Applications of Theoretical Models for Interactive Narrative Animation

AN EXEGESIS OF A RESEARCH PROJECT SUBMITTED IN FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS OF ARTS

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Declaration

I certify that except where due acknowledgement has been made, the work is that of the author alone; the work has not been submitted previously, in whole or in part, to qualify for any other academic award; the content of the thesis is the result of work which has been carried out since the official commencement date of the approved research program; any editorial work, paid or unpaid, carried out by a third party is acknowledged; and, ethics procedures and guidelines have been followed.

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APPLICATIONS OF THEORETICAL MODELS FOR INTERACTIVE NARRATIVE ANIMATION

summary:

Interactive fiction is certainly interactive, and it's fictional in the sense of being made up, but it's certainly not storytelling. Some practitioners of the field write eloquently of the glorious narrative possibilities, but the actual creations remain elaborate puzzles.¹ (interactive narrative designer Chris Crawford, 2005)

This research program explores structural and theoretical models for interactive narrative animation, through the creation of a series of structural prototypes, and also animation content for these prototypes.

The aim is to find methods which might provide the author of an interactive narrative animation with the ability to satisfactorily limit and direct the variability of the narrative presented. However the aim is also to achieve this without also neutralising any potential benefits of interactivity, both for the author and for the user.

The outcome is therefore expected to point to the creation of something more than elaborate puzzles; the aim is to discover new models for storytelling.

INTRODUCTION:

Current Status of Research into Interactive Narrative Animation

DEFINITION OF SCOPE

Interactive narrative animation is a relatively new medium which can now be found within many different formats. A non-conclusive shortlist of these formats would include: computer applications, computer games, web animation, websites, DVD authoring, mobile phone applications, handheld device applications, interface designs, interactive cinema experiments, and installation art.

It would be impossible for any one research program to investigate the varied uses of interactive narrative animation within all these media, because the scope would be far too broad.

This introductory section to the research program’s exegesis is therefore devoted to:

- examining some of the more important and identifiable conclusions drawn so far about the current nature of interactive narrative animation.

- using these to more precisely define the relevant subset of interactive narrative animation which is researched in this particular research program.

To adequately describe the issues confronted by the designer of interactive narrative animation, it is necessary to begin by examining those issues which are common to all interactive narrative media, whether animated or not. From this discussion it will be possible to proceed to specifically animated forms of interactive narrative media.
Interactive narrative is sometimes referred to as interactive storytelling. The exact definitions of the words “interactive”, “narrative” and “storytelling” are not universally agreed upon. It may be useful to briefly examine some definitions, in order to more precisely describe the scope of this research.

The word “interactive” dates back to the nineteenth century, meaning one which acts upon or with another. It was adopted widely in the late twentieth century as a description of computerised products (e.g. computers, software, appliances) in order to emphasise the idea that the user may actively do things to the product and receive a response from the product.

Yet the exact definition of “interactive” has remained somewhat slippery. If “interactive” means “able to be acted upon and to respond”, then how broad can the definition of “act” or “respond” be? It can be argued that a painting is interactive; if the user is said to act by looking at it, and the painting to respond by providing an aesthetically stimulating sight; perhaps even from different viewpoints if the user chooses to scan the image or reposition his or her line of sight. This question has been further complicated by the word “interactive” acquiring a popular meaning in marketing culture, where it has come to be used as a synonym for “responsive”, or even used to describe anything at all which a person can act upon. By such definitions, a tennis ball or a rock is “interactive”, because it can be picked up and thrown (act), upon which it will move away through the air (response).

The important element that is missing in any of these very broad definitions of interactivity is: that of the response being calculated and considered. Recent usage of the word “interactive” carries an implication that, after the user acts on an interactive product, the product will first consider the data it has received, before providing an appropriate response based on that consideration. More precise definitions of “interactive” have focused on exactly this consideration or processing of the data in between exchanges.

For the sake of clarity, I have chosen to always use the word “user” to describe the person using any interactive product, rather than “audience”, “reader”, “viewer”, or “player”. This is because the user of an interactive product might perform any of those roles, either in sequence or simultaneously. “User” describes all the behaviour that a person might engage in while using an interactive product, and without suggesting any misleading limits to that behaviour.
The computer game designer and creator of “Storytron”\(^3\) Chris Crawford, in The Art of Interactive Design (2003), uses the metaphor of a conversation to describe this process, pointing out that good conversation can only occur when the participants listen and think before they speak. This applies even in the metaphorical conversation between user and computer, when “listen” is defined to cover all methods of receiving data, and “speak” is defined to cover all methods of sending data. By this definition, looking at a painting or throwing a rock cannot be called interactive, because the painting or rock cannot “think” (process data) before responding, unlike a person or a computer.

Crawford’s precise definition is “interactivity” –

a cyclic process in which two actors alternately listen, think and speak.\(^4\)

A conversation is an apt metaphor for defining the kind of exchanges between user and computer that should be considered truly interactive; it neatly describes the back-and-forth process in which data is received, considered, given, and updated in memory by both parties.

Crawford makes a further point that offering the user some kind of choice is a crucial criterion of an interactive product. If the user of a computer doesn’t get to make a choice, then in the terms of Crawford’s definition of interactivity the computer is not “listening” to the user “speak”. The method of the user’s “speaking” (mouse click, keyboard input, voice command, etc) or the degree of complexity permitted the user when speaking may vary, but the point is that in any case where the user cannot “speak” at all, the experience for the user is not interactive.

This research program proceeded with a definition of “interactive” based on Crawford’s – a cyclic process in which two actors alternately listen, think and speak. This definition could also describe projects which do not use computers at all (for eg. interactive live theatre experiments). However, in the case of this research program, one of these actors was always a human user and the other actor was always a computer.

\(^3\) Storytron is a software engine for running interactive stories which Crawford has been working on since 1992, after becoming disillusioned with designing computer games. The first authoring tool based on this engine, Swat, was released in March 2009.

DEFINITIONS –

“Narrative” and “story” are also terms that require some examination and definition in order to more precisely define the scope of this research.

Dictionaries define “narrative” as;

Narrative: an account of a series of events or facts given in order and with the establishing of connections between them; a story; the art, technique, or process of narrating.

A “story” is defined as;

Story: a narrative of real or fictitious events designed for the entertainment of the hearer or reader; a succession of significant incidents.

There is some circularity here, and neither term is a strict subset of the other. However, what they have in common is; Firstly, the concept of a description of events in series or succession; things happening one after the other. Secondly, the idea that these events have connections or significance; that this ordering in sequence adds up to something larger than the sum of its parts. Note also that the usages of the word “narrative” include the process of telling as well as the outcome. The word “story” tends to have more connotations of a fixed and finished outcome only, and requires another separate word to describe the process; “storytelling”. There is, at present, some variation in the terms used for interactive works which involve stories. There are practitioners and theorists, Crawford for example, who prefer the term “interactive storytelling” precisely because it isolates and prioritises the process only. This issue of the different roles played by process and content in interactive narrative is an important one, and has a direct bearing on the exact subset of interactive narrative I propose to work with.

This research project is concerned with outcomes (stories) playing a role in the user’s experience, as well as process (storytelling). Therefore, there will be a conscious avoidance of any terms that restrict meaning to outcome only or process only; the term “narrative” rather than “story” or “storytelling” will therefore be used in this project.
Thus - the full definition of “interactive narrative” as used in this project is:

Interactive narrative: A cyclic process in which a human user and a computer alternately receive, process and send data to and from each other, to create an account of a series of events in an order and with connections between them, and in which process that user is offered choices, and in which the computer processes the incoming data from the user before responding.

This definition of interactive narrative describes its use in multiple interactive media, examples of which are hypertext fiction, websites, web animation, computer games, interactive cinema, and installation art. Although narrative is often thought of as verbal or textual, many of these media use images in some way. The author and artist Mark Meadows, who also chooses to use the term “interactive narrative” in his book “Pause and Effect: The Art of Interactive Narrative” (2002), points out that the act of “narration” does not exclude images:

It’s natural that interactive narrative, things such as video games, for example, includes imagery. Narration is not limited to text. Narration has been neatly transferred to text, but text is a close cousin of image, and an image can be a kind of “non-verbal” text (as it’s called in many educational and academic circles)⁵

This point can be expanded outward to include not only imagery and the written word, but also sound, music, dialogue, and movement. All can be used by the interactive narrative designer to communicate narrative meaning.

WHY MAKE NARRATIVE INTERACTIVE?

Because it is in its infancy, interactive narrative’s practitioners are developing new languages for narrative by finding common ground within the various media it includes and borrows from. Thus, although it builds on existing conventions from other media, interactive narrative is largely unexplored territory. The innovative use of multiple media in new hybrids makes interactive narrative an important new area both for creative designers and for users, because it can actually create entirely new ways of experiencing narrative.

In “Pause and Effect” Meadows comments on this potential, describing the benefits of interactivity as “perspectivist”:

Interactive narrative is the most ambitious art form existing today because it combines traditional narrative with visual art and interactivity. Strangely enough, these three art forms share an important feature: They each allow information to be understood from multiple perspectives. Traditional narrative has tools such as foreshadowing and epiphany. Visual arts rely on point-perspective and foreshortening. Digital Interactivity uses iconography and expanding menus. These are all tools that do the same thing: convey perspective.⁶

That potential for multiple perspectives is often considered one of the primary creative benefits of making narrative interactive. In a core text on the future potentials of narrative in digital media, “Hamlet on the Holodeck: The Future of Narrative in Cyberspace” (1997), Janet Murray invokes the literary precedents of Joyce, Faulkner and Tolkien as “encyclopaedic writers” who created an entire world within their narrative creations.

⁶ p. 2, Meadows, ibid.
Murray’s related term for this is “kaleidoscopic”, and she comments that the computer is the tool that can now permit creators to expand this kind of narrative onto a “kaleidoscopic canvas”:

The kaleidoscopic power of the computer allows us to tell stories that more truly reflect our turn-of-the-century sensibility. We no longer believe in a single reality, a single integrating view of the world, or even the reliability of a single angle of perception. Yet we retain the core human desire to fix reality on one canvas, to express all of what we see in an integrated and shapely manner. The solution is the kaleidoscopic canvas that can capture the world as it looks from many perspectives – complex and perhaps ultimately unknowable but still coherent.⁷

Meadows and Murray are here attempting to articulate the fundamental benefits of having interactivity in a narrative at all. For the designer, there is the chance to create a narrative world seen from many angles, a means to express narrative through multiple perspectives, and a method by which to construct narratives whose eventual form may surprise the designer him or herself. For the user, there is the chance to experience a narrative which can be played with, which is repeatable without being exactly the same, and which offers a new perspective on the nature of narrative itself.

At the time of writing in 2010, hybridisation of media is also leading to social implications as well as creative ones. This tendency, dubbed “convergence”, describes trends such as, for example: using mobile phones not only to make telephone calls but also to watch movies, or look at global positioning satellite maps, or: using the internet not only for email and web surfing but also to share photos or listen to radio shows, and so on. The convergence of media is therefore leading to the mixing not only of media, but also of user behaviour.

There is a utopian bent to some of the claims made about the social benefits for the user of these emerging media, the enthusiasm being derived mostly from ever-increasing rapidity and convenience in accessing all kinds of information digitally and remotely. For the designer, however, there is a more prosaic and practical problem of how to create new interface designs and perhaps even new forms of narrative content which can withstand this process of integration with other media.

It is also interesting to note that, for some cultural critics, whether this convergence of media is desirable for the advancement of creativity is perhaps moot, as such convergence is most likely inevitable whether desired or not. It is the nature of these media to be in constant change. For example, in a 2006 essay in Film Comment, film director and critic Paul Schrader explained why he believes this issue complicates any attempt to define a “film canon” when the medium itself is constantly changing. Schrader suggested that the future of narrative film, including whether it becomes interactive, will depend on the nature of the technology bringing it to viewers (or users):

The future of audiovisual entertainment (I hesitate to use the term “motion pictures”) will be determined by technology. The technical means of capturing, producing, and distributing moving images has always defined the “art” in film art...The current uncertainty about the nature of cinema—and its future—cannot be resolved by artists or financer’s; technology will accomplish that task...The new face of film will be the face most appropriate to this technology. Will motion pictures be downloaded on demand? Will they be seen on cell phones and wraparound headsets? Will it be possible to reedit pre-existing material as one watches it? Will viewers be able to select parts of existing films (chase sequences, etc.)? Will we live in a world of constant, multiple 24/7 video streams? All of this seems entirely likely. These new technologies will dictate what “film” is to become.

