

## Storytelling and Computational Narratives - Reaching for the High Bar<sup>1</sup>

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### ABSTRACT

As our forms of media entertainment and information change, there are more and more examples of non-linear forms within our traditionally linear media. We as a culture are increasingly seeing ourselves as a collection of cultures, each with a voice, each with a story, and each deserving of being a part of every story. The storytelling process includes an author, a story and an audience. When storytellers perform, whether their medium is oral, written or cinematic, they rely on a form of feedback from their audience or some portion of their audience to help guide their story. There is an active two-way connection between the audience and the author. The computer can be an appropriate central tool for combining the interaction that oral storytelling provides and the multiple view points that these emerging forms provide. Many computer systems exist which help the author carry out their work, and there is an increasing amount of research on systems which act as a central mediating engine in the storytelling process. A tool expressly for this task is necessary to create these emerging story forms. This research introduces the term *metilinear narrative* as a descriptor of this new narrative form.

Media entertainment technology is rapidly evolving. From radio to broadcast television to cable television, from photographs to motion picture film to digital video disks, as the media evolves, so do the stories told through the media. We already share many more stories and more types of stories from many more sources than we did a decade ago. This is due in part to the development of computer technology, the globalization of computer networks, and the emerging new medium which is an amalgam of television and the internet. The storyteller will need to invent new creative processes and work with new tools which support this new medium, this new narrative form. In my doctoral dissertation from the MIT Media Lab, I proposed a name for this new narrative form – the *metilinear narrative*. The metilinear narrative is a collection of small related story pieces designed to be arranged in many different ways, to tell many different linear stories from different points of view, with the aid of a story engine which sequences the story pieces. With tools and frameworks such as metilinear structure, new types of stories can be written and new methods of learning employed in ways not available today.

One of the challenges of writing stories in the last years of the twentieth century has been the writer's awareness of the ever-widening diversity of characters and viewpoints which reflect our increasingly global perspective. The effort to include these multiple perspectives makes it

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very hard to maintain story coherency. The challenge becomes more difficult as we proceed through an information age where we know more intimate details than ever before about the cities, towns, and countries of our planet through the nearly ubiquitous media.

In the 1980's, significant historical events in China and Germany appeared in North American living rooms. During the Gulf War in 1991, events in New York, Washington DC, and the allied base in Saudi Arabia were shown by CNN in Baghdad. While the bombs fell in Baghdad, the world tuned in and watched. Perhaps for the first time in history, a military commander could gain valuable political if not military strategic information simply by watching TV.

The growth of the internet has accelerated our awareness of multiple cultures and made it easier for us to come into contact with one another and learn from one another. During the 1995 succession referendum vote in Quebec, Canada, anyone using a web browser could view an up-to-the minute tally of an extremely close political race upon which the future of a nation depended. Using personal computers and the internet, millions of people worldwide place themselves in countless special interest e-mail groups and share their personal narratives through tens of thousands of newsgroup bulletin boards. We can electronically label and identify ourselves as having important similarities with people who are geographically and culturally distant. We are more aware of who we are globally and, therefore, simultaneously see ourselves as parts of our local subcultures and also as parts of larger global units. We are not as easily represented by a single leader's voice anymore, but instead recognize the multitude and magnitude of our collective voices.

Though we now see and experience the world as a much more diverse place, this worldview is difficult to represent in narrative. While there is more to know and more things possible to include, writing a traditional linear story is largely an exercise in editing out. In a news article the writer can not include all the points of view. In a movie the director can not include all the angles. In a world with so many different faces, how can the writing process and writing product include more voices? And how can this new product be an environment for learning from these voices?

