, Epel, Naomi (Ed.), 1993.

2.1 What are Metalinear/Multiform Stories?

Traditionally, writers construct stories such that a specific audience may experience their story in a single fixed linear form. The classic example of such a linear form is the printed word. Books, for example, are a time honored medium for publishing linear stories. Even the term "t*o write*" has a traditional connotation that the end result will be some form of printed work. Books are well suited for the linear story experiences, i.e. this happens, then that happens, then this happens. While it is possible for a reader to jump around through a book nonsequentially, still the pages of a book are numbered sequentially, with sentences and paragraphs left unfinished at the end of one page typically taken up at the beginning of the next. These physical attributes of books tend to inspire a linear progres-

Fig. 4 Books have a linear structure to their text, and thereby inspire a linear approach to writing new content.

sion through them. When computers are added to the writing process, the linear structure of narrative can be significantly altered, if not completely blown apart, by introducing mechanisms for creating many more kinds of narrative structures. From Vannevar Bush's proposed Memex system in the 1940's (Bush, 1945), to interactive videodisc projects of the 1970's and 1980's (Perlmutter, 1983), to digital video stories delivered over the internet, computational power has given us the tools to reshape the traditional linear narrative model and deliver narratives with increasing flexibility and diversity.

2.1.1 Defining the Terms

Fig. 5 African stories about Anansi the spider and other characters entertain while expressing cultural and moral values.

Story and storytelling are largely about two things: culture and structure. It is impossible to have story without a least a small amount of both culture and structure: two complex and intertwined elements. As storytellers and authors Norma Livo and Sandra Rietz put it, "Story structure is not an accidental or idle invention, but the profound product of a culture's evolved perceptions of the way the universe works." (Livo & Rietz, 1986, p.28)

For instance, many traditional sub-Saharan African stories are used as morality teaching tools. In their depiction of characters and events, they inspire thought about community citizenship, prosperity, selfishness, friendship and so on. What many of these stories do not do is end in manner familiar to Western audiences. Often the main character of a traditional African story will face a conflict, respond to that conflict in some way which is not fully resolving, and then the story ends. (Berry 1991) There is often no neat summary of events where everyone lives happily ever after. Stories are used as tools for inspiring thought about life in a set of cultures where individual survival is tightly linked to community survival. These stories have a purpose other than simple entertainment and this facet of their story structure reflects that. For this research I have used the term *story struc-*

ture to refer to a story's form, an abstract skeletal description of what happens in the story and what kind of events take place.

The term *metalinear narrative* is used here to define a method for creating and developing multiple linear narratives from a highly structured collection of small narrative pieces, thus creating a new story form. These narrative pieces on their own do not constitute a single narrative path or plotline, such as a chronological spine, but instead act as building blocks for constructing many different narratives. This new type of story defines a form which transcends linear in the sense that it is a form from which many linear stories can be made, therefore metalinear. While the viewable product of a metalinear narrative system can include several media types (such as movies, still pictures, audio, etc.) the original representation for these elements (that is, the original medium of authoring) will most frequently be the written word. This is because from an early age children are taught to express and manipulate ideas through written and spoken language more than through other forms of expression, like music, photography, or video. We are more adept at manipulating words on the page, therefore, this is typically the first form a narrative will take. The task of weaving multiple narratives using multiple media types is first a writer's task, though photographers, filmmakers and sound recordists may eventually get involved.

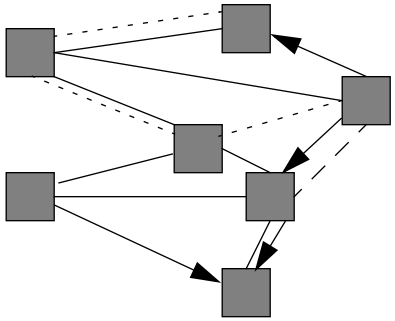

Fig. 6 A representation of the metalinear narrative structure as a network of differently connected nodes.

In the past, many terms have been used by writers and narrative researchers to describe stories which veer from a strict singular path. Massachusetts Institute of Technology research scientist and author Janet Murray defines multiform story as "... a written or dramatic narrative that presents a single situation or plotline in multiple versions, versions that would be mutually exclusive in our ordinary experience." (Murray, 1997, p.30) Indeed this definition goes far to define a narrative form which in essence is linear, yet

with many different instances of its linearity. The metalinear narrative theories of this research are built upon many of Murray's ideas, as well as those of other researchers such as J. David Bolter, Stewart Moulthrop, and Seymore Chatman.

Fig. 7 Humans have looked up at the stars since before recorded history. Ancient astronomers saw drawings in the heavens composed of stars and the spaces between them. Those drawings became characters, and those characters became stories.

Because metalinear narrative defines a volume of interconnected story pieces much like star constellations in space, it requires a particularly spatial form of thinking. Thinking about relationships between characters such as mother–son, manager–employee, teacher–student does not require complex imagery. Thinking about the relationships between things that characters say such as "Hello Grandmother" and "Child, take off your cloak and put it in the fire, then come into bed with me where you'll be warm," is much more complex. What is said can have many layers of meaning and can mean different things in different contexts. When there is a community of characters all related one way or another, all speaking and all changing, the task of representing this universe of meaning becomes even more complex. Thinking about this universe in spatial terms helps to simplify the task of writing.