Schrader’s point that technologies will “dictate” what “film” is to become is borne out by history (witness the changes wrought by the advent of sound, of television, of the internet). However, it is misleading to draw conclusions that “technology” alone will automatically provide its own new designs and interfaces. Technology must circumscribe certain limitations but, as ever, the actual forms and content will be created by human designers, who will be borrowing and adapting from what has gone before. However, while it seems likely that interactive narrative will continue to develop as media continue to converge, the basic technology to create interactive narrative has been available for some time.

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Yet interactive narrative has to date remained relatively obscure for the most part, relegated to the fringes of both popular entertainment and art. To examine just why this should be requires a closer look at the nature of the medium of interactive narrative.

THE ACTIVE VS PASSIVE PROBLEM –
LOW-INTERACTIVITY AND HIGH INTERACTIVITY

Within these emerging hybrids of converging media, a persistent problem tends to keep resurfacing whenever any attempt is made to add interactivity to narrative told via moving imagery. This is the problem of how to reconcile a degree of passivity within the user’s experience of watching, with a degree of activity within the user’s experience of doing. Game designer and writer Jesper Juul, in his essay “Games Telling Stories?” (2001), noted that this contrast can be literally physical – the movie viewer leans back, but the game player leans forward.  

This problem of the conflict between two types of user experience is often described using some kind of analogy, such as: “How can you watch the scenery if you are too busy driving the car? Or how can you drive the car if you are too busy watching the scenery?”

The behaviour designed for the user of interactive cinematic narrative can be conceived of as running along a spectrum – from passive user to active user, i.e. from low interactivity to high interactivity. At the low-interactivity extreme end, a passive user watches the narrative but misses out on interacting; at the high-interactivity extreme end, an active user interacts but misses out on watching the narrative.

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This basic conflict between receiving information and acting on it is still causing great difficulties for interface designers. This conflict is especially reflected in the practical problems of the relationship between narrative content and interface design. The computer game designer, Walter Freitag, describes this;

There's a conflict between interactivity and storytelling: Most people imagine there's a spectrum between conventional written stories on one side and total interactivity on the other. But I believe that what you really have are two safe havens separated by a pit of hell that can absorb endless amounts of time, skill, and resources.\textsuperscript{10}

It is in this “pit of hell” as designated by Freitag that the active/passive conflict is to be found. Closing in on either of these “two safe havens” at either end of the low/high interactivity spectrum, but still remaining inside Freitag’s “pit of hell”, is where some of the clearer examples of successes and failures in solving this conflict can be examined.

ON THE LOW-INTERACTIVITY SIDE –
ON THE FAILURE OF INTERACTIVE CINEMA

At the extreme low-interactivity end of the spectrum are examples of media such as the conventional linear narrative film. For such products, user behaviour is arguably “passive” insofar as it is completely non-interactive.

For a good example of a medium which has edged just slightly along the spectrum and increased interactivity a little, but while still staying close to the low-interactivity end, we can examine the medium of “interactive cinema”. Interactive cinema is usually conceived as being a film which for the most part is watched like any other film, but in which the user can also make some choices about how the narrative unfolds, whether through, say, some buttons in a cinema seat’s armrest, or through the buttons on a DVD player’s remote control.

It is interesting to note that although there have been some individual interactive cinema projects by designers and artists which have drawn some critical acclaim and artistic success, these have remained relatively infrequent, certainly when compared to traditional linear film.

An example of a filmmaker with a high public profile who is still currently attempting to create interactive cinema projects is the British filmmaker and artist Peter Greenaway. However, it is interesting to note that while Greenaway is enthusiastic about digital media, he persistently characterises his own work as “anti-narrative”, and often presents it in an art gallery context in which it is perhaps better defined as installation art rather than interactive cinema.

When compared with the continued prominence of traditional linear film in popular culture and even in high art, interactive cinema as a medium has been a particularly conspicuous industrial failure. The writer Peter Lunenfeld examined precisely this phenomenon in a 2004 essay entitled “The Myth of Interactive Cinema”, describing interactive cinema as “a much-hyped hybrid that never did quite make it.”

Lunenfeld notes that enthusiasm for interactive cinema has often been driven by:

> ...the idea that new technologies would generate not just new stories but also new ways of telling those stories. The record on the screen, however, indicates that the real impact of digital technologies was not to strengthen narrative – linear or not – but to contribute to its decimation.¹¹

In other words, the conflict between active and passive behaviour in the user has not been reconciled, except arguably for one particular conception of interactivity. Lunenfeld proposes that possibly interactive cinema’s best practice is to expand the interactive experience outside of the cinema or moment of viewing. Lunenfeld is here referring to projects such as 1999’s The Blair Witch Project, which generated a fan-based world of clues and user interactions and responses through web pages, mobile phone numbers and so on. This approach does arguably solve the active/passive problem, but does so by positioning the active component outside the viewing experience; in effect radically expanding what is defined as “interactive”.

While this is also an interesting area for research, it does lie outside the proposed scope of this particular research project, which is specifically concerned with the localised interaction between one human user and one computer.

ON THE HIGH-INTERACTIVITY SIDE –
ON THE SUCCESS OF COMPUTER GAMES

While interactive cinema is an example of an interactive narrative medium which has shown only limited evidence to date of industrial success, an alternate example of interactive narrative has since proven to be extremely lucrative, with its own blockbusters and franchises to rival and even surpass Hollywood cinema in earning power. In addition to this commercial success, this form is also beginning to see some serious critical examination as an art medium. This form is the contemporary computer game, which serves as an instructive example of a medium to be found at the high-interactivity end of the low/high interactivity spectrum.

To examine just one recent case, the sixth game in the Call of Duty war game franchise, Call of Duty: Modern Warfare 2, cost around $40-50 million dollars US to develop. Its maker Activision then spent an estimated $200 million US on marketing. In November 2009 the game was released and earned $310 million dollars US in its first day of sales alone, rising to $550 million in its first five days.¹² This is more than almost all Hollywood blockbuster movies.

The popularity of these computer game products would suggest they have found some means of solving the active/passive conflict between active game and passive narrative, but it is important to examine to what extent narrative exists in such games, and with what degree of success.

Do these games really provide narrative? According to our earlier definition of narrative, yes. All computer games present events in sequence, and in many computer games these events are also presented as having narrative significance. However, it should also be noted here that there is some critical debate around the issue of whether narrative does belong in computer games at all.

Contemporary games theory casts the conflict between active and passive into broadly analogous terms – ludology and narratology.

From a ludologist perspective, gaming and narrative are separate things, and any attempts to combine them are intrinsically wrongheaded. For example, the writer Markku Eskelinen comments that:

> Outside academic theory people are usually excellent at making distinctions between narrative, drama and games. If I throw a ball at you I don't expect you to drop it and wait until it starts telling stories.\(^{13}\)

From the ludologist perspective, a computer game should prioritise “game” elements such as spatial problem-solving rather than narrative. A computer game such as Tetris (in which different shaped geometric blocks fall from the top of the screen and must be combined at the bottom by the user) is a good example of a game arguably approaching a state of zero narrative. Eskelinen takes an extremist ludologist position when he argues that

> ...stories are just uninteresting ornaments or gift-wrappings to games, and laying any emphasis on studying these kinds of marketing tools is just a waste of time and energy.\(^{14}\)

By contrast, the narratologist perspective does not see stories as nothing more than “marketing tools”, rather seeing stories in games as potentially intrinsic components which might be fully integrated into a gaming experience. The success and massive popularity of games such as Call of Duty: Modern Warfare 2, which do include a narrative, might seem to justify the narratologist perspective.

Many of the most financially successful computer games, again such as Call of Duty: Modern Warfare 2, are games in the “first-person shooter” format. This means that the action is presented in a cinematically first-person point-of-view perspective, in which the player experiences the action through the eyes of a fictional character in a simulation of real space.


It is interesting to note that “first-person shooter” games do always include a narrative component, because the user is in effect playing (and “being”) a character in a scenario. These games are very much to the high-interactivity end of the low/high interactivity spectrum; the user is offered a great many options and choices, and the game designers have presumed that taking action rather than watching will be the primary means by which the user is entertained. The first-person perspective interface is directly manipulable by the user, meaning that the user’s options include a near-constant altering of the eyeline of the character through whose eyes the user sees, to which the game’s 3D engine responds by adjusting the environment’s perspective in real time. The designers of these games have therefore chosen to overcome the active/passive conflict by greatly increasing the product’s responsiveness to the user, thereby keeping the user actively engaged at all times. The aim is to provide the illusion that the user is “really there”, and offer the user a great many possible actions, thereby keeping the user very active and very close to the extreme high-interactivity end of the spectrum. The most useful term for this is “immersive simulation”, and it is a design strategy worth examining more closely.

WITHIN HIGH-INTERACTIVITY NARRATIVE – IMMERSIVE SIMULATION

This success of combat games with first-person shooter interface designs relies on immersive simulation to solve the active/passive conflict by keeping the user strictly active. This therefore suggests another spectrum on which to consider interactive narrative – from immersive simulation to non-simulation. In immersive simulation, the user is offered an interface which is very responsive, often designed in some kind of illusionistic imitation of the real world. The first-person shooter games are designed to provide an immersive simulation of exactly what the fictional character (“played” by the user) would see, whenever the user chooses to turn the character’s head. There is a precise precedent for this format in traditional cinema’s use of the “point of view” camera.

It should be noted that is not only the “first-person shooters” which use a form of immersive simulation as a design strategy. Computer gamers and critics use the slang term “sand-box game”, to describe computer games which are not explicitly goal-driven, in which the user is able to interact inside the game’s world with no goal other than play, like a child playing in a sandbox.
Although not all these games use the illusionistic “first-person” perspective of the “first-person shooters”, the “sand-box games” are all similarly based on the principle of solving the active/passive conflict by adding more responsiveness, more simulation. One of the most successful “sandbox” games to date is “The Sims”, whose very title acknowledges this strategy.

This design philosophy of “more responsiveness, more simulation” is directly related to what Crawford describes as “process-intensity”. Crawford suggests that many interactive designers make a mistake by focusing on “data-intensity” (or content), when they should instead be focusing on the process, because that is what computers do best. Crawford in fact chose the term “interactive storytelling” to describe his work rather than “interactive narrative” in order to define the area he works in as “process-intensive” only. Crawford uses a commercially failed format of the 1980s, the videodisc game, (perhaps the best known example of which was 1983’s Dragon’s Lair, animated by Don Bluth) to illustrate his point,

How was I able to correctly perceive that the videodisc game was doomed to failure once its fad value was exhausted? Simple; its crunch-per-bit ratio stank. All that data came roaring in off the disc and went straight onto the screen with barely a whimper of processing from the computer. The player’s actions did little more than select animation sequences from the disc. Not much processing there.

For Crawford, as for the designers of immersive simulation, the interactive narrative should be designed to be at the highest possible place at the high end of the high/low interactivity spectrum. At its most extreme, this process-intensive methodology results in the creation of what amounts to a form of artificial intelligence, in which the computer is simulating an independent thinking agent to the point where it has progressed so far in its imitation as to apparently cease simulating and begin simply being.
THE LIMITATIONS OF SIMULATION

It can be argued that although these games which use the design strategy of immersive simulation do provide narrative, that does not necessarily mean it is especially good or satisfying narrative.

The creation of narrative, to be effective, is generally supposed to involve considerable selection on the part of the author. In “Aspects of the Novel”, E.M. Forster commented that “Every action or word in a plot ought to count.” The film director Alfred Hitchcock once summarised this even more pithily as “Drama is life with the dull bits cut out.”

One of the biggest problems with creating narrative in an environment designed to offer the user immersive simulation, is that it clearly gives the user the chance to put the “dull bits” back in. If the user chooses, he or she may simply direct the virtual character’s gaze downward, and endlessly contemplate his or her virtual shoes. This problem is often countered by designers of “first-person shooter” immersive computer games by greatly increasing the action (gunplay, explosions, etc).