While the computer can accommodate many voices through its massive digital storage and search capabilities, it cannot automatically make sense of those voices. This is the job of the author. Yet how does the author, trained to see uni-linear stories, shape these many narrative elements into a coherent form? Through the use of intelligent tools. There are already people using computers to author multimedia stories which incorporate multiple points of view. Projects from the MIT Media Lab's Interactive Cinema Group such as *It was a Knowledge War* (Houbart, 1994), as well as the Apple Computer's *Guides* project (Oren, Salomon, Kreitman, & Don, 1990), are early examples of multimedia projects which, among other things, incorporated multiple narrative points of view around central issues. Other developers use what could be called a plot-based approach to authoring multimedia stories. Instead of focusing on characters and point of view, the author focuses on plot, and structures the story as an interconnected branching network of plot lines. The interactive laserdisc narratives of the 1980's are early examples which used this method. But while these projects concentrate on the

end-user experience, they do not recognize or facilitate the author's task. In the case of the plot-based approach, how does the author overcome the seemingly intractable problem of exploding combinatorics? (Bruckman, 1990) How is the author to make sense of a multitude of narrative viewpoints? By not creating a single linear narrative, but by creating a broader narrative in which many constructions and, therefore, many experiences are possible. Such a narrative is a metalevel narrative.

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 "to 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 progression 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 utilizing tools such as *Quicktime* from Apple Computer, *Java* from Sun Microsystems and *Flash* from Macromedia, computational power has given us the tools to reshape the traditional linear narrative model and deliver narratives with increasing flexibility and diversity.

Story and storytelling are largely about two things: culture and structure. It is impossible to have story without at 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)

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 metalevel 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. There is a dialog between audience and storyteller. Oral storytelling involves a shared task, different from the physically separated tasks of the writer and reader of the printed story. The audience and teller negotiate a story into being in a highly dynamic interactive process. (Livo & Rietz, 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. According to African story collector and professor Jack Berry of Northwestern University:

*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)*

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. A creative balance of satisfying and violating audience expectation inspires close listening, detailed imagery, and learning in the sense of strong familiarity and connection with the story material. Violating the audience's expectation can allow the audience to enjoy 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.<sup>2</sup>*

A typical audience's expectations would now be 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. It is using this age old understanding of story, whether explicitly or implicitly, that will give computational storytelling its greatest level of power and authenticity.

In literary media, 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.

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

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<sup>2</sup> 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/](http://web.mit.edu/21W765j/Spring_97/StudentWork_SP97/Groundhog/nick/)

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.

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) In these small paperbacks, the reader is given the opportunity every few pages to choose 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.

Hypertext is the binding of many electronic documents to one another through the use of links. These 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) 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.

Much of the early vision of hypertext is largely satisfied today through the world wide web. Both the world wide web and special hypertext software applications like *Storyspace* (Eastgate Systems, 1996) offer authors the opportunity to make links between many pieces of fictional and non-fictional text. Indeed, the publisher of *Storyspace*, Eastgate Systems, also publishes many hypertext works of fiction and nonfiction.

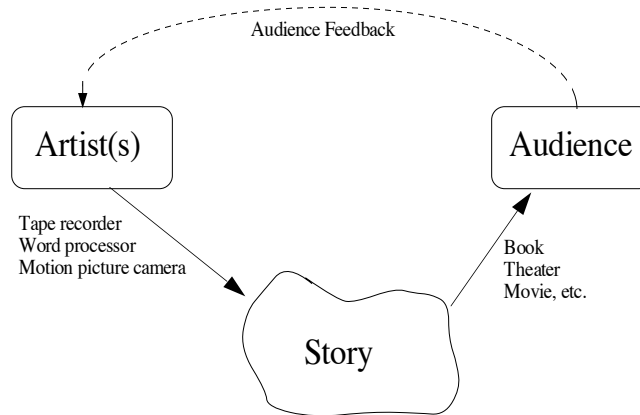
However, these examples cited, as well as many other possible examples from film/TV, are bound to the fundamental linearity of their media. No matter how talented the writer or filmmaker, no matter how engaged the audience, literary and motion picture media remain a linear. The question is, is it possible to create a truly nonlinear or metalinear story with the prevalent tools available today designed for linear media? While it can be said that imagination, determination and talent strongly dictate an artist's ability to create new work, it is the tools they use which has an over arching effect on the artist's thinking and performance. It is not surprising that when a sculptor or musician wants to make a totally new type of art,

often their approach is to create a totally new type of tool or instrument to guide their thinking and express their passion. Writing computational stories, whether purely for entertainment or for education, is no different. Writing using a standard word processor and a multilinear presentation tool cannot yield a metalinear result. One requires a special tool to aid appropriately in the process of building a metalinear story system.