Fortunately, this way of thinking for the writer is nothing new. In his book Writing Space, J. David Bolter of the Georgia Institute of Technology investigates the connection between technology, particularly computer technology, and the spatial characteristics which have always been a part of writing. (Bolter 1991) Bolter claims the act of writing requires the writer to enter into a reflective and reflexive relationship with the page (or the screen), thus it becomes difficult to say where the thinking ends and the writing begins, where the mind ends and the writing space begins. The writing space is where thinking about narrative happens. It is where the writer travels along the relationships drawn from node to node, considering narrative paths and patterns. Metalinear narrative encompasses

this space, representing the relationships between an entirety of what happens and what is said in between characters in the narrative. Metalinear narrative focuses on the 3-dimensional writing space from which many 1-dimensional or linear narratives are born.

Nonlinear is probably the most popular term used to describe narratives of indeterminate path. With its frequent use however, some researchers have turned away from using the term nonlinear because in their opinion it does not adequately describe the narrative material. Applying the term "*nonlinear*" to narrative material describes more what that material is not, rather than what that material is. This issue is echoed in Espen Aarseth's research on cybertext, a multiform textual narrative.

> *In my campaign for the study of cybertexuality I soon realized that my terminology was a potential source of confusion. Particularly problematic was the word nonlinear. For some it was a common literary concept used to describe narratives that lacked or subverted a straightforward story line; for others, paradoxically, the word could not describe my material, since the act of reading must take place sequentially, word for word. (Aarseth, 1997, pg. 2)*

Aarseth, a researcher and professor from the University of Bergen in Norway, chose not to use the term "*nonlinear*" because he saw the process of reading as a linear one. If the act of reading is linear, he argues, how could a form of literature be nonlinear? The same question could be asked of cinematic narrative. If viewing the narrative experience is linear, how can the art form be anything but linear as well? Metalinear narrative addresses these problems first by being a term which describes a potential. The metalinear form resolves to many potential linear narratives. It is a form of writing which, from the start, acknowledges and embraces many worldviews without invalidating or necessarily editing any

out. Aarseth uses the term *ergodic* to describe a type of literature where nontrivial effort is required to allow the reader to traverse the text. This effort is executed with the help of a computer in the form of hypertext, which will be discussed later in this chapter. The thesis of this research is that metalinear narrative necessitates a computational system for storing, representing and presenting the potential linear forms. The details of this computational system are discussed in chapter 4.

Long before the computer, long before written language, oral storytellers defined the art form of crafting story. Later, story writers added and continue adding craft and creativity of form and content to the art. Within each mode of expression, authors have pushed the bounds of their art form in a metalinear direction. What follows is a discussion of four expressive modes of the storytelling art form and some examples of how certain artists have stretched the definition of linearity.

2.1.2 Oral Storytelling

Many audiences for oral storytelling just sit and listen to a story presented to them in a linear way. It appears to them that the storyteller begins the story, recounts the events, embodies the characters, and then simply ends the story in a meaningful fashion. Actually, from the storyteller's point of view, oral storytelling is a much more fluid and flexible process, suggestive of a metalinear structure. As the storyteller begins, and often even before they begin, they must tune–in to the audience's attitude and responses, what many storytellers refer to as the audience's energy. Based on this energy, the storyteller will adjust their timing, their posture, their characterizations, and sometimes even the events of the story.[2] There is a dialog between audience and storyteller. Oral storytelling involves a shared task, different from the physically separated tasks of the writer and

[2] As a professional oral storyteller, there are a number of stories I perform which have no written endings. The ending, as well as some middle parts, are totally dependent on the energy I get back from the audience, my feelings at the time, etc. There are many other professional storytellers who go even further by not writing down any of their stories. They perform them not by memorizing words, but memorizing the structure and key points of their stories. The words, the intonations, and the physical postures used in characterizations are all products of surfing the audience's energy.

reader of the printed story. The audience and teller negotiate a story into being in a highly dynamic interactive process. (Livo, 1986) As noted storyteller Rafe Martin puts it, there is a connection made with the audience through the teller's words and the rhythms of their voice and body. (Martin, 1996) The storyteller maintains that connection throughout the telling, modulating it according to their sense of the audience's energy.

One example of this "interactive" connection between audience and storyteller exists in African folk tales. In Western Africa for example, as well as in many parts of the Caribbean, storytellers create a connection with the audience through call and response. As African story collector and professor Jack Berry of Northwestern University said it:

> *Listeners may be asked and reply directly to questions from the storyteller or, on their own initiative, interject exclamations of assent and approval by way of encouragement. So important to narrative tempo are these interpolated interjections that, if too long delayed, the narrator will frequently substitute his own exclamations of "Good" and the like.*
> *(Berry, 1991, pg. xviii)*

This example demonstrates how the storyteller is fueled by and interacts with the energy of the audience through the story they tell. The audience's energy is also fueled in part by their expectations. When they sit down for a story, the audience expects to be taken away and taken up into a reverie of characters and events, of emotion and adventure. Their expectation is presented to the teller with outstretched open hands, for the teller to do with what he or she pleases. The storyteller's act of surfing the audience is thus begun by the teller answering the question: What do I do with their expectation? Do I satisfy it, violate it, or both?

Much of the audience's expectation comes in the form of narrative structure. From an early age, humans are taught to expect certain kinds of things to happen in a story in particular sequences. For instance, in his book Hero With A Thousand Faces, author Joseph Campbell talked about the universality of the hero character. The hero appears in similar forms and the hero story is told in similar ways in a great many cultures around the world.(Campbell 1949) The audience expects these similarities and when the teller satisfies their expectation, the story seems "right." When the audience's expectation is violated, the storyteller risks confusing or even alienating the audience.