The point here is that the games industry’s solution to the interface/content conflict is a very specific one, based on keeping the user strictly up the high-interactivity end of the high/low interactivity spectrum. It is also often based on a very particular use of cinematic technique (first-person viewpoint) to attempt extremely realistic simulation and immersion in a believable world, aiming to make the user “forget” the interface exists by dramatically increasing the volume and complexity of content, immersing the user in realistically simulated response. The success of this strategy has led some designers to see more simulation as the only solution to problems of interactive narrative.

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15 p. 95, Forster, EM 1927, Aspects of the Novel, Penguin, Middlesex.
This approach is neatly captured in this quote from Harvey Smith, the project director for Ionstorm’s Deus Ex 2 computer game:

...really what we need right now is deep simulation. We need it so that everything gets simulated – and not just the environment...As soon as virtual actors are as complicated and unpredictable as the people [who] are playing...THIS is when things will get interesting...Really, simulation is what it’s all about. Algorithmically or procedurally generated environments are the only thing that will save the game industry.\textsuperscript{16}

It is instructive to compare Smith’s quote with one from Murray, writing more than a decade ago in 1997, but already identifying that the increased simulation and combat found in computer gaming are potentially limiting concepts for future interactive narrative projects.

Current narrative applications overexploit... the gamelike features of simulation, but that is not surprising in an incunabular medium. As digital narrative develops into maturity, the associational wildernesses will acquire more coherence and the combat games will give way to the portrayal of more complex processes.

Murray’s point here is that combat, gaming, and simulation may have their successful qualities, but only in a limited sense. The first-person viewpoint design strategy alone already limits narrative to heavy identification with a character in physical space, and therefore limits the user to a certain degree of naturalism and physicality. Immersive simulation also tends to eliminate or at least curtail the possibility of ellipsis and editing in narrative.

There potentials for interactive narrative in other formats are much greater. Yet in the time since Murray made these comments, most interactive narrative products have to a great degree remained bound by the limits she has described. These limits can still be seen in the occasional contemporary computer games which are championed as supposedly being advances in sophistication or maturity in interactive narrative.

\textsuperscript{16} p. 194, Meadows, op cit.
For example, the 2007 computer game Bioshock received often favourable reviews with particular attention paid to its inclusion of moral choices for the user in the overarching narrative. For example, a reviewer for the website Eurogamer.net commented

BioShock isn't simply the sign of gaming realising its true cinematic potential, but one where a game straddles so many entertainment art forms so expertly that it's the best demonstration yet how flexible this medium can be. It's no longer just another shooter wrapped up in a pretty game engine, but a story that exists and unfolds inside the most convincing and elaborate and artistic game world ever conceived. It just so happens to require you to move the narrative along with your own carefully and personally defined actions. Active entertainment versus passive: I know which I prefer.17

In Bioshock, the user is given the option whether or not to kill certain characters in the game to harvest useful genetic material from them. The game has three possible narrative outcomes, depending on the moral choices the user has made. However, Bioshock’s basic structure is still that of a conventional first-person shooter game, using immersive simulation with all the limitations that entails. There may be a little less shooting, but the only advances in terms of narrative and interface design are cosmetic.

ON LOW-INTERACTIVITY –
BEING THE AREA EXAMINED BY THIS RESEARCH PROJECT

The high-interactivity end of the low/high interactivity spectrum of interactive narrative is currently being investigated with much enthusiasm. This is particularly so in the case of the computer game industry which has found immersive simulation to be one quite lucrative solution to the active/passive conflict, albeit a solution which arguably limits the potential scope of the narrative. The other end of the spectrum, the low-interactivity end, is where we can find both immersive and non-immersive interfaces, but not attempts at simulation of reality.

These interfaces do not attempt immersive simulation via a vast increase in responsiveness. This area has been arguably less popular for recent design and investigation into interactive narrative, perhaps due in some part to awareness of the history of failed attempts to turn interactive cinema into a success.

As we have seen, for some critics and designers (Chris Crawford, for example) this area is in fact totally dismissed, because reducing the user’s activity is seen as antithetical to the nature of interactivity. Crawford offers the example of videodisc games such as “Dragon’s Lair” as an example of a failed interactive narrative format, which failed because its interactivity was too low. Yet, if users can find any utility at all in those narratives which include no processing whatsoever (ie. traditional movies, tv, plays), then it may be that users will be also be able to find some utility in narratives with only a little processing. It may be that “Dragon’s Lair” failed primarily because its design promised a more interactive experience than it delivered. It was posited as a game and not as a story.

The view that interactive work must be as interactive (or process-intensive) as possible to justify existing is worth challenging. The area thus delineated may prove to be of only limited use for storytellers, but this is not the same as useless. The challenge is therefore to design material and forms appropriate for a low amount of interactivity. In this way, the designer may retain some of the benefits (mainly control) enjoyed by linear narrative storytellers.

There are several intriguing questions to be asked at this low-interactivity end of the low/high interactivity spectrum, such as: Can there be other approaches, besides the failed interactive cinema models, to creating interactive narrative at the low-interactivity end? What kinds of new hybrid media might make it possible to do so? Instead of solving the active/passive problem by staying very close to the active “interactivity” side of Freitag’s two “safe havens”, is it possible instead to stay very close to the other passive “storytelling” side, and yet inch forward very minimally into interactivity?

So this is also where we encounter the question:

How far can interactivity be reduced and still be present?

There are several reasons for creating a research project at this low-interactivity end of the low/high interactivity spectrum, besides the fact that it has not been explored as much as the high-interactivity end:
PRACTICALITY OF APPROACH TO DESIGN RESEARCH

At the passive end of the spectrum, the design elements may be simplified and reduced down to forms resembling essential building blocks. Often for a designer it is better to build up from first principles; to try ideas with the simplest structures before trying out more complex structures. The methodology for a very complex project might be revealed by first attempting a very simple version. In the case of interactive narrative, this might mean attempting to identify solutions from simple interface or structural concepts, as opposed to those existing strategies based on increasing a project’s complexity through saturation of simulation and immersion.

INCREASING USAGE OF AND NEED FOR INTERACTIVE INTERFACES IN NON-IMMERSIVE CONTEXTS

Interactive interfaces are likely to continue to become more prevalent in everyday life as technology continues to develop. Cinematic or televisual spaces for viewing (both narrative and non-narrative) and interactive GUIs (Graphic User Interface) are very likely to continue to merge.

The low-interactivity end of the spectrum is an appropriate area in which to explore relevant design issues, especially as they relate to interfaces. High-interactivity and increased user immersion are not necessarily always the only solutions for increasing usability, and in some contexts, may add complexity where it is counter-productive.

At the time of writing in 2011, it has been interesting to note that consumer interest in the Apple Mac products iPhone and iPad and similar handheld devices has recently revived commercial interest in designing more simple and more intuitive interfaces, mostly within customised software applications (called “apps” for short). To date the apps have mostly been simple puzzles or games, and have yet to really engage with the problem of interactive narrative, but the nature of the interfaces is already markedly simpler than those to be found in console-based computer games, web pages, or computer software.
For example, a 2010 web article called “Useful Design Tips For Your iPad App” summarises its advice as “Minimalism works best on iPad”.

With robust, portable, location-aware devices like the iPad, the temptation is to throw in everything and the kitchen sink. If you’re an iPhone developer, you’re probably excited about the additional screen real estate. Resist the temptation to fill the space! Keep it simple. Display only the content and controls that are relevant to the user at that moment.\(^{18}\)

AESTHETICS

Interactive narrative projects at the low-interactivity end of the spectrum allow for a different kind of narrative style to those at the high-interactivité end. As we have seen, immersive simulation has been particularly applied to combat and action narratives, which includes highly stimulating and aggressive content. The low-interactivity end permits a designer a different kind of pace and tone - slower, subtler, less aggressive.

There are some cases of low-interactivity narrative products already available for the iPhone which are designed with a more leisurely user in mind. Japanese produced interactive novel/mangas in the soap-opera genre, such as “Kira Kira”\(^ {19}\) are one example of this. These products are essentially comics for reading, but with minimal interactive elements included. The minimal interactivity is used for aesthetic ends; to create small self-contained narrative moments within the larger narrative.

It should also be noted that the low-interactivity end of the spectrum is also the low-budget end, where a designer has considerably more freedom to remain independent and experiment than, say, the designer of a mass-market computer game, which carries heavy market expectations.

ON A PREVIOUS PROJECT: TESTIMONY: A STORY MACHINE

This research project is also proposed to continue and expand on research begun by the author in a previous project, which was also created at the non-immersive low-interactivity end of the low/high interactivity spectrum. A brief synopsis of that project may be useful here.

Testimony: A Story Machine is a web-based interactive animated comic strip, created in 2002. (see Fig. 1 below)

It won the MEGABITE Digital Film Project at NextWave Festival 2002 in Melbourne Australia, the New Talent Competition at MILIA 2002 in Cannes, France, and Best Internet Short at I Castelli Animati International Animated Film Festival 2002 in Rome, Italy. It was also included in the book "Macromedia Flash Interface Design - A Macromedia Showcase: 12 Effective Interfaces and Why They Work".

Fig 1. Screen grab from Testimony: A Story Machine (2002) by Simon Norton online at www.myballoonhead.com/storymach

Testimony: A Story Machine presents a newspaper style comic strip in a sequence of panels, shown in a web page. The user can click the panels using the mouse, and the

clicks produce simple random permutations of the set content, which includes cartoon still images, animated scenes, text and sound.
The form and the underlying structure have been kept very simple. There is no complicated procedural calculation from the computer. The programming is mostly showing elements at random in response to the user’s clicks.
The narrative content was originally based around the theme of a trial (hence the title). This proved too rigid and was discarded in favour of a looser murder mystery theme, in order to design material for multiple contexts. (Murray has commented on this tendency among designers to use mystery or crime-solving genres as a structure for interactive narrative, calling it the “violence-hub” approach.\(^\text{21}\))
The resulting product has some degree of success: it does indeed create some successful and varied narratives. It also produces many nonsensical narratives. Depending on how tolerant the user is of nonsense or the absurd, this can be seen as a degree of failure in the product.
Another interesting quality noted by the author was that users would often prefer to keep clicking, rather than stopping to read the sequences of still images being created. Also interesting was that this was seemingly less likely to happen when the user was engaged by animated images.
The author also noted that some users expressed disappointment upon learning that the underlying structure was not involved in any elaborate “process-intensive” calculation. Interestingly, these users were not dissatisfied with the simple structure’s effects, \textit{before} they learned of its true simplicity. This observation is relevant to considerations of whether the user should be aware of an interactive narrative’s underlying structure.
The author’s conclusions were that:
In creating interactive narrative, the author’s control over the nature of the narrative content is clearly crucial, but refinement of the underlying structure seems likely to be the best method of refining the product in accord with author’s aims: to reduce the nonsensical narratives, and create a more cohesive longer-form version of interactively generated narrative.

\(^{21}\) p. 136, Murray, op cit.
ON EXISTING THEORETICAL MODELS FOR INTERACTIVE DESIGN

The creation of interactive narrative often depends on models, flowcharts and diagrams of navigation to achieve a more readily interpretable and coherent outcome. Chris Crawford identifies the main models in his book “The Art of Interactive Design”. These models are “storytrees”, and are forms of linear tree diagram in which the tree has branching points at which the user might choose one of several directions. Such models are similar in structure to the 1980s “Choose-your-own-adventure” publishing fad. Crawford also describes the “linkmesh” model (see Fig. 2 below), in which many nodes on the “storytree” connect to many other nodes, thus removing, or at least reducing, the limits of linearity.

![Diagram of a linkmesh flowchart](https://via.placeholder.com/150)

Fig 2. – Chris Crawford’s example of a “linkmesh” flowchart

There are also some existing models for the sequence of production in creating interactive narrative. One of these models is the concept of “Structure Before Story”; in other words, using the process of designing the underlying structure to lead into conclusions about exactly what kind of narrative content to use. This concept has been developed and championed particularly as a reaction to the failure of many interactive narrative projects in which the author has attempted to “tack on” interactivity to existing non-interactive narrative content.