In general, the computer has the ability to be this tool. Yet the problem remains; how? How can a computer take instruction from a story writer such that the computer can “know” something about the story? How can a computer provide feedback to a writer during the grueling rewrite process? How can a computer fit into the metalinear story design system which includes story creation, presentation and writer/audience feedback?

If a computational system is to make narrative sequencing decisions, it will have to have access to some portion of the author’s intentionality. It will have to have some representation of how the author understands his/her own story. The metalinear narrative model accomplishes this by representing the authorial intentionality through various types of links. By connecting one piece of story to another, and stating a simple reason for this connection, like causality or temporal precedence, some amount of the author’s intention is represented in the linking system. Additionally, by providing the author with feedback in the form of a story, a writer will know if the connections they made between story pieces can be navigated in a coherent way. A specialized software tool for writing metalinear stories can provide such functionality. It can help the author construct metalinear story by capturing the relationships between story pieces, providing a means for constructing narrative structure, and by providing ways to reconstruct multiple linear narratives from the same collection of narrative material.

Any storytelling experience or system, whether electronic or otherwise, typically includes three important elements: the artist/storyteller/writer, the story itself, and the audience. (Figure 1.) For a commercial system these functions might be called creator, product, and consumer. The artist creates the story, which is then realized in a specific medium and presented to an audience or consumer. Once the audience experiences this single instance of the story (book, theater, movie, etc.), there may be some mechanism for the audience to respond to the artist. While a book is fixed, with audience feedback possible only after the fact (through the publisher), feedback in live theater is a little more fluid. One example is that actors can often read the audience for needed adjustments during their performance. Additionally, applause during or immediately after the performance serves as some measure of artistic success for performers and writers. However the audience's feedback is usually given only after they have experienced the story – this is especially true in the case of movies. In general for all media, the audience cannot give feedback during the story in a way which will change any of the narrative structure or its production elements. While this model does not hold for oral storytelling, which has a much more fluid artist-audience interaction, this model does hold true for all recorded media. For the benefit of reaching a wider audience through mass duplication, the recording process tends to distance the audience from the artist.



**Figure 1**

Is it possible for a computer mediated story to change this model? Computers have already been incorporated into the story writing and production process – most notably with the use of word processing tools. Word processors mainly offer a way of getting the story text written down quickly, and allow for fast and efficient editing. Beyond this common functionality, there are software tools that also give feedback to the writer based on some simplified knowledge the tools have about the written language. Spell checkers and grammar checkers have a representation of words and sentence grammar which allow them to use the written text as input for comparison with their rules. The software offers the writer feedback regarding where its representation of correctly spelled words or proper grammar does not match the writer's text. These actions compose a feedback loop between writer, the story/text, and the computer. However, these systems have little to do with the narration of the story and nothing to do with the audience. That is, they do not have any representation of what the story is about.

Many researchers and software designers have tackled the problem of trying to place the computer within the creative process in a more meaningful way. These attempts have usually not been directed toward general solutions, but instead toward application specific solutions. I discuss a number of examples of these software tools in detail in (Brooks 1999). Metalinguar narrative offers a more general purpose approach (Figure 2.)

Metalinguar narrative encompasses a balance between authorial and audience control. The author can offer a narrative to an audience in which the audience is more empowered than they are with the functions on their VCR remote. The author's craft is one of story potential, where the final form is many possible forms. This makes the audience more active than ever, making choices on a level and scale never before accomplished. Striking this balance of authoring story potential and authoring audience activity is not an easy one. Yet within that struggle to find balance there is also freedom. It is within the bounds of restriction that writers often find their voice, their power.