When the audience's expectation is satisfied, but in an unexpected way, the audience typically enjoys the story even more. Their interest is piqued higher and their activity in constructing narrative detail runs at a much stronger pace. For example, a story could start out simply,

> *Once upon a time there was a sweet little girl beloved by everyone who ever looked at her. But the one who loved her most was her grandmother and she hardly knew of anything in the world that she would not have given to the child. Once she made her a gift of a hood of red velvet and, as it suited her so well so that she would not wear anything else ever afterwards, she was simply called "Little Red Riding Hood."*

We know this story. We know the setting, we know the characters, we can see the cottage in some detail, we can picture the grandmother and the little red velvet hood. Most importantly, we know what comes next – we have an expectation for the sequence of events in the rest of the story. Even if the setting and characters were totally different and they included a young urban girl named Latoya taking the subway to her grandmother's

apartment on the South side, a typical audience would have recognized the pattern and expected certain kinds of things to transpire in the story. The story continues:

> *The girl's mother asked her to set off through the forest to visit her grandmother. She brought along a basket of bread and milk. Around her head she wore the fine red hood her grandmother had made for her. Along the way she encountered a wolf. Although sinewy and fearsome, the wolf was hidden in the shadows. When he greeted the girl with a smooth voice, however, he stepped from the shadows like Harvey Keitel in The Piano, revealing the full length of his male body. Her eyes widened, and she sputtered a hello in return.*[3]

[3] This passage is inspired by the work of Robert Darnton (Darnton 1984) and by the computational storytelling work of Nick Montford. See: http://web.mit.edu/21w765j/Spring_97/StudentWork_SP97/Groundhog/nick/index.htm

A typical audience's expectations would now be slightly different. All the major elements of their expectation were satisfied, but in a way they would not have expected. The storyteller could now have the wolf say almost anything to the little girl. No matter what the wolf says at this point, the audience's sense of knowing what comes next would be in constant flux, still recognizing the story's structure, but having to work at painting all new detail, hearing all new voices and accents, feeling all new sensations for a story they have known since early childhood. The audience is active.

It is precisely this level of interactivity between audience and storyteller, and the ability of the teller to respond quickly to audience energy and expectation, that gives oral storytelling its power. It is to this level of interactivity which computational storytelling aspires.

2.1.3 Traditional Literary Examples

Writers have been pushing the linear bounds of the printed narrative for a great many years. Some of this pushing has taken the form of books written as a collection of various

first person accounts. Some literary works have played heavily with the reader's concept of time and space, such that all at once the reader is led to a perspective where time is no longer a linear path, but a set of simultaneous branching possibilities. Other forms have been narrative path–based, defining frequently bifurcating story lines leaving the reader to decide which to take. The rest of this section includes examples of these forms.

In the late 1920's, William Faulkner wrote perhaps his most famous novel, The Sound and the Fury, about events occurring around the Compson family. (Faulkner, 1956) The novel is divided into four parts, each part using a different narrator. The first three parts are from the points of view of three of the family members, with the fourth part written using an omniscient narrator. Because each section has a different point of view, the reader is placed inside the mind of the current central character. Therefore, not only is the reader privy to selected story details which that character deems most important to tell, but the reader also gets to experience the way in which each character thinks. As the novel progresses from section to section, the reader is left with the task of merging the details and opinions gleaned from earlier parts.

Jorge Luis Borges' stories such as Garden of Forking Paths and The Circular Ruins show time as a set of branching paths and as an infinitely cyclical journey, respectively. (Borges, 1964) (Borges, 1962) Borges' stories suggest a world where one can see dimensions far beyond the one dimensional process of reading from the two dimensional page. The Garden of Forking Paths is a story within a story about an ancient Chinese novel in which time is defined as an infinite set of forking paths, created by each of the decisions we make in life. When faced with a decision, we do not make a single choice, but instead make all choices simultaneously, thus splitting time into many paths of possibilities.

The Circular Ruins is about a man who banks his canoe on a river's shore, near the circular ruins of a stone building built for worshiping an unknown god. The man falls asleep and discovers that his purpose there is to dream a new human being into creation. He dreams the human detail by detail – the heart, the skeletal system – until at last the man brings this new creature to life with the help of fire from the fire god of the temple ruin. The man teaches the new creature about the ways of the dream and the real worlds, eventually sending him on his way further down the river where there is yet another temple ruin. After this new creature, this new man departs, the first man quickly grows old and tired. The circular walls of the temple become a fiery enclosure that slowly engulfs him. As the man awaits the burning pain of death, he feels none, realizing that he, too, is merely a creation of fire, "...a mere appearance, dreamt by another."

In Einstein's Dreams, author Alan Lightman wonders what Albert Einstein would have dreamt about while he was writing his seminal paper on relativity. (Lightman, 1993) Chapter after chapter Lightman asks questions through Einstein's character such as, "What if time was circular? What if it was linear, but ran slower at higher altitudes? What if time ran at different speeds in different geographical locations? Etc." With each 'what if' question, a resulting dream scenario is played out in the small Austrian town where Einstein lived and worked in the patent office. The reader is able to see time not just as bifurcating, but as having many possible structure; each structure true relative to a certain point of view.

Choose Your Own Adventure books such as Richard Brightfield's The Curse of Batterslea Hall, are a good example of narratives with bifurcating paths. (Brightfield, 1984)[4] In these small paperbacks, the reader is given the opportunity every few pages to choose

[4] This is just one of many examples published.