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ON ANIMATION AS AN APPPOSITE MEDIUM FOR INTERACTIVE NARRATIVE

Noting that the users of the Testimony: A Story Machine project were often more engaged by animated images led to the idea that more prioritisation of moving imagery and filmic space might be useful in designing interactive narrative projects. The medium of animation is in a unique position to be useful for the problem of integrating narrative content with interface design. Animation has an inbuilt ability to find common ground between these two seemingly antipathetic media, in that it is already used both by narrative storytellers and by interface designers. Animation may well prove to be better suited than other media (such as, say, live-action film, or text) to integrate interactive items into narrative content. Animation already leads the viewer some way towards accepting unnaturally stylised images and movements as meaningful content, meaning that the introduction of unnaturally stylised images for the purposes of interactive interface may be less jarring for users of interactive narrative animation.

Animation also has the benefit of being a very tightly controlled medium. In a live-action film, a lot of extraneous detail is often recorded automatically in any scene, often necessitating much care with avoiding continuity errors to achieve the director’s aims. The animator arguably has more control over working methods to reduce this kind of extra information at will, through design.

Perhaps a side note is also in order on the apparently different aims of 3D Animation (CGI, or Computer Generated Imagery) and traditional hand-drawn 2D animation. Although 3D animation as a medium is capable of stylisation, to date 3D animation has often been employed to achieve the aims of immersive simulation and hyper-realism. (The examples of “first-person shooter” video games cited above are all generated using hyper-realistic 3D animation.) 2D animation as a practice has an arguably greater variation of established precedents for different styles, and arguably has more potential to be integrated with the stylisation and iconography found in already established conventions of interface design.

ON EXISTING FILM-BASED MODELS FOR ANIMATED NARRATIVE CINEMA

The medium of animation is predicated on filmic structures and conventions. This would suggest that theoretical models for narrative cinema are to be of potential use in
this research project. These theoretical models already exist in forms such as, for example:

- editing conventions – for example, the convention of the over-the-shoulder format for showing conversations, or the use of master shots punctuated by closeups to keep the viewer oriented in space.

- editing theory – for example the famous montage theories as developed by Eisenstein, Kuleshov, et al.

This film-language-derived approach has been disparaged by some interactivity theorists such as Crawford, due to its seemingly being focused too much on content instead of process. Yet there are others who disagree that film language has nothing to add. For example, the interactive artist Grahame Weinbren has commented:

In my judgment, the most immediately available techniques can be found in the language of montage. A deliberate use of film editing strategies can keep reconvincing the viewer of the non-arbitrariness of connection between old and new elements, between the elements already there and those produced by viewer action.23

ON THE ADAPTATION OF THE TOOLS AND METHODS FOR THE CREATION OF INTERACTIVE NARRATIVE

To create a new interactive narrative project which addressed the perceived shortfalls as seen in the creation of the Testimony: A Story Machine project requires an adjustment of the tools and methods used to create the work. This poses the questions - how could the toolset for creating interactive narrative be expanded, to:

1 – offer the author better control of the narrative via the underlying structure
2 – develop a less static, more filmic space using moving imagery for the narrative

23 p 380, Lunenfeld, op ci.
THE RESEARCH QUESTIONS:

The exact research questions for this project can therefore be formulated as follows:

1. What kinds of theoretical models from film editing theory and from interactive design and navigation theory are useful for authoring interactive narrative animation?

2. What kinds of stories can be told using these models?

DESIGN OF WORK:

DESCRIPTION

This project will explore methods of creating narrative in the medium of interactive animation. As a medium, interactive animation has only come into existence relatively recently, and the theories specifically on methods of creating interactive narrative advanced by theorists such as Crawford, Murray, Meadows and Juul are works in progress. They are naturally based on some borrowing of theory developed for earlier media, but have yet to coalesce into a history of confirmed practice. Taken together they create a picture in which there are some broad overall guidelines for current practitioners (such as the use of flowcharts, storyboards, etc), but also much that is contradictory and nascent. For this reason, the primary research strategy adopted here is to apply to these broad guidelines a heuristic methodology based on a reiterative testing process; in other words, to discover by making.

Heuristics as a methodology aims at discovery through trial and error. Rather than exploring a hypothesis based on cause and effect, the heuristic method is the attempt to find patterns by making something while looking at it from multiple angles. This is a particularly apposite method for examining the subject of interactive storytelling, which is very much concerned with ideas of multiple viewpoints.
In this project the heuristic method is applied specifically to a core idea of combining two perspectives on structure. These two perspectives are:

- the presentation and exposition of the animated narrative is filmic
- the underlying base structure for creating narrative sequences is non-linear and interactive

In order to see the nature of the combination of these concepts as clearly as possible, the heuristic method is here applied to attempting to find the simplest, most minimal solutions first. In this way, a base concept might be found which could then point the way to those directions in which a designer might fruitfully attempt greater complexity. This attempt to find simple or minimal solutions applies therefore to the handling of both concepts; to the filmic presentation of narrative animation, and to the creation of non-linear underlying structural models.

In addition to being non-linear and interactive, the structure should offer the author at least some control over the nature of the narrative sequences it produces, rather than a non-linear structure which generates purely random sequences. This criterion, and the previous criterion of initially creating the simplest possible solutions, both reinforce this project’s initial positions along the two theoretical spectra of interactivity (as discussed above in the introduction).

- On the first theoretical spectrum of user behaviour from active to passive, this project begins by anticipating its users being closer to the passive end. The user’s focus is intended to be primarily on watching narrative animation. This means this project will attempt to create interactive animated narrative in which the user’s awareness and use of interactivity is intended to be minimal and unobtrusive.

- On the second theoretical spectrum of interface design from immersive simulation to non-immersive non-simulation, this project begins by proposing to design an interface which would be placed closer to the non-immersive end. The aim is again to imagine the user as closer to being a viewer than a participant. This leaning away from immersion means the project attempts also to create interactive animated narrative by eschewing design strategies which are hyper-realistic or simulation-like.

The means designed to achieve these aims is a process which begins with the design of structures, before attempting any design of narrative content. This process begins with theoretical structural models, progressively leading up to the creation of fully animated prototypes of interactive narrative animation.
The narrative content in this process will be treated as temporary until the problems of structure have been explored. This means that initially the narrative content will be a kind of “placeholder” narrative, intended for replacement by more appropriate content later in the process, ideally after experiments with the structure have made it more apparent what kind of narrative content might be most appropriate.

Yet – some initial criteria for narrative content are suggested by the move away from procedural-based interactivity and towards the expectation of a user being closer to being a passive watcher. Therefore the initial narrative content will be fixed rather than dynamic, to reduce interactivity to a base level. The interactive variations are initially only to be in the narrative content’s presentation, not its constitution.

The initial toolset for the process will therefore be comprised of theoretical structural models for the creation of underlying sequence structure. These models are derived from interactive design practice, such as flowcharts and interface design concepts, and also from narrative animation filmmaking, such as storyboards and the division of time-based material into shots.

The process is intended to be reiterative; the steps will be repeated and the results adjusted as the prototypes are developed.

DESIGN OF WORK

OVERALL DESIGN PROCESS

Step 1 - Designing structure with the aid of theoretical models
Step 2 - Designing presentation, visual style and animation style
Step 3 - Designing interactivity and interface
Step 4 - Designing narrative content (Initially as “placeholder” narrative)
Step 5 - Analysis – identifying potential adjustments
Step 6 – Return to Step 1 and repeat the process – making adjustments as steps are repeated, with emphasis on progressing from pre-production structure models to physical prototypes
RESULTS:

THE CREATION OF PROTOTYPES

1. - First Prototype: Spherical Foldback Flowchart Theoretical Model:
2. - Second Prototype: Three Ring Foldback Flowchart Theoretical Model:
3. - First Interactive Animation Prototype (Conversation):
4. - Second Interactive Animation Prototype (Eyelines):
5. - Third Interactive Animation Prototype (Therapy: Sketches And Designs):

1. - First Prototype: Spherical Foldback Flowchart Theoretical Model:

1.1. - Initial Criteria

In designing a first theoretical model of an underlying structure for interactivity, the initial criteria were

- it should be non-linear and permit many permutations of sequence
- it should have the potential for at least some control by the author over the nature of the sequences it produces, rather than generating purely random sequences.

1.2. - The Prototype

In Crawford’s shortlist of flowchart structures for the interactive designer\(^\text{24}\), he describes how any branching flowchart can become unwieldy for the designer. As each branch splits into two or more branches, the possible directions soon become exponentially enormous.

The simplest solution to this problem is named a “foldback” model by Crawford; meaning that the branches of the flowchart “fold back” and loop back to an earlier section in some way. If all the branches fold back, then the flowchart does indeed create a finite world with potentially infinite permutation within it.

The first theoretical model designed to meet these initial criteria was a spherically shaped flowchart on the “foldback” model. (see figs. 3 and 4 below)
This flowchart is divided into 180 discrete triangular spaces. Any path followed through the triangular spaces on the sphere will never have to lead to any definitive end. The model therefore presents a structure for a world which is endlessly navigable, yet contained. Such models have precedents of use in map-making. A good example is the Dymaxion map patented by Buckminster Fuller in 1946, which shows the world projected on to a twenty-sided icosahedron. One of Fuller’s intentions was to show the world from different perspectives, with different aspects of the world emphasised depending on how the user unfolded the map.

By rearranging the triangles, with the South Pole at the center of the map, navigation routes by sea become readily apparent, just as air routes across the North Pole are obvious in the original configuration. Fuller explored more than 25 different useful configurations of the Dymaxion Air-Ocean World Map.25

However, Fuller’s use of the model remained geographic and based on space, rather than as a flowchart representing a user’s progress through a process.

Although the flowchart chosen for this project permits many non-linear paths for the user to move through its triangular spaces, the structure may also be used to limit the user to progress only to one of three adjoining spaces from any one space. The structure therefore offers the designer a means by which to write discrete pieces of content which need only take into account three short-term contexts, as opposed to several hundred or more contexts in a structure of random sequencing. Thus this model satisfied one of the key initial criteria; it provided some control for the author, but still within a structure which permits the user many permutations.

The discrete spaces on the model can be used to represent visible pieces of content experienced by the user in sequence, such as for example, screens, images, or discrete shots of footage. However, rather than only being used to represent pieces of visible content, these discrete spaces on the model might also be used to represent other types of concept in sequence, such as character, moods, physical space, or time.

1.3. - On Structure

Looping And Repetition Of Content

There are six directly looping linear paths through the triangular spaces on the spherical form, each path meeting every other path exactly twice. To a user following these straight paths around the spherical model, the corresponding narratives would therefore be looping narratives; meeting themselves at their own beginning in endless cycles, and intersecting the other looping narratives along the way.

Crawford describes this looping quality of the “foldback” model as having a major drawback in that it is “repetitive”; the assumption being that such repetition of content is automatically problematic for satisfactory creative effects.

However, critical investigations of repetition and looping in narrative have already suggested that this need not always be the case. In “Telling It Again and Again: Repetition In Literature and Film”, Bruce Kawin explores the various creative strategies afforded to the writer of narrative by techniques using repetition. Kawin makes the case that repetition can be used in storytelling to create effects such as order, rhythm, irony, comedy.

Kawin points to the work of writers such as Proust, Stein, Beckett and Faulkner. Kawin makes the case that

(Repetition) can lock us into the compulsive insatiability of neurosis, or free us into the spontaneity of the present tense; it can strengthen an impression, create a rhythm, flash us back, or start us over; it can take us out of time completely.\textsuperscript{26}

\textsuperscript{26} p. 5, Kawin, Bruce F 1972, \textit{Telling It Again And Again: Repetition In Literature And Film}, Cornell University Press, London.
In a novel actually entitled Repetition (2001), the nouveau roman author Alain Robbe-Grillet even defends the technique of repetition as a means of getting closer to objective reality. In the frontispiece, the author comments:

And I don’t want to be bothered with eternal complaints about inexact or contradictory details. This report is concerned with objective reality, not some so-called historical truth.\(^{27}\)

For Robbe-Grillet, to meet the same material twice is a deliberate aesthetic strategy to get closer to a picture of reality. Even if that picture turns out to be ultimately contradictory, that is also a deliberate and valid form, rather than being necessarily due to indifference or lack of care on the part of the author. Therefore, despite criticisms of looping flowchart models, there are precedents to argue that although the need for repetition created by this particular structural model is necessarily a restrictive limit for the author creating narrative content, those restrictions are arguably not necessarily detrimental to narrative itself.