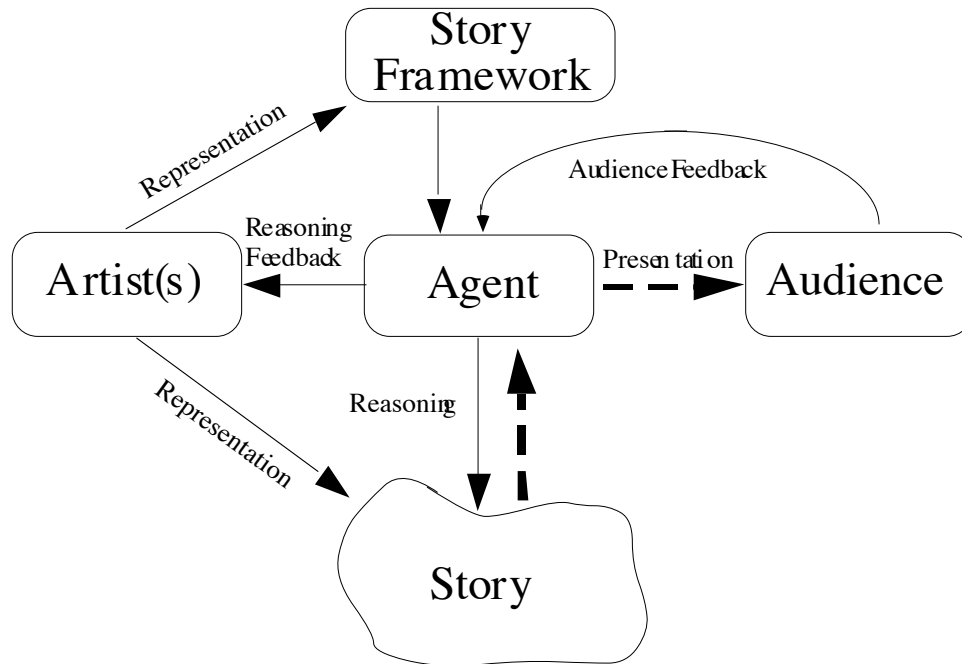


Figure 2.

The metalinear art form is born from a collaboration between writer and computer. The computer assists the writer in the process of structuring her story granules for sequencing. This process relies on the computer providing a means of representation for the granules. Writing a metalinear story means manipulating the computer's representation of the characters and events such that it can sequence the story granules according to the author's intent. In freeing the writer from linear writing, metalinear narrative provides a structure into which multiple story fragments or granules can exist. Through this structure multiple construction is possible. The writer is free to write many different versions of the same story granule. The writer is not held to a single "right" scene, paragraph or sentence. They may create different versions of story granules in order to give characters and character relationships multiple possible sequences.

A writing tool which offers the author knowledgeable feedback about narrative construction and context during the creative process, is essential to the task of creating metalinear narratives of significant dimension. By "significant dimension" I mean in terms of size as well as quality. A writer is able to keep only so much of a complex story structure in their head while they are creating. The task of remembering that structure while also thinking about the many different ways that structure can be applied to their story domain, is harder still. A specialized writing tool is needed to help manage a complex narrative structure and allow the writer to focus more of their energy on what they do best - writing good story material. There

is a need for a software tool which maintains human creativity and authorship in the writing process, while also enabling the computer to construct multiple linear narratives. A software tool called *Agent Stories* was developed as part of this research as a first step toward enabling writers with the power of metalinear story creation. A complete description of *Agent Stories* can be found in (Brooks 1999). *Agent Stories* research continues at the MIT Media Lab in a variety of forms.

Further research topics suggested by the development of metalinear narrative include: better feedback mechanisms and understanding, further understanding of multiple viewpoint narrative styles, further understanding of how multiple and growing viewpoint stories can contribute to or establish new methods of teaching and learning.

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