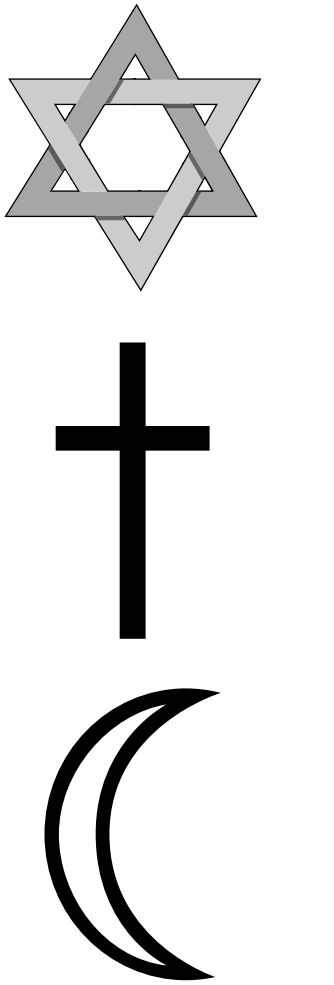

Fig. 8 Symbols of the three ways Pavic used to represent the world of the Khazars.

what they would like to happen next, given a number of simple choices. Each choice is assigned a new page number for the reader to turn to, thus leading the reader through a reading experience of jumping around from one part of the book to another. The narrative, therefore, is structured as a set of paths which continuously split, leading to a diverse set of endings. The author's challenge is to give each possible path through the entire narrative a sense of intentionality and craft.

In Dictionary of the Khazars, author Milorad Pavic presents not a straight narrative, but a dictionary, or more accurately, an encyclopedia for an extinct culture called the Khazars. (Pavic, 1988) Living in the Baltic region of Europe between the 7th and 10th centuries, the Khazars were a people who battled, married, were conquered by and who in other ways touched the lives of many other cultures of the area. The book entails accounts of significant Khazars from the Christian, Islamic, and Jewish points of view. The book is presented to the reader as a tool that may be use to help them make up their own mind as to who the Khazars were. The introduction to the book includes instructions on the dictionary's use. After a brief overview of the dictionary's navigational tools, such as religious symbols and color schemes, the author further encourages the reader as to how he may approach the work.

> *But the reader should not be discouraged by such detailed instructions. He can, with a clear conscience, skip all these introductory remarks and read the way he eats: he can use his right eye as a fork, his left as a knife, and toss the bones over his shoulder. That will do. He may, of course, wander off and get lost among the words of this book, as did Masudi, one of the writers of this dictionary, who wandered into the other people's dreams, never to find his way back. In that event, the reader has no other choice than to begin in the middle of any given page and forge his own*

> *path. Then he may move through the book as through a forest, from one marker to the next, orienting himself by observing the stars, the moon, and the cross.*
>
> *...Hence, each reader will put together the book for himself, as in a game of dominoes or cards, and as with a mirror, he will get out of this dictionary as much as he puts into it, for, as is written on one of the pages of this lexicon, you cannot get more out of the truth than what you put into it. (Pavic, 1988 p. 13)*

Pavic gives the reader free rein to consume the book as they see fit, thus actively constructing their own understanding of the work and the culture represented. But Pavic is given little choice about having to introduce the reader to the book as he does. The notion that the book is a dictionary, and needs to be approached as one even though it may be fictional, needed to be reinforced in order to break the reader's tendency to read from beginning to end, instead of the non-sequential meandering paths Milorad Pavic's writing tries to encourage.

Once a computer is mediating the material, rather than the bound pages of a book, the reader's tendency to think in a linear fashion can be redefined and beginning-to-end linearity no longer assumed. While the cited books use different methods with varying success to minimize their linear nature, it is only with a new tool, a new medium, that true nonlinear narrative can be born.

2.1.4 Hypertext

Hypertext is the binding of many electronic documents to one another through the use of linkages. These linkages or links can have the form of a hot word within text, or hot region within images and video. The idea of hypertext was first proposed by MIT research scientist Vannevar Bush in an article written in 1945 entitled As We May Think. (Bush,

1945) In that article, Bush describes a machine, which he calls memex, as "a device in which an individual stores all his books, records, and communications, and which is mechanized so that it may be consulted with exceeding speed and flexibility." Bush goes on to say that this device should work more like the human mind does – by association rather than by indexing of information. That is, the human mind tends to remember things in terms of how they are related to other things; i.e. a family member's birthday relative to a religious holiday, someone's last name relative to the name of an occupation or trade, a friend's favorite and least favorite foods relative to a particular shared meal in the past. Bush sought to link documents in such a way.

> *One cannot hope thus to equal the speed and flexibility with which the mind follows an associative trail, but it should be possible to beat the mind decisively in regard to the permanence and clarity of the items resurrected from storage. (Bush, 1945)*

The term hypertext was coined in the 1960's by author/visionary Theodor Nelson. (Nelson, 1987) Nelson hoped to link texts as a way of linking human thought and knowledge, so someone could more easily navigate a large body of connected knowledge on an electronic screen. Researcher and Brown University Professor George Landow, who has written extensively about hypertext, describes this form of writing as one which truly requires an active reader.

> *Hypertext, in other words, provides an infinitely re-centerable system whose provisional point of focus depends upon the reader, who becomes a truly active reader in yet another sense. One of the fundamental characteristics of hypertext is that it is*

composed of bodies of linked texts that have no primary axis of organization. (Landow, 1992, pg. 40)

Much of the early vision of hypertext is largely satisfied today through the World Wide Web. Both the World Wide Web as well as special hypertext software applications like Storyspace (Eastgate Systems, 1996) offer authors the opportunity to make links between many pieces of fictional and nonfictional text. Indeed, the publisher of Storyspace, Eastgate Systems, also publishes many hypertext works of fiction and nonfiction.[5]

[5] http://www.eastgate.com/

Postmodern literary critic and professor Stuart Moulthrop of the University of Baltimore, as well as George Landow, and others who have written extensively about hypertext, see hypertext as an ideal multiform structure where the reader is called on to be more active than previously expected in piecing together narrative. (Landow, 1992, p.7) Typically, someone reading a book or magazine would simply have to keep track of the page number sequence to know what's next. In the case of a magazine with non-contiguous articles, a bit more attention has to be paid to page numbers and references, but that is the limit of awareness needed to follow a magazine type narrative. Hypertext, on the other hand, has no visible page numbers. What's next is determined by what is physically clicked on with the computer's mouse.