1.4. - On Structure

Potential Applications Of Content

- The initial key decisions made in pursuit of finding the simplest method of applying ideas for interface and narrative content to this structure were as follows:

- The use of fixed rather than dynamic content. This was the result of trying to find the simplest method of applying the filmic presentation and exposition of narrative to the structure. Therefore the discrete triangular spaces on the flowchart model were treated as each representing discrete shots of animated footage, rather than as, say, triggered images superimposing on a single screen. The use of discrete shots created a conceptual match between the separateness of the spaces on the model to the separateness of shots in a film.

The use of the six direct linear paths around the sphere as each holding the content of an independent looping narrative, all of which intersect. The alternative to this would be to attempt planning content for narrative sequences along twisting non-linear paths through the triangular spaces on the sphere. This would add much complexity to the task of writing content, without any obvious corresponding potential benefits gained in narrative complexity, and with considerable loss of author control. The creation of simple linear narratives which can then be variously navigated offers complexity generated by the mere application of the narrative content to the structure, which when navigated in non-linear paths automatically creates new resulting sequences for the user.

1.5. - On The Application Of Interface Design To Structure

- The use of the intersection points between the triangular spaces as not only cuts between shots of animated footage, but also as the moments of choice for the user, and therefore points at which some kind of interface response would be offered to the user. This decision was intended to satisfy the initial design criterion of offering the user primarily the more passive experience of a viewer, who is also offered but a minimal amount of interactivity. The proposed technique was intended to remove interactivity from the shot itself and place it in the moment of editing between shots.

1.6. – Developing The Design Process

Devising some specific initial content with which to test this model presented the problem of finding an appropriate method of visualising and designing the content to fit inside the theoretical model. The work proceeded initially with the use of traditional tools from animation production, such as character design sheets and storyboards. These sketches were notated with numbers corresponding to the spaces on the theoretical model. (see fig 5. below)
1.7. – On Narrative Content

At this stage in the project the narrative content was conceived as only preliminary “placeholder” narrative for the purpose of testing. Narrative content for this prototype was initially conceived by making each path on the structural model represent a single character in time, thus suggesting an overall story about six characters who all meet each other. Their stories should also relate somehow to a lack of finality, suggested by the endlessly looping nature of the paths. At this stage, other ideas occurred about the possibilities of distinct contrasts between the forms of the paths themselves, so that a user navigating from path to path might be more conscious of how the act of navigating is putting the content into new contexts. For example, one path might depict its events in a single shot, while another path depicts its events using cuts. Navigating in and out of these paths at different junction points could thus vary the form as well as the content. However, these ideas were set aside at this point in the project, as for the author they both added complexity and reduced control.
In pursuit of the initial design criterion of a user who is more of a passive viewer, it was intended to have a default position in which the footage kept playing in a sequence corresponding to a linear path on the structure even if the user did nothing, rather than waiting for user input. This arguably made the linear looping sequences more likely to be seen by users in their entirety, thus making it more important that in the design of content the six characters should each do things which make narrative sense when seen in an independent endless loop.

For this model, each of the six looping paths met every other looping path twice each. This meant that the written narrative for any one path not only had to loop itself but also had to have ten points at which it intersected the other five looping linear path narratives. Applying this to six characters immediately proved very complicated, and attempts at creating miniature storyboards in sketch form soon suggested that the structure should perhaps be re-examined to determine if it could be further simplified. However, before this step was made, some further research was done into precedents for writing narrative content within limiting constraints.

1.8. – On Narrative Content

Precedents For Writing Within Constraints

The spherical flowchart model’s structure of multiple intersecting paths was suggestive of limits which might be used by the designer to work with or against when writing narrative content. On this spherical flowchart model, the structure is combinatorial. For example, if any one of the paths around the sphere has been filled in with pieces of narrative content for each space, then any path intersecting it will have content already filled in on those intersection spaces. Content generated for that second path must therefore “fit in” between that content already filled in – forcing the author to write a kind of narrative link. As more content is filled in, the remaining spaces are more and more constrained by the content filled in around them, and more ingenuity is required of the author to create narrative connections. Ultimately the user moving through the different possible paths through the narrative content will create multiple combinations of this narrative content.
Writing within structural constraints does have historical precedents. Combinatorial structures have been used by writers of novels, such as Italo Calvino in writing The Castle of Crossed Destinies (which used a lattice of randomly laid tarot cards as its underlying structure) and George Perec in writing Life: A User’s Manual (which used a complicated mathematical table as its underlying structure). Both writers were members of the group of writers Ouvroir de Littérature Potentielle (“Workshop of Potential Literature”), known as Oulipo for short.

The Oulipo group of writers is a notable case of organised research into the idea of writing within constraining limits. These writers used a variety of techniques to constrain writing, generally as a means of triggering inspiration. Most of these constraints were based on mathematical or linguistic structures. For example, one of the most famous results was Perec’s lipogram novel, “A Void”, written using the constraint of never using the letter “e”. When an acquaintance commented to him that such seemingly rigid techniques seemed antipathetic to writing good stories, Perec replied:

> There are two ways of getting water. You can go to the spring and bring it back in buckets; or you can lay down pipework and pumps to make it play before your eyes. It’s the same water either way.²⁸

There is a strong similarity between the intersecting paths on this project’s spherical flowchart model, and some of the structures underlying projects by Oulipo authors, particularly Calvino’s The Castle of Crossed Destinies. Calvino’s underlying structural model created from tarot cards is published in the book as an appendix (see fig. 6 below), with an accompanying explanation.

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Calvino’s explanation of how his structure worked is remarkably similar to my imagined potentials for the spherical flowchart model:

...each story runs into another story, and as one guest is advancing his strip, another, from the other end, advances in the opposite direction, because the stories told from left to right or from bottom to top can also be read from right to left or from top to bottom, and vice versa, bearing in mind that the same cards, presented in a different order, often change their meaning, and the same tarot is used at the same time by narrators who set forth from the four cardinal points.  

Fig 6. The tarot card based model printed in the appendix to Italo Calvino’s The Castle of Crossed Destinies (1969)

Of particular interest for this research project was this idea of the same piece of content changing its meaning for the user as it is experienced within a different order. This approach is in marked opposition to theories of interactivity design that define unchanging (non-procedural) material within interactive projects as inevitably leading to dull and inferior results compared to procedurally based interactive projects. However, the Oulipo group generally insisted on the nature of the limits imposed being totally arbitrary. In this project, the constraints are not intended to be arbitrary; they are rather intended to give the author some control over multiple reconfigurations of set material, and to inform the nature of the narrative content. This major difference suggested that these precedents set by the Oulipo group might not prove to yield much of further use as guidelines for this project in the creation of narrative content.

1.9. – Prototype Results

Problems With Structure

The ultimate result of this first prototype flowchart model was that, even with the task broken down into simple looping paths, the writing of narrative content did remain inhibited by the structure itself. This was seemingly due to the over-complexity of the number of shots and intersections, rather than the fact that the narratives were required to be looping. It was the consciousness that any piece of content had to fit in to so many potential narrative paths that caused a second-guessing effect whenever any sequence was under construction. At this point, this seemed to be purely a structural issue; the conclusion was that if the structure were to be simplified further, ideally as greatly as possible, perhaps this might yield some insights into exactly how complex the structure should be, and what form more complexity should take.
2. - Second Prototype: Three Ring Foldback Flowchart Theoretical Model:

2.1. - Initial Criteria

The initial criteria for the adjusted theoretical model of an underlying structure for interactivity was that it should:

- Retain a structure which permits infinite variations of sequence, with greater control for the designer than generation of complete randomness
- Reduce this structure to the minimal number of spaces and paths possible

2.2. - The Prototype

The theoretical model designed to meet these new criteria was a three-ringed flowchart, again on the “foldback” model. (see figs. 7 and 8 below)

Fig 7. The second theoretical model as a three-dimensional paper model
Fig 8. The second theoretical model as a flat flowchart prepared for printing

This model reduced the complexity of the first theoretical model from 180 spaces and six intersecting looping paths on a spherically formed flowchart, down to 24 spaces and three intersecting looping paths on an interlocking ring flowchart.

Several concepts and approaches were carried over from those devised for the previous model:
- to treat the discrete spaces on the model as representing discrete shots of animated footage in a limited and stylised form of animation
- to treat the intersection points between the spaces on the model as not only cuts, but also points at which some kind of interface would be offered to the user.
2.3. - On Structure

Potential Applications Of Content

In the design of content, a question for this prototype was whether to continue to treat the direct linear looping paths (now reduced from six to three) as each representing a separate character, meaning that the narratives of three characters would intersect, or to attempt further simplification by taking a different approach, such as using the looping paths to represent different facets of one single character.

Rough ideas were developed for uses of the three paths which would show three different times of life for one character: Youth, Middle Age, and Old Age.

The navigating user would find that switching from path to path could create flashbacks or flashforwards, or imaginings of the future. Another idea was that the three rings could represent three types of behaviour of one character, and navigation from path to path might make variations in the consistency of that character’s personality.

One concern which emerged in the project now related to narrative content relative to the structural model; this was to avoid limiting the uses of the model to the representation of physical space to be walked along. Instead of this, there were more potentially rich applications for the model as conceptual space rather than literal space, such as, for example, using it to represent time. For example, one ring could represent a sequence depicting a looping ritual of a few minutes, but another ring represents a cycle of several days or months. The navigating user might get narrative meaning out of changing paths, for example finding that a character is still performing some kind of ritual action, even after several months have passed in the narrative.
A rough narrative was then developed following this idea of trying to write so that the user’s potential navigations themselves might elicit story meanings. In this proposed “Snowstorm” narrative, there were two characters. One is in a cabin and one is buried up to his neck in snow. One idea was that the user might perceive that the character in the cabin becomes “crueler” the longer he remains on a path in which he hesitates before going to help the second character out in the snow. (see Figs 9 and 10 below)

fig 9. example of sketchbook page from development of second theoretical model (see also accompanying website section 2.1)
fig 10. example of sketchbook page from development of second theoretical model (see also accompanying website section 2.1)

This idea of a kind of cross-cutting editing being inserted by the user’s navigation from ring to ring suggested further potential ideas, such as:

- to use one path to tell a story in dialogue contrasted with another path on which story was told using pantomime.
- to contrast narrative stasis on one path with another path on which there is a palpable rise and fall of a story.

These “style changes” might even be used to give feedback to the user about where he or she is in the overall story.

Yet; an important initial criterion in designing content was to begin with the simplest possible application to the model, at least in the initial prototypes. A decision made in the pursuit of this simplicity was to eliminate the possibility of the user being permitted to navigate in both directions along any one path.
Navigating in both directions necessitates palindromic ideas for content, and some early attempts to draw and write palindromic sequences of narrative and dialogue were much too complex. It was therefore decided to limit the user into travelling in one direction only on each path, in effect making each path “one way”.

Another idea also adopted now to make the devising of content simpler was to no longer insist on any one space on the theoretical model representing precisely one single shot of footage, rather allowing the space on the model to represent a short sequence including several shots if need be.

2.4. – Developing The Design Process

By this stage of the research project, a process for developing content had developed in the sketchbooks. This process was an improvised mixture of drawing, writing, diagrams, storyboarding and notes on editing the process itself as it developed. Usually there was first a kind of sketch or sequence of code as a diagram (see fig 11. below) representing a proposed use of the structural model, and intended to help the author when sketching sequences to be aware of a short-term narrative context but not necessarily the larger narrative contexts of longer combinatorial strings of sequence.
fig 11. example of sketchbook page from development of second theoretical model (see also accompanying website section 2.1)

Storyboards were then used to create test narratives, using the diagrammatic sketches and codes of the model as a loose structure. Character design sketches also remained part of the process of developing potential content. (see fig. 12 below)
2.5. – On Narrative Content

As sketches progressed, the use of the model’s paths as each representing a separate character proved easiest to conceive of, and would therefore serve as the simplest starting point for the next prototype. More specifically the prototype would have 3 characters, 18 shots, 6 meetings, and one direction along each path (i.e. not palindromic). There were subsequently several sketch ideas created based on three characters, such as a Boss and two Employees in an office, and a Chef, a Waiter, and a Patron at a restaurant. (see fig. 13 below)
The trio of characters eventually selected as the most promising was that including a Doctor, a Cop, and a Criminal, although the exact roles were intended to not necessarily remain sharply defined.

2.6. – Prototype Results

Problems With Structure Provisionally Resolved

The ultimate result of this second prototype flowchart model was that the writing of narrative content was now developing with more ease compared to the first prototype, leading into the creation and design of characters and content for a potential narrative about a series of meetings.
3. - First Interactive Animation Prototype (Conversation):

3.1. – Initial Criteria

The first interactive animation prototype, (“Conversation”) was based on the second foldback flowchart theoretical model; the flowchart model in the shape of three rings (see fig above)

The initial criteria for this first interactive animation prototype were that it should:

- Attempt to minimise interactivity and narrative as far as possible using this model, on the theory that this practice may then show in which direction to attempt more complexity

- Use the intersection points between spaces on the underlying flowchart model to correspond to moments in the prototype where the user is to be offered some kind of simple interactive choice.

3.2. – The Prototype

The prototype developed to meet these initial criteria is an interactive animation suitable for distribution via a web page. It depicts three characters conversing, and the user may choose which character to follow to the next shot by clicking on that character.

(see fig. 14 below)
3.3. – On Structure

Potential Applications Of Content

Interface Design

Considering the initial criteria led immediately to the development of some initial decisions about the potential interface design. One of these interface design decisions was about whether there was any benefit to the user being aware of the underlying structure or not, and possibly even able to see the structure as a form of feedback or interface. This issue had a strong analogy to issues already faced by the Oulipo writers in creating their novels, as referred to above.
There was some disagreement within the Oulipo group as to whether the author should *reveal* an underlying structure or constraint to the reader, which would effectively make the structure become part of the narrative. Calvino was among those who believed that there was no reason not to show the underlying structure; hence the inclusion of the structural model in the appendix to The Castle of Crossed Destinies (see fig. above).

The writer and Oulipo member Harry Mathews was of the opinion that the structure or constraint should *not* be shown to the reader, likening it to scaffolding that is removed after building a house.\(^{30}\)

For this project the provisional decision was made that the user should *not see* the underlying model. Although this three-ring flowchart model could plausibly be presented visibly on screen as a form of navigation feedback for the user, or even used as part of an interface, at this stage it was decided that in such cases the designer would be prioritising the use of the model as representing physical space only, and would therefore be needlessly limiting the potential uses of the structure.

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3.4. – Developing The Design Process

The process of designing and developing ideas for the interface had by now developed further into the use of diagrammatic sketches, which were a kind of hybrid of diagram, codes, storyboards, and even floor plans. (see figs 15 and 16 below)

fig 15. example of sketchbook page from development of first interactive animated prototype (see also accompanying website section 3.2)
The proposed animated footage was conceived as being in a limited and stylised form of animation, both as a potential means of integrating the footage more seamlessly into an interface, and additionally of keeping production demands more practically achievable.

3.5. – On Interface Design

Regarding interface design, the aim was to integrate any interactive interface directly into the content on the screen, rather than to have any separate menu or navbar placed to the side, top, or bottom of the screen like a control panel. Instead, the content itself would be the interactive element.
This decision was intended to maintain the user’s proposed position closer to the passive end on the active/passive spectrum of user behaviour, offering the user a minimal amount of interactivity. Thus the interface would be created to be ideally as non-distracting as possible for the user, maintaining priority for the filmic presentation and exposition of narrative animation.

The decision was also made to use the conventions and limitations of the ordinary home computer interface, particularly as used on the web. This meant customising the interface design to be appropriate for mouse-based clicking, sweeping, hotspots and the like. This decision was made with the intention of potentially facilitating less resistance or confusion in users by harnessing their already acquired knowledge of interface conventions, although ideally the design should also be intuitive to use for any users without a history of using home computers.

The resulting interface design sketches were based on the previous sketches of the three characters Doctor, Cop and Criminal. This interface was designed to be available to the user only when two of the characters meet, and then to allow the user to choose which of the characters to follow to the next shot. The shots in between meetings were to always be designed as one character onscreen alone, in which the prototype would not be interactive.

To create this interface concept, the onscreen characters were to be designed to be themselves selectable (or “clickable”), and to give feedback to the user on which of the characters was currently selected. The feedback to the user was to be created by making the characters colour coded, and designing different colour states for each character (more intense for selected, more lightened for unselected).

If the user did not make any choice about which character to follow, then the prototype would continue to the next shot after a set time-out, continuing to follow the last selected character. This was designed in accordance with the key initial design criterion of attempting the least amount of interactivity; in effect aiming for a film experience which happens to be occasionally interactively “nudgable” by the user.
This interface design concept was tested first with no character designs or narrative content at all, by using nothing more than coloured circular buttons and numbered shots (see fig 17 below).

![Fig 17. Screen grab of interface design test from development of first interactive animated prototype](image)

(see also accompanying website section 3.1)

This was then followed by the first button tests for switching between colour-coded characters. (see fig 18 below).

![Fig 18. Screen grab of interface design test from development of first interactive animated prototype](image)

(see also accompanying website section 3.1)
This test also introduced the idea of using the animation technique of an animated "boil" (loop of three or more drawings to make the character vibrate) to dispel the sense of the image becoming static.

3.6. – On Narrative Content

This prototype next required the writing and designing of specific narrative content. In this process, it was recognised that the spaces on the flowchart model need not only be used to represent physical space. ie. A change from one space to another can represent the idea of the user progressing from shot to shot, rather than the idea of the character moving from place to place along a physical model of interlocking rings.

Therefore – In the sequence developed for this prototype, although the red and the purple characters must both walk and physically change location to meet the other characters, the green character never walks or changes physical location; the other characters come to him. The spaces on the green character's ring represent his events in temporal sequence, but he does not physically change location.

An initial graphic idea for meetings had been to use the medium of animation to show the characters climbing out of each other when they meet, as if one character’s substance were another character’s negative space. or was standing inside another character. (see fig 19 below.) However, this initial idea was soon abandoned for not meeting the key criterion of beginning with simplicity.
fig 19. Screen grab of character test from development of first interactive animated prototype (see also accompanying website section 3.1)

The simpler graphic method of having characters meet and interact which was selected was from film editing structure – the use of the film convention of shooting conversations in over-the-shoulder shots (see fig 20 below)

fig. 20. over-the-shoulder method of shooting two characters from Grammar of the Film Language by Daniel Arijon\textsuperscript{31}

\textsuperscript{31} p. 51, Arijon, Daniel 1976, Grammar of the Film Language, Silman-James Press, Los Angeles.
At the points on the structural model where the characters meet, this editing format shows the characters conversing, during which the user is permitted to choose to continue following one character, or to switch to following the other character, thereby switching rings on the underlying structural model. Dialogue can be used to attempt to keep the animated action initially reduced to a minimum, while not sacrificing content. However, the narrative at this stage of the project was still conceived of as temporary placeholder narrative, meaning that the dialogue was written onscreen as loosely suggestive fragments of text. It was intended that these would likely be replaced by recorded sound with animated lipsync in any finished version. This also introduced a further idea of the possible use of changes of voiceover performer as feedback for the user to know which character he or she is currently following.

3.7. – Prototype Results

The resulting prototype’s structure was satisfactory; the prototype did provide infinite combinations of limited content. The problems in the prototype were in the interface design and the provisional narrative content.

3.7.1. – Problems With Interface Design

The interface design for this prototype was problematic, particularly insofar as it allowed the user the potential distraction of clicking the characters back and forth into positions without any narrative information gained in the process. In interface design theory, this relates to the idea of the designer attempting to match what the user wants to do to what the user can conceive of doing. In other words, in this prototype the design should either provide something relevant when the user clicks the characters back and forth, or the design should not permit the user to do that action. Ideally, the design should make it unlikely or impossible that the user could conceive or want to do that action.
3.7.2. – Problems With Narrative Content

The narrative content for this prototype was also unsatisfactory; however, given that the content was only provisional, this was an issue that was put aside until interface design issues had been further resolved.

One problem noted at this stage however, was that writing or designing narrative content which connected multiple characters who were moving in a fictional physical space within the constraints of this structural model was already showing the potential to lead the designer into writing forced and dramatically awkward content. In particular, devising shots in which the characters are constantly arriving or leaving their meetings was confining the action and the editing to very limited physical locations. This suggested a reevaluation of the initial conception of what was initially conceived as the simplest approach to applying narrative content to the model, which was that using multiple characters who all physically meet and separate.
4. - Second Interactive Animation Prototype (Eyelines):

4.1. – Initial Criteria

The second interactive animation prototype, (“Eyelines”), was again based on the second foldback flowchart theoretical model, which is the flowchart model in the shape of three rings (see fig above).

The initial criteria for this second interactive animation prototype were similar to the previous interactive animation prototype, but with the following adjustments;

- The interface design should be adjusted so that the user’s experience of interacting with the interface does not become disconnected from the potential narrative or narratives.

- The narrative content should be adjusted if possible to reduce the designer’s forced writing to physically connect multiple characters

- The design of shots to convey the narrative might introduce more elliptical editing, in order to free the narrative content to recombine less rigidly, rather than being strictly confined to one unity of time and place
4.2. – The Prototype

The prototype developed to meet these initial criteria is a second interactive animation suitable for distribution via a web page. It depicts one character, and at certain points in the narrative the user may choose a direction for this character’s eyeline to look, after which the next shot will always represent the scene as seen from the character’s viewpoint. (see fig 21 below.)

![fig 21](image)

fig 21. Screen grab of interface design test from development of second interactive animated prototype, showing character’s eyeline directed offscreen. (see also accompanying website section 4.1)
4.3. – On Structure

Potential Applications Of Content

Interface Design and Narrative Content

Instead of choosing which one of three characters to follow, as on the previous prototype, the user’s interactive choice was changed to choosing between two possible eyelines for a character. Therefore, the number of characters in the narrative content could be reduced and in theory simplified, from three protagonists to one protagonist. For this prototype it was intended to experiment with applying three specific themes to the narrative content represented by each of the three rings on the underlying structure, rather than by applying three characters, as in the previous prototype. For this prototype the themes for the model’s rings were:

- one ring in which the character fears he is being followed but is not
- one ring in which the character fears he is being followed and is
- one ring in which the character is in a dream state where cause and effect break down

In theory a user who is switching from path to path by means of altering the character’s eyeline will create an endless narrative in which it is uncertain whether what the character is seeing is a logical chain of cause and effect or not. The user is therefore intended to get a multiple and shifting viewpoint on possible events when the three rings are navigated combinatorially.
4.4. – On The Design Process

By this stage of the project, the design process had formalised into the analysis and revision of design aspects in a distinct order; first Structure, then Interface Design, and finally Narrative Content.

Yet these aspects did not remain purely distinct. The storyboards were now drawn with the inclusion of interactive concepts; for example marking any junctions in the narrative with a star on the relevant storyboard panel, and drawing “multiple-exposure” images on that panel showing roughly the different potential states of the character. (see fig 22 below)

![Sketchbook page example](image)

fig 22. example of sketchbook page from development of second interactive animated prototype, (see also accompanying website section 4.2)
Therefore the design process proved more complicated overall on this prototype. This was especially the case as regards interface design, and the effects of the structure on narrative content. During the production of this prototype, there were conspicuously more diagrams and notes produced than drawings or designs. (see figs 23 and 24 below)

fig 23. example of sketchbook page from development of second interactive animated prototype, (see also accompanying website section 4.2)
For this prototype, the structure was carried over from the previous prototype without adjustment, and so the start of the design process proceeded directly to interface design.
4.5. On Interface Design

The interface design concept for this second prototype was based on concepts of Point of View editing and character eyelines, derived from film production. In film-making, a point of view shot is used to permit the viewer to momentarily see what a character in the narrative is seeing. Traditionally, the character is first seen framed in a shot with his or her eyeline looking offscreen in a particular direction. There is then a cut to a new shot which shows whatever it is the character is looking at. This then cuts back to the character to show his or her reaction to what he or she has just seen. (see fig 25 below)

![Image](image-url)

fig 25. – example of “point of view” editing, from Grammar of the Film Language by Daniel Arijon

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32 p. 148, ibid.
To set up a film is to bind persons to each other and to objects by looks.