For example, given a hypertext passage such as:

"Oh Grandma, what big ears you have."
"The better to hear you with my dear."
"And Grandma, what big eyes you have."
"The better to see you with my dear."

"And Grandma, what big teeth you have!"
"The better to EAT you with my dear!"

the user could click on any of the above words, or the white space around the words, and depending on which word the user clicked on, a different passage would fill the same space on the screen. For instance, if the user clicked on the word "Grandma," the next passage could be a parallel plotline about another grandmother character in another fairy tale, it could be a passage about grandmothers in general, or it could be a different passage about this particular grandmother in this particular story, as if the user needed to know more about her before continuing on with this plotline. The user could click anywhere in the active space and go wherever the hypertext story designer had dictated. By clicking on a non-consequential word like "with," "And," or "what," the user could be taken down the path of a default plotline which might correspond to the user's expectations for this story.

While the narrative path taken by the user is laid out by the author ahead of time, it is only one of many clearly defined paths through the narrative material. From hypertext comes hypermedia, which goes beyond simple text as a medium of expression in favor of a diversity of media forms including still pictures, video, sound and text. Both hypertext and hypermedia have been defined and built, as Moulthrop states, "with electronic cross references that move the reader instantly from one piece of information to another." (Moulthrop, 1990, p.7)

The World Wide Web is an example of a hypertextual design using multiple media. In the web, HTML documents are by and large "hard linked" to other documents[6] by way of individual alpha-numeric characters, words, collections of word-like phrases or sentences,

[6] It is no accident that HTML stands for HyperText Markup Language. The foundational ideas of the world wide web are rooted in the theories and ideas of hypertext's early thinkers such as Vannevar Bush and Theodor Nelson.

pictures, or even predefined areas of a still images. The act of surfing the web requires following link after link, testing, tasting, and jumping around in search of new and interesting information – a type of activity which is becoming more and more common, and more commonly understood.

> *Although narratologists have almost always emphasized the essential linearity of narrative, critics have recently begun to find it to be nonlinear. Barbara Hernstein Smith, for example, argues that, by virtue of the very nature of discourse, nonlinearity is the rule rather than the exception in narrative accounts. (Landow, 1992, pg. 24)*

2.1.5 Cinema

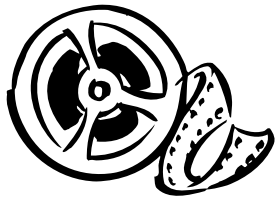

Fig. 9 Cinema is a linear medium, yet inspires nonlinear narrative through films by directors such as Kurosawa, Altman, Jarmusch, and Tarantino.

Film is a medium even more rigidly held than text to a linear format due to its physical characteristics. It is difficult to navigate around a 400 foot reel of motion picture celluloid, other than by straight linear progression from beginning to end. Yet, films such as Akira Kurosawa's Rashomon, Robert Altman's Short Cuts, Jim Jarmusch's Mystery Train, and Quentin Tarantino's Pulp Fiction exemplify how a film maker can still stretch, if not break, the boundary of linear experience. These films in particular are examples of nonlinear story design in a linear medium and have inspired this research effort in numerous ways. Another film, Rocky Horror Picture Show, directed by Jim Sharman, has redefined interactivity in traditional cinema for a quarter century.

Short Cuts, a film by Robert Altman, follows the lives of ten sets of characters as they interweave. (Altman, 1994) While the stories of each set of characters are intriguing in their own right as they struggle through their lives in modern day Los Angeles, the multiple "independent" storylines take on new significance as they cross each other. Because

the film hops back and forth between the different stories, telling bits and pieces of each in an interwoven manner, it has a distinct non-linear nature. The audience has no control over the near misses when one story comes close to intersecting another, nor control over the direct and sometimes violent collisions between one story and another, and so can only passively participate. The linear film experience of sitting in the theater watching without guiding is maintained, while the feeling of the story itself remains nonlinear.

Jim Jarmusch's film Mystery Train is also an example of interconnected storylines through multiple sets of characters. (Jarmusch, 1989) Unlike Altman, Jarmusch's approach gives the audience the perception that they are witnessing time fold back onto itself. The story begins by following a Japanese couple's journey to a Memphis hotel. It then follows a young Italian widow's serendipitous journey to that same hotel. With each additional set of characters and events connected with the hotel, certain scenes are shown as timing cues, sometimes repeatedly, in order to reinforce the message that many of these events are happening simultaneously. These short repeated scenes are often in the hotel lobby or are sounds from surrounding hotel rooms which the audience recognizes as being associated with previously viewed scenes. They synchronize the viewer as to when there actually is a passage of story time. The notion that this is time folded comes from the fact that the audience is forced to watch all of these events sequentially, yet with the repeated cinematic message that these events are happening at the same time. Again while the audience has no control over what events they see when, they are involved in a narrative construction process, where sequentially presented events must be overlaid one on top of the other and selectively placed end to end, in order to grasp the full story.