- Robert Bresson – Notes on the Cinematographer

To apply this technique to this prototype’s interface design, the points on the model where the paths intersect were assigned to correspond to shots in which the user would be offered interactive control of a character’s eyeline.

The user is able to choose one of two possible eyelines for an onscreen character. When the shot of the character looking offscreen finishes (after a set time), the next shot would be a non-interactive shot representing the character’s point of view, selected based on the most recent direction of the character’s eyeline. The interactive segments would have a time-out limit, so the narrative would continue even if untouched by the user. This idea was carried over from the previous “Conversation” prototype.

This design also creates an interface in which a cut to a shot representing the character’s point of view takes the interface itself offscreen, as the character itself is the interface. In effect this creates an automatic removal of the interface when the interface would not be required. The interface design therefore would give effective feedback to the user on when to stop interacting, but still had to address how to indicate when the user might start interacting.

The initial proposed solution to this issue was to use the narrative and animation style to create conspicuous pauses in the narrative, as if the character periodically stops and waits for something. This was to be designed to suggest to the user that he or she need only act when the character seems “caught” or “stuck”. At these moments, the character himself would become a hotspot, with a rollover state which makes him appear to vibrate, to suggest to the user that acting on the character will bring the character “back to life”; i.e. release him from this “stuck” state.

When the character is actually clicked by the user, the character would animate to a different pose with an alternative eyeline. When clicked again, the character would return to his initial pose and eyeline. This interface, when clicked repeatedly by a user, would create a character looking back and forth, which in itself is a mini-scene which may be tailored to be meaningful within the overall narrative.

(see 4. Eyelines: Second Interactive Animated Narrative Prototype)

4.6. – On Narrative Content

The narrative content and the final animation style for this prototype were again to be provisional "placeholder" material only, devised for the purpose of testing the structure and the interface. This prototype was not to be considered a finished story or to have finished artwork. Yet as noted above, some decisions about narrative content were now being made to match it to a particular kind of structure and interface design. This raised questions about whether there were particular animation or visual styles that might more seamlessly integrate interactive hotspots, buttons, mouse sweeping, and so on, into the animated scene. Similarly, animation techniques relating to the meaning of images in time, (such as looping, or still images used as “holds” in which a character pauses during acting) which are already commonly integrated into an interface design, might be more explicitly contrasted against the same technique used in linear animation. An animation loop in the context of a narrative film is a depiction of a repetitious action, whereas the same animation loop in the context of an interface is a “wait-state”; such simultaneities might be exploited to creative effect by the designer.

At this point, a preliminary investigation was also made into formal precedents for story structure and guidelines for constructing plots. However, these were found to be of limited use for this project. This may be because they were consulted prematurely, before the project was in need of structures for specific narrative content. The cinematic technique of using characters’ eyelines to indicate their point of view has precedents in its use in specific genres of narrative film, such as the thriller, horror, mystery, and suspense genres. In these genres a character is often attempting to make sense of contradictory data, rather like the user. Janet Murray has noted that these genres have been appealing to early interactive narrative designers, partly because the designer can arouse and regulate the anxiety intrinsic to the form by harnessing it to the act of navigation.34

This suggests narrative content about a character who is looking and, depending on the choices made by the user, seeing different sights. Alfred Hitchcock’s 1954 film “Rear Window” is an example of a film which is structured around these kinds of point of

34 p. 135, Murray, op cit.
view shots. In the film, a photographer with a broken leg is unable to leave his apartment, and takes to looking out his window at his neighbours. The film typically shows the photographer looking, followed by a shot of what he is seeing (usually something his neighbours are doing), followed by a shot of the photographer’s reaction to what he has seen. These shots are often presented without dialogue, to emphasise the effect of the editing technique. This suggested that for this prototype, narrative content without dialogue might be more suitable for the interface now being planned.

The underlying structure is suitable for devising narrative content which creates evidence of cause and effect in short-term sequences, but with uncertainty of cause and effect in long-term sequences. It also has an endlessness which, rather than being linear, is more suitable for the gradual building up of a poetic image. Both of these qualities were to be found in the Theatre of the Absurd, as described by critic Martin Esslin;

Instead of a linear development, (these plays) present their author’s intuition of the human condition by a method that is essentially polyphonic; they confront their audience with an organized structure of statements and images that interpenetrate each other and that must be apprehended in their totality, rather like the different themes in a symphony, which gain meaning by their simultaneous interaction.

Esslin remarks that cause and effect, and logical linearity of time, were both devalued by the writers of the Theatre of the Absurd. This suggested that their work might be potentially useful templates for the narrative content required by this structure. In particular, the idea of narrative content that must be apprehended in totality is apposite; in this prototype, the ingredients are spread over three rings, and the larger picture is only available to the user by interacting, and ideally the narrative content would be designed so that the larger picture gets ever fuller as the user continues to watch or interact. Changing paths does not merely show what happened elsewhere at the same time in the narrative, but rather it creates an alternate reality within the narrative, in which time is breaking down via exploration.

4.7. – Further Ideas Not Explored At This time

Many of the other ideas explored in sketches and diagrams were for alternative applications for ring paths on the structural model, such as:

- an idea for applying narrative content with three varying levels of one character’s subjective distortion to the three rings on the model
  For example:
  ring 1 – shows all shots as “normal”
  ring 2 – shows point-of view shots as visually distorted, but non-POV shots as “normal”
  ring 3 – show all shots as visually distortion

This idea would link the user’s navigation to the character’s subjective degree of distortion. The use of different “time jump sizes” between shots on different rings (different sized time ellipses).
  For example:
  ring 1 – cuts between shots are gaps of several years in narrative time
  ring 2 – cuts between shots are gaps of several weeks in narrative time
  ring 3 – cuts between shots are gaps of several seconds in narrative time

This idea would link the user’s navigation to the passing of narrative time.

- a more complicated idea; an idea of using a shot in one ring (Ring 1) which can only be interpreted as the direct point-of-view of a character in a certain position when the same shot is accessed via another ring (Ring 2). Then, if the same shot is seen again accessed via the first ring (Ring 1), the same shot is no longer neutral although it is not explicitly framed by the looker character; the shot can trigger memory of having seen the same shot as a point-of-view.

- an idea for possible changes of the meaning of what a shot’s content graphically represents, as it is arrived at from different directions; a shot in which a shape is shown (a circle, for e.g.) may totally change its representational meaning when accessed in a new context. (The same circle may depict a sun in one context, and a coin in another, for e.g.)
Another idea noted at this time was a procedural-based idea for the depiction of memory, in which the computer would keep track of how long it has been since the user had visited any one scene. The scene would become more and more graphically stylised the longer it had been since the user’s last visit, as an analogy to a fading memory. However, this idea clearly contravened the original criteria of attempting to work with the simplest forms of underlying structure.

4.8. – Prototype Results

As with the previous prototype, the structure was satisfactory but the interface design and the narrative content presented problems.

4.8.1. – Problems With Interface Design

The main problem with the interface design was that it did not indicate clearly enough to the user when exactly the character was interactive and can thus have its eyeline changed, and when the character was not interactive and should therefore only be watched by the user. This issue was raised by the first draft of this prototype (see 4.1 Interface & Animation Tests). In this first draft, the interactive segments provided feedback to the user only when the character was rolled over by the cursor. This feedback was that the character began to “boil”. (“Boils” in animation are loops of three or more very similar drawings which make a posed character appear to vibrate, so that a still character does not look like the film has stopped.). However, without rolling over the character, there was no way for the user to tell which were interactive segments, and which were not. In the second draft of this prototype this issue has been addressed by adding the animation technique of "boils" to all footage, except the moments when the character becomes interactive.
The intention is that the user will recognise that if the character stops "boiling" (moving or vibrating), then the character is now “waiting”, and is thus potentially interactive. Rollover with the mouse is designed to confirm this for the user as the character starts “boiling” again.

(see fig 4. Eyelines: Second Interactive Animated Narrative Prototype)

This issue also raised the idea of aiming to integrate all possible interface states into the overarching narrative content. In such a design, any potential user choice would create a mini-scene appropriate to the larger narrative, (including the user making no choice).

The interactive segments for this prototype used a time-out method, so that after a set time, the prototype proceeded to the next shot based on the most recent eyeline selected by the user. This interface design was unsatisfactory for maintaining narrative, as the change from interactive shot to non-interactive shot was too jarring, and caused uncertain pauses for the user.

4.8.2. – Problems With Narrative Content

The narrative content about a character who fears he is being followed required the character to change physical locations within the narrative. The designer must then devise several other linking narrative sequences to that same location, often limiting the main action of the story to physical movements. An experiment with a story about a character who does not change location, but still changes eyelines, might prove a potentially richer source of material.

In “Animation in the Cinema”, Ralph Stephenson noted that one idea which is much easier in animation than live-action is to simply have the backgrounds change around the character, rather than to make the character physically move from location to location.37 While being in itself graphically elegant, this also addresses the problem that the narrative content in this prototype seemed to be getting caught up in literalism, instead of using effectively the more non-realistic possibilities of the animation medium, and indeed interactivity.

5. - Third Interactive Animation Prototype (Therapy: Sketches And Designs):

5.1. – Initial Criteria

A third interactive animation prototype, (“Therapy”), is again based on the second foldback flowchart theoretical model, which is the flowchart model in the shape of three rings. (see fig above)

The initial criteria for this third interactive animation prototype are similar to the two previous interactive animation prototypes, but with the following adjustments;

- The interface design should have a less jarring transition from interactive to non-interactive than a time-out.
- The interface design should ideally communicate narrative content in all its possible states.
- The narrative content should make use of the fact that the character might be the interface, and that the editing structure can add or subtract that character from the screen.
- The narrative content is intended to not force many changes of location, and should benefit from being less “realistic”, more absurdly humorous, and be designed to build up a gradual image as opposed to depicting simultaneous linear narratives.
- The three aspects of process, Structure, Interface Design, and Narrative Content, should be considered more simultaneously, if possible, rather than separately.
5.2. – The Prototype

The prototype developed to meet these initial criteria is a third interactive animation suitable for distribution via a web page. It depicts one main character (the patient), and the user may choose directions for that character to look, after which the next shot always represents the scene as seen from that character’s viewpoint. (see fig 26 below)

fig 26. character design sketch for third interactive animated narrative prototype (see also accompanying website section 5)
5.3. – On Structure

Potential Application Of Interface Design and Narrative And Narrative Content

The previous Eyelines prototype had problems with too much counterproductive literalism and geographic exactitude in the application of narrative to the structure. The content of this prototype is designed to be freer with animation’s possible depiction of impossible events within the footage and also within the interface itself.

(See 5.1 Therapy: Interface & Animation Tests for examples.)

The narrative content is based on the aesthetic and narrative potential of loops within loops. This is intended to bring the project closer to a potential integration of form with narrative content, insofar as the narrative content is also written about smaller loops (behaviours, quirks, idiosyncrasies) within larger loops (habits, routines, cycles, trends), as well as the circumstances under which such loops are broken.

The eyeline model of interface design also suggested the use of narrative content about the nature of subjectivity. An application of this is be the use of animated imagery of subjective mood effects, created through images of looping footage.

(See 5.1 Therapy: Interface & Animation Tests for examples)
5.4. – On The Design Process

For this prototype, the design process has proceeded again through analysis and revision of Structure, Interface Design, Narrative Content, but with more simultaneity. Again, there are conspicuously more diagrams and notes produced than drawings or designs. (see figs 26 and 27 below), and again the structure has been carried over from the previous prototype without adjustment, and so the design process has proceeded directly to interface design.

fig 26. example of sketchbook page from development of third interactive animated prototype, (see also accompanying website section 5.2)
5.5. – On Interface Design

The question of the nature of the interface and how it affects narrative during interactivity has become one of the most central issues for this research project; arguably more central than types of structural models or types of narrative content. For this prototype, the concept of using the character’s eyeline for the interface design is retained, but now adjusted for the user to use mouse rollover for exploring choices and then clicks for confirming those choices and proceeding to the subsequent Point of View shot. The time-out has therefore been removed; the user may take as long as he or she wishes before clicking to confirm. The rollover within the interface also permits the
designer to offer the user a more painterly sense of “scrubbing” back and forth a very reduced and confined mini-narrative animation.
(see 5.1 Therapy: Interface & Animation Tests)
The interface design continues to use the idea of constantly moving or “boiling” animation which indicates to the user that the character has become interactive by having character reach a point of stillness. A design idea to prevent the user’s potential confusion that the entire film has stopped is to always keep something onscreen moving in a stylised loop.
(see 5.1 Therapy: Interface & Animation Tests)
Another initial idea for interface design is to use music from the suspense genre which has its own implied meaning. Suspense music often “holds” in a chord that “wants” to be relieved and progress to the next chord. This “holding” chord can also be used to indicate to the user that the character has become interactive.
(see 5.1 Interface & Animation Tests for example)
In production this idea was abandoned in favour of more suggestive sound effect ambience loops of room tones or atmosphere.