PULP FICTION, like the films above, uses interconnected stories driven by strong characters. (Tarantino, 1994) PULP FICTION is distinguished from the others the filmmaker's choice of structure. After weaving through the many sets of characters and story lines, Director Quentin Tarantino chose to replay the opening scene from an earlier point in its story, and even filled in a part of the opening that he omitted in the beginning. By replaying this scene, the audience knows what is going to happen next, or thinks they know. The audience's omniscience is shattered when the new scene is inserted in the middle of the old, giving the once familiar ending a new context and meaning. This sequencing choice is especially striking because one of the main characters in the opening sequence, played by John Travolta, is killed in a previous scene. The structure forces the audience to look on the characters from the opening scene differently, even though the scene again resolves pretty much as it did at the beginning of the film.

RASHOMON, a classic film by Akira Kurosawa, chronicles a crime on a rural road in ancient Japan. (Kurosawa, 1951) In recounting the crime to the authorities, the different characters involved tell different stories. The audience sees all of these versions played out, each from a different character's point of view. Time and story events are not folded as in the previous example; here the events are presented to the audience sequentially, and the audience is asked to do the work of placing them side by side in their mind for comparison. This work, this required thoughtful viewing by the audience, is similar to the activity asked of the reader in hypertextual stories. The author presents a firm structure and story content within that structure. The audience then appropriates the linear story (or a linear story) by reconstructing the story events. One definition of interactivity, then, is a measure of how much the audience is willing to or motivated to do this reconstruction and how much the story structure aides them in that activity.

It is interesting to note that while many theater and distribution companies like Loews, Sony, Time Warner and others are spending lots of money and time trying to develop interactive story systems for theaters and personal computers, what has proved to be perhaps the most successful "interactive" movie in history allows the audience to effect neither the film's production nor outcome. Audiences attending screenings of The Rocky Horror Picture Show have been packing movie houses for over 20 years to recite the dialogue along with the characters on the screen, throw story-relevant objects during the movie at specific times, and even come to the theater dressed as their favorite characters. (Sharman, 1975) Their active participation alters their experience of the movie, and the audience largely comes to the theater expecting the standard movie experience to be altered. This phenomenon is one piece of evidence which indicates that interaction in a movie experience does not necessarily require modifying the movie itself. Rocky Horror takes advantage of the human imagination and its tremendous ability to fill in and expand story. It is this very same ability upon which metalinear narrative relies when making its narrative construction.

2.1.6 Granularity

For this research, the notion of granularity relates to the act of building narrative and the parts that one builds with. In general, a granule is that part or tiny piece which one uses to build something much larger. The larger the granules used to build with, the easier it is to build; for instance, it is much easier to stack bricks to build a castle than pile grains of sand. It will take many more grains of sand to build a castle than it would bricks. The smaller the granule, however, the more precise and smooth the building can be. Building a vase with granules of clay is smoother and more precise than building it with pebbles

or brick, for instance. A potter has very precise control over very minute detail of her work largely because clay granules are so fine.

In film, granularity is the coarseness of the meaningful units of audio or visual material. That is, a film can be broken down into a series of scenes, which are large pieces or broader strokes of meaning. Scenes can be further broken down into sequences, which are the result of continuity on various planes, including temporal, spatial, and perceptual. (Davenport, 1991) Sequences can be further broken down into shots, which are one or more frames of film or video that have been recorded contiguously, and therefore represents a continuous action in time and space. The shot can be finally broken down into the frame, the smallest addressable unit of film representing the limit of what the film camera can capture at any instant.

> *For image processing, the descriptive granularity has to be fine enough to address specific objects in the frame. When editing a movie, the granularity must be coarser to encompass thoughts, actions, and intentions. (Davenport, 1991)*

For example, there is a scene in Little Red Riding Hood where the girl, noticing a patch of flowers some distance to the side, wanders off the path. The wolf, who had been lurking in the shadows, confronts the girl, asks her destination, and then leaves to take the short cut to the grandmother's cottage. A sequence within that scene could be the following series of shots: an over the shoulder shot of Red walking down the path through the forest; Red's POV of the flowers in the near distance; a medium shot (head, shoulders and waist) of a large smile growing on her face as she turns off the path and starts toward the flowers; Red's point-of-view reaching the flower patch and gently reaching down to pull up a flower when a shadow enters frame-left, followed by a hairy paw; the camera tilts up

to a medium close-up of the wolf's face with an exaggerated grin, showing all of his sharp teeth. An example of a single shot from this sequence is the final shot, ending with the wolf's ominous smile. A single frame from this shot would be the final frame of the wolf smiling, or the frame which includes Red's gentle hand grasping the small flowers with the shadow of the wolf darkening the upper left hand side of the frame. Thus, a cinematic scene can be broken down to ever smaller granules of meaning.

For metalinear story, granularity has to do with the representation of meaning for each story piece. Given the fluid and flexible nature of digital media, the meaning of a granule is based not on physical limitations, but more on how (or how many ways) the granule can be used to tell a part of a story. When a writer writes a metalinear story granule, what that writer is creating is a multifunctional cog that can be positioned in many different places within the linear story. The writer must, therefore, be aware of the issues connected with the creation of each granule – economy of size vs. precision in use. A balance or compromise must be struck, keeping in mind the complexity required to communicate the story at hand. In other words, to write a metalinear story, one needs to ask the question, "How complex does the system of interconnected story pieces have to be in order to tell this story well?" Some computational storytelling systems are designed around using large chunks of story and sometimes even use full stories as granules.

Computer and cognitive scientist Roger Schank at Northwestern University, along with his team, created a system for storing a large number of entire stories that are retrieved with the use of software agents. (Schank, Bareiss, Fano, Osgood, & Ferguson, 1992) The agents work in pairs and target stories along a single subject axis, with each agent representing an extreme of that axis. For instance, one pair of agents named Einstein and Ed-

ison retrieve stories about science. Einstein looks for stories having to do with theoretical and abstract science, while Edison looks for stories having to do with invention and practical engineering. When sent off to retrieve stories, those stories selected by both agents are placed higher in the priority list. On the other hand, if a story comes back as retrieved by Einstein, the user will know something about what approach to science the article contains. It is important to remember that the agents here do not perform a construction process using small narrative granules, but instead select entire stories.

To decide on a granule's size and functionality is to define the flexibility of the entire system. While metalinear narrative makes no restrictions on size and shape, it is the writer's responsibility to design the granules for optimum functionality for their own work. Some of the attributes which govern the functionality of story pieces include size, the relationship between story pieces, and the types of narrative parts that it represents. These attributes will be discussed in more detail in chapter 5.

2.1.7 Assembly in Multiple Ways

Once story granules are defined, how does one construct them into a coherent whole? Once a whole story is constructed the first time, how is it constructed again differently – and indeed over and over again? This is done through the use of story structure.

Aristotle, as well as modern day narrative researchers and authors such as David Bordwell of the University of Wisconsin and Edward Branigan of the University of California in Santa Barbara (who have focused much of their attention on the power of story structure) recognized the ability of story structure to communicate ideas. Bordwell suggests that there is a connection between story structure and a listener's memory of a story.

> *Nearly all story-comprehension researchers agree that the most common template structure can be articulated as a canonical story format, something like this: introduction of setting and characters – explanation of a state of affairs – complicating action – ensuing events – outcome – ending. Distortions in comprehension and recall tend to occur at points when the narrative violates or ambiguates this ideal scenario (Bordwell, 1985, pg. 35)*
>
> *Story integrity and recognizability are, in fact, a matter of structure – the manner in which a given story binds information together into some sort of coherent whole. A random collection of bits of information not organized into a conventional story shape is denied story status. (Livo & Rietz, 1986, pg.29)*

In his article on knowledge and memory, Roger Schank repeatedly states that there is a strong connection between human knowledge, memory and the stories we carry around. The better that observed or reported events can be couched in a familiar story structure or pattern, the better our memory of those events. (Schank, 1995) Schank's earlier work had to do with creating a computational model for life's actions such that a computer system could read a "story", disambiguate its events, and then be able to predict or generate what event(s) should follow (Schank & Abelson, 1977). Schank's definition of "story" was a recounting of stereotypical, chronological events and did not make room for higher level narrative structures such as flashback, flash forward, or narrative primitives like those introduced later in this document. Schank modeled expectation using an elaborate construct of IF/THEN path lines. There was no room for character development, personality, or emotion.

Professor Michael Dyer of U.C.L.A., who was a student of Schank while he was at Yale University, furthered the field of story understanding with his BORIS project. (Lehnert,

1983) Like Schank's work, Dyer's BORIS program could read stories, disambiguate the text, and pick out main characters. In an extension to BORIS, called MORRIS (Moral and Reminding Interface System), the system could read a story in depth and perform a careful analysis of the appropriateness of character actions. (Dyer, 1983) From this, MORRIS would extract the moral of the story, in the form of narrative summarization, which it could then refer to later when attempting to analyze and understand other stories. By addressing story moral, the BORIS/MORRIS system addressed a level of human creativity that few computational systems could. Still, it is important to note that the systems built by Schank and Dyer were story analyzing systems, not story construction systems. To seek out and model information that is already in a story is very different from creating a story which contains multiple levels of moral and emotional information.

Joseph Campbell's work in myth and archetype, in parallel with psychologist Carl Jung's writings on human personality, goes far in describing character roles and expectations. They each seek to explain some of the roles and patterns of how we as human beings live out our lives, and through those patterns interpret characters and events in stories. (Vogler, 1992)

Writer Carol S. Pearson provides six Jung inspired archetypes in her book The Hero Within—Six Archetypes to Live By. (Pearson, 1989) In that volume, Pearson examines the character archetypes of the Innocent, the Orphan, the Martyr, the Wanderer, the Warrior, and the Magician. As Pearson states,

> *Each of the archetypes carries with it a worldview, and with that different life goals and theories about what gives life meaning. (Pearson, 1989, pg. 11)*

Pearson's archetypes give insight into how people see themselves and the world around them. They are a model for providing meaning to the way people act in different situations. Because of this, the archetypes can also be a model for realistic ways in which story characters can act in various fictional situations. Pearson provides one of the few character-based, rather than plot-based models.

Branigan's work in cinematic story structure offers a wealth of insight, especially in the area of narrative schema. (Branigan, 1992) (Brooks, 1996) This research uses Branigan's structures as a general guide in developing a framework for structuring metalinear stories. Branigan's narrative schema consists of the following:

1) introduction of setting and characters;
2) explanation of a state of affairs;
3) initiating event;
4) emotional response or statement of a goal by the protagonist;
5) complicating emotions;
6) outcome;
7) reactions to outcome.

The order of these elements is important, as they progress from the beginning of an archetypical narrative to the end. Elements one and two introduce the narrative, bringing us quickly up to speed with the rules, physical attributes, and even the physics of the environment, as well as the state of this story world and its important characters. Element three, the initiating event, is the spark which sets the affairs of the story world even more off balance than they may have already been. Element four represents a direct or nearly direct statement by a main character, which focuses the entire narrative around the stated goal of this main character.[7] Elements five and six are part of a causal relation-

[7] No other of Branigan's narrative elements illustrates more clearly that this narrative scheme is specific to stories/movies of the American culture. Many European movies, for example, do not offer the audience a direct statement of the protagonist's goals. Instead, the narrative progression of many non-American movies is based much more on the strength of the characters and character interplay alone.

ship stemming from the initiating event, in that the initiating event happened and caused certain emotions and outcomes. Element seven is then part of a causal relationship with element six. Recognizing such causal relationships, or in Branigan's terms "focused causal chains," are important for helping to give the audience a handle for understanding life as represented in the narrative.