5.6. – On Narrative Content

The narrative content for the two Interactive Animated Narrative Prototypes made so far (Conversation, Eyelines) has been provisional and undeveloped. This new prototype also uses provisional content, in the expectation that the process of continuing to make prototypes should eventually reveal a point at which such content is ready to be adapted into finished "real" content.
For this prototype, narrative content is based on the themes of:

- loops within loops
- looking and reacting
- control

Narrative content has been developed about smaller loops (behaviours, quirks, idiosyncrasies) within larger loops (habits, routines, cycles, trends), as well as the circumstances under which such loops are broken.
Narrative content is also about ideas of looking and reacting, via a sense of the organs of sight (eyes, brain) being subordinate or rebellious, and also whether or not they are subject to control, by therapy, or (by analogy) by the interaction of the user.

The main idea for the specific narrative is of an endless course of therapy, interweaving with narrative wheels within wheels in the life of the patient.

The main idea for the specific narrative is of an endless course of therapy, interweaving with the wheels within wheels of the life of the patient.

A neurotic patient has daily routines, including regularly seeing a therapist. The therapy is endless, and can only seem to have effects if the user switches structural paths after the character attends a therapy session. Repeatedly seeing the patient visit the therapist is intended to create a narrative meaning relating to how good the therapist is at curing neuroses (which are themselves often another kind of loop); ie. the more often the loop is seen, the less effective the therapist appears to be.

There is potential black humour in the idea that the longer the user sees the patient attending therapy without improving, the less effective the same therapist would appear to be, despite the images depicting the therapist having remained the same.
OVERALL ANALYSIS OF RESULTS OF CREATING PROTOTYPES

As the creation of prototypes progressed, the design process itself split into distinct and repeated categories, each of which had its own issues for the designer to consider. These repeated categories were:

- Structure, or Underlying Models
- Interface Design
- Narrative Content

Another category could be proposed for Process itself, as the nature of the design process itself was variable and also raised its own issues for the designer to consider. In practice it was noted that these categories did not remain strictly separate, and had considerable overlap. Each category was found to be influencing one or more of the others to a remarkable degree.

These discoveries made at these meeting points of the categories are worth examining more closely:

Structure can cause problems for the creation of narrative content. This is especially the case when writing narrative content is hampered by excessive consciousness of many possible contexts for that content, through its intended application to a non-linear underlying structure.

The designer requires some kind of useful writing format or tool other than flowcharts and storyboards to assist and customise the designer’s awareness of the structure. In this project’s prototypes, the diagrams, sketches, customised storyboards and basic interface tests were spontaneously combining. This was found to be helpful but only up to a limited point. This is suggestive of the need for more standardised tools. This is a case in which issues of Structure are combining with those of Process.

38 There have been some attempts to design specific tools to assist the writer of interactive narrative - see for example the Virtools development toolset - www.virtools.com
Structure can itself contribute to the meaning of narrative content, rather than merely supplying navigation. For the prototypes in this particular project, this was the idea of looping; the looping structure indicating possible patterns or routines of looping behaviour for the characters. In such a case, the repetition itself is narrative content – the cumulative effect is creating narrative meaning, rather than simply the opportunity to navigate to see something again.

This is a case in which issues of Structure are combining with those of Narrative Content.

Interface Design can potentially bring narrative to a halt, particularly when the user is permitted by the designer to indulge in actions which do not further the narrative. This introduced the idea that the interface design itself could be designed so that any action at all taken by the user would still result in the prototype’s response being interpretable as continuing narrative content. Even such possibilities as the user’s clicking impatiently back and forth on an interface might result in short repetitive scenes which form a logical part of the narrative; a sort of mini-scene. (see figs)

This is a case in which issues of Interface Design are combining with those of Narrative Content.

Interface Design and the Structure of animation can both employ the same image or piece of footage, but derive different meanings from it. A set of looping drawings is a “wait-state” in an interface design, but the same loop is a repetitive action with narrative meaning in a piece of animated footage. These contrasts and variations in meaning of visual animated loops and still images might be exploited by the designer to creative effect.

This is a case in which issues of Interface Design are combining with those Structure, (in this case the existing Structure of Animation Practice).

Interface Design and the Structure of film editing combined in an unexpected way in the Eyelines prototype. The initial idea was to apply the structure of film editing to the underlying flowchart structure by matching discrete shots of footage to spaces on the flowchart. Upon adding an interface based on a clickable character to create edits based on Point of View Shots, it was noted that the editing structure was serving some of the needs of the interface design; in that the cut to the character’s point of view, which moved the character offscreen, also moved the interface offscreen, because the character himself was the interface. This suggests there may be more combinations of interface and film editing for the designer to use.
This is a case in which issues of Interface Design are combining with those of Structure (of Film editing).

Narrative Content’s potential to be presented in a first-person perspective or a third-person perspective overlaps with issues of Interface Design. The third-person interface as designed in this project’s prototypes created a narrative world in which the user’s precise role could remain ambiguous. In a third-person perspective interface, a fictional character may or may not be aware of the user’s existence in the world of the narrative, and the user may or may not identify with the character. This is in contrast to a first-person perspective interface, in which a fictional character will be “aware” of the user, when the user interacts in the role of a first-person character, and in which the user identifies with that first-person character.

The prototypes in this project progressed towards the use of Point of View editing, which does encourage the user’s identification with a looking character, but while maintaining a third-person perspective interface, which was a decision intended to maintain the designer’s control over the narrative content. This unexpected contrast introduced ideas about the use of third-person perspective interface as deliberate aesthetic strategy to potentially regulate degrees of user identification with characters.

This is a case in which issues of Interface Design are combining with those of Narrative Content.

Narrative content is an area which remained provisional in this project, as it was always last in the sequence of design process. Nevertheless, it can be seen in the examples above that narrative content was necessarily explored insofar as its qualities overlapped with issues of structure and interface design. In these explorations, the need to conceive of the narrative as non-linear began to lead to conceptions of narrative as image-based, poetic, polyphonic, and musical. This project did not have the scope to explore this more thoroughly, and it is clearly an area worthy of more study.

The overall design process used in this project (Structure, Interface Design, Narrative Content) was possibly too rigidly distinct and sequenced, even though the categories did overlap and influence each other. This process developed over the course of the prototypes to eventually suggest that perhaps what is required are new processes based precisely on creating more fluidity for the designer in the hybridisation of these different categories.
ON NEW PROCESSES AND MODELS

As we have seen, the issue of structure, interface design, narrative content and process influencing each other has become central to identifying areas for future research. This leads to the conclusion that we must expect the theoretical models we borrow from to become very hybridised to be useful, whether these models are borrowed from navigation theory, film editing practice, or another discipline altogether. It is also important to note that this applies as much to underlying structures which may be invisible to the user, as it does to new forms in the surface of visual language. However, it should be noted that this is a considerable challenge for any designer. The medium of narrative live-action film, without the inclusion of animation or interactivity, already has a history of being nominated as a medium for the creation of a “total art work” (“GesamtKunstWerk”), as it can include image, word, sound, and movement (ref). Thus the production of narrative film alone is already acknowledged as complex for the designer. It can then be argued that the animated film is even more complex to design, as the designer potentially has control over even more specific aspects of production, and unlike the live-action filmmaker has less of a recording function and more of a creative one, creating moving images from a blank slate.

The British animator John Halas has commented:

> Among the other visual communication disciplines, such as graphic design, fine arts, illustration, film and photography, I maintain that animation is the most difficult. It contains aspects of most of the other disciplines to various degrees, plus others such as a sense of time and space, and an understanding of music and motion.\(^{39}\)

Practitioners of animation have responded to this challenge by developing production tools such as storyboards, timing sheets, and model sheets, but while this has streamlined production, the difficulty of mastering so many disciplines remains.

The would-be creator of *interactive* narrative animation is then proposing to add aspects of *still more* disciplines to Halas’ list, such as computer programming, interface design and structural modeling. It is clear that this adding of more aspects makes Interactive Narrative Animation potentially one of the most complex of all media for the designer. So - there is a conspicuous need for better tools to assist the designer in the task of adding the complexity of interactivity to the already complex medium of the animated narrative film. And - the most fruitful areas would seem to be in exactly the areas of *combined* and *hybridised* aspects – suggesting the need for a process in which the spontaneous combination of these aspects might be achieved with more simultaneity.
CONCLUSIONS
SUMMARIES AND FUTURE DIRECTIONS

The original research questions posed by this research project asked what kinds of theoretical models from film editing theory and from interactive design and navigation theory are useful for authoring interactive narrative animation, and what kinds of stories can be told using these models.

Even within the very specific subsets of interactive narrative animation explored in this project, some conclusions and potential areas for future research can be identified. These areas are generally to be found where aspects of the design process were combining and hybridising.

CONCLUSIONS WITHIN THIS PROJECT

To recap and summarise the conclusions and areas for future research derived from the creation of prototypes in this research project:

- theoretical models which have been inventively combined and hybridised are capable of developing into better tools to assist the designer of interactive narrative, and may possibly be more efficiently derived from the study of new design processes.

- underlying structures are capable of serving as narrative content, and not merely navigation. (In the case of this specific project, narrative content was developed within looping structures.)

- structural conventions, such as those for animation or film practice, are capable of serving the needs of interface design, and of adding fluidity to the user’s experience. (In the case of this specific project, an example of this was an interface which was automatically removed when an edit occurred in animated footage.)

- interface design is capable of serving as narrative content, and not merely navigation (In the case of this specific project, interfaces were developed which create mini-scenes in response to all possible user activity.)
- a more complex case of interface design having the potential to serve as narrative content was found in the tension between first-person and third-person perspective viewpoints. The designer’s control over the user’s potential identification with characters through first-person perspective techniques might be creatively contrasted with the user’s potential detachment from characters through third-person perspective techniques. This last seems one of the richest potential areas of future research, particularly as it might benefit from existing research into cinema audiences’ identification with characters.

- narrative content can be conceived of as non-linear, image-based, poetic, polyphonic; like a single image which is progressively built in the mind of the user, rather than a series of images in sequence. This project’s practice was limited to only the beginnings of exploring this issue, and it is also a clearly viable area for future research.

CONCLUSIONS EXPANDING OUTSIDE THIS PROJECT

This project has been operating inside a specific and narrow subset of possibilities for Interactive Narrative Animation. This subset, as defined by the original design of work for the project, limited the project to:

- design which conceives of the user’s activity as more passive than active
- design which conceives of the user’s experience as more non-simulation than immersive simulation

In the practice of creating the prototypes within this narrow subset, this project’s field was then further reduced and refined, as specific structures and techniques were chosen to meet initial criteria. As a consequence, this project was limited to exploring only those solutions which used:

- structural models based on physical flowcharts with looping paths
- interface concepts which were character-based
- narratives which were loop-based
- animation styles which were two-dimensional and limited
- design processes beginning with structure and ending with narrative
Outside of the very specific field this project has been examining, but still remaining inside the field of Interactive Narrative Animation, there is even more potential for expanded research, based on the conclusions drawn from this project.

For example, this project did not have the scope to also explore:

- structural models which cannot be represented as physical flowcharts, such as, for example, those based on mathematical formulae or algorithms
- structural models from film theory other than those based on over-the-shoulder editing and point-of-view editing
- interface concepts other than those which are character-based
- animation styles other than two-dimensional animation, such as, for example, CGI, stop-motion, or cut-out animation
- alternative design processes, such as, for example, processes which begin with specific narrative content and attempt to shape existing structural models and interface design concepts to fit that narrative, instead of vice versa

Any of these areas could be used profitably by future researchers for further investigation, particularly in the exploration of potential new hybrids of these alternative structures, interface designs, narrative content, and processes.
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