> *Focused causal chains are not just sequences of paired story events in time and space, but embody a desire for pairing events and the power to make pairs. Narrative causes are thus principles of explanation, or criteria for grouping elements, which are derived from cultural knowledge as well as from physical laws: the human plans, goals, desires, and routines—realized in action sequences—which are encouraged, tolerated, or proscribed by a community. (Branigan, 1992, pg. 116)*

In the early part of the twentieth century, Russian formalist Vladamir Propp proposed a set of 31 narrative characteristics to provide a method for understanding and cataloguing Russian fairy tales. (Propp, 1968) Propp explains in Morphology of a Folktale that he did this by breaking up a large number of fairy tales into components and then made a comparison of the tales according to their components. Propp created two levels of these components or categories; the thirty-one major characteristics, with each one including one or more sub-categories. For example, Propp's category 16 is, "The Hero and the Villain Join in Direct Combat," with sub-categories, (1) They fight in the open field, (2) They engage in a competition, (3) They play cards, and (4) a special form relating to a specific story in which a she dragon proposes the following to the hero: "Let Prince Iván get on the scales with me; who will outweigh the other."

Much of the power behind Propp's work is that it offers detailed patterns of narrative events with an almost mathematical symbol system of representation. Category 16 has a designation of the letter "H." To make the full designation, the sub-category number is added as superscript. If the Hero and the Villain battled in a game of pinochle, for example, Propp's designation would be H3. If the full story were that the Villain rode into town and promptly abducted the Hero's wife, to which the Hero responded by challenging the Villain to a game of pinochle, at which the Villain eventually lost, then Propp's story designation would be: A1 H3 I3.

It is difficult to accurately apply Propp's work to modern narratives because its form of sequencing is quite rigid and based on a deconstructionist approach to the study of narrative. Propp's work was also based on his own cultural folk tales and was never intended to be applied beyond that domain. There are other researchers, however, who tried a broader approach.

Around the same time Propp was writing his volume on morphology, Finnish folklorist Antti Aarne created a tale type and motif index for the comparative study of folk tales. Upon Aarne's death in the mid 1920's, the work was taken up by folklorist and professor Stith Thompson of Indiana University. (Thompson 1955) Thompson expanded the tale type and motif index to include tale types and motifs from many cultures around the world. Thompson defines tale type as "a traditional tale that has an independent existence. It may be told as a complete narrative and does not depend for its meaning on any other tale." (Thompson 1977) A tale type is made up of one or more motifs. A motif is "the smallest element in a tale having a power to persist in tradition." In other words, motifs are story granules.

Examples of the Aarne-Thompson tale types are: Magic Objects, Supernatural Power or Knowledge, and Supernatural Helpers. Examples of motifs within the Supernatural Helpers tale type are: the three old women helpers, the wild man, and the gifts of the little people. The motifs are story granules which define the meaningful chunks of a tale. Thompson assigned a unique sequence number to each of his thousands of motifs to make it easier to codify a tale. Therefore, similar to Propp's work, it is possible to construct a sentence of motifs which represent a particular folk tale. For example, the Grimm's story *Rumpelstiltskin* has a tale type of 500: The Name of the Helper. *Rumpelstiltskin's* list of motifs are: H914, M242, S211, H521, D2183, H1092, N475, C432.1.[8] With such representations it is then possible to compare stories from different cultures, note similarities and postulate reasons for these similarities. According to the Scribner Resource Collection of World Folktales, there are at least three other stories from England, Scotland and America with the same tale type and similar motif list, and therefore, are variants of Rumpelstiltskin. (Clarkson, 1980)

What Branigan provides is an abstract structure for organizing story material. What Propp and Thompson provide are classification systems for identifying and comparing different stories – and in Thompson's case, comparing stories from different cultures. They each provide a structured method of addressing narrative and a method of attaining new understanding about narrative through structure. Propp and Branigan make the point that because the story material is organized in a structure, especially a structure which is common or recognizable to the audience, the audience enjoys the story more and maybe even remembers it better. By putting together the various parts of the story into an over arching structure, the story as a whole works. The same is true for metalinear narratives:

[8] Meaning: *H914* - Tasks assigned because of mother's foolish boasting; *M242* - Bargains and promises between mortals and supernatural beings; *S211* - Child promised to supernatural being; *H521* - Test-guessing unknown propounder's name; *D2183* - Magic spinning; *H1092* - Task-spinning impossible amount in one night; *N475* - Secret name over heard by eavesdropping; *C432.1* - Guessing name of supernatural creature gives power over him.

by providing an abstract story structure, in this case taken mostly from Branigan's work, a entire story can be constructed from parts based on that overarching structure.

Even with Branigan's relatively small number of narrative schema elements, compared to Thompson's thousands of motifs, it is still possible to describe a large number of narratives. Branigan designed his schema elements to be broadly useful in the description of narrative. If, instead of deconstructing, one wanted to construct narrative from a large collection of story granules using one of the above structures, help would be required for organizing story granules and sequencing granules based on their descriptors. Help would be needed, in the form of a tool, to construct a story; and with such help, the nature or process of construction is changed. Bringing in the right tool can change the way one thinks about a business, as has been shown by the tractor in farming, the power saw in logging, and the computer in finance. A tool for developing and constructing metalinear story can change the way one thinks about the business of writing.