Research into Interactive Digital Narrative: A Kaleidoscopic View

Janet H. Murray[1]

[1] Georgia Tech, Atlanta GA 30332, USA
jmurray@gatech.edu

Abstract. We are at a milestone moment in the development of the cultural form of Interactive Digital Narrative (IDN), and in the development of the study of IDN as a field of academic research and graduate education. We can date the beginning of the field to the late 1960s with the release of Joseph Weizenbaum's *Eliza* in 1966, and recognize the late 1990s as another turning point when 30 years of diverse development began to coalesce into a recognizable new media practice. For the past 20 years we have seen accelerated growth in theory and practice, but the discourse has been split among contributory fields. With the convening of IDN as the focus of study in its own right, we can address key questions, such as its distinct history, taxonomy, and aesthetics. We can also recognize more clearly our unique challenges in studying a field that is evolving rapidly, and from multiple intersecting genetic strains. We can also articulate and investigate the potential of IDN as an expressive framework for engaging with the most pressing themes of human culture of the 21st century, and as a cognitive scaffold for increasing our individual and collective understanding of complex systems.

Keywords: Interactive Digital Narrative (IDN), IDN as academic discipline, IDN education, understanding complex systems

1 Through the Kaleidoscope, and Across the Decades

1.1 Why Kaleidoscopic ?

The kaleidoscopic view of the title refers to the many components and potential taxonomies of the artifacts that are the objects of study in this new field. It also refers, more importantly, to the potential of interactive digital narratives (IDNs) to present us with multiform scenarios in which the same events can be understood in multiple contexts and the same starting points can be imagined as giving rise to multiple possible outcomes. More than anything else, it is the possibility of furthering such a multiform, multi-sequential, multi-vocal, narrative practice that makes the recent formation of a dedicated organization for research in IDN, in which theory and practice are closely intertwined, such a promising milestone.

1.2 This Moment in Temporal Context

Last year at ICIDS 2017 a group of researchers[1] brought forward a proposal for the Association for Research in Digital Interactive Narrative (ARDIN) as a new interdisciplinary/disciplinary home for the study of this emerging cultural form. The proposal was approved and ARDIN exists but now must define itself. Therefore, we are meeting at a generative moment – a moment in which a dispersed population actively explores a common identity, which I expect to involve stressing points of differentiation, from neighboring and overlapping tribes and from one another within this newly affirmed common tribe. I am hoping to add to the creative momentum by framing the promise of this very moment here in Dublin from my own personally situated perspective, using the vantagepoint of career longevity despite lifelong habits of interdisciplinarity to look backwards across five decades of innovation for context, and to apply the insights gained from that view to speculate forward about the future of Digital Interactive Narrative and how it might change from the effects of reframing ICIDS within this new organization. In addition, I will try to recruit you all to collaborate in what I see as the most important common purpose behind such an organization.

I have been a practitioner/theorist of digital media since 1981, when I began designing interactive digital narratives for language learning in an educational computing project funded by the Annenberg Foundation as part of MIT's pioneering Project Athena. This alone would give me a long view of the traditions of IDN, but I also tend to think in relatively deep temporal horizons both personally, through the luck of family longevity which stretches in two generations back to 1881, and from my training in the history of narrative with important milestones extending not just centuries but millennia, starting with Gilgamesh (c 2000 BCE) through the Book of Kells here at this University where we are gathered (9th Century AD) and up through the multi-century development of the English novel, and the century-long plus evolution of storytelling in moving images. Also highly salient to me is the history of the women's movement which I have both studied as a scholar of the English 19th century, and participated in as an American woman of the "baby boomer" generation. This telescopic view of cultural change and aesthetic evolution over long periods of time has turned out to be a fortunate complement to my privileged (though often challenging) situation as a humanist at MIT (from 1971-1999) and then at Georgia Tech (from 1999 to the present), and to the distortion that comes from overvaluing the latest commercial gamble in high tech, billed as a "magic leap" or something similarly suggestive of large profits.

Being able to think of cultural change over long periods of time does not make it easier to predict the pace of change in the adoption of any particular technology (e.g. how long for television to move from analog to digital, or for VR or AR to become a viable consumer product), or much less the success of any particular platform (such as the iPod, the Kindle, or Google Glass), but it has made for some reliable judgments of the long-term direction of change, and of the innovations that, sooner or later, are likely to take root because they serve human need and add to the coherence of the larger medium of all things digital.

---

[1] The ICIDS Steering Committee: Luis Emilio Bruni, Gabriele Ferri, Andrew Gordon, Hartmut Koenitz, Alex Mitchell, Frank Nack, Valentina Nisi, Rebecca Rouse, David Thue

From this long-term perspective, the founding of ARDIN in 2018 seems to me like a significant milestone and perhaps even a tipping point, marking a critical mass of human effort around interactive digital narrative and a shared sense of understanding of new possibilities. And whether it turns out to be so or not, it provides a useful opportunity to take stock of the enterprise from this longer term perspective, assuming a kind of metaphorical elevation to pick out a few landmarks ranging across a larger breadth of practice, perhaps, than is visible from the kind of detailed immersion in more immediately relevant practices that we are all called to maintain in order to "keep up" with such a productive area of research and creative practice.

I offer a set of landmarks here as representative, but necessarily arbitrary. Other people or even I myself on another day would choose other specimens. The field is various and every arrangement is partial, but each one contains information that can help us to understand the whole. So I offer this version not as a canon but as one turn of the kaleidoscope.

2 The First Wave

We could indeed start the story of the narrative structures of interactive digital stories with Gilgamesh or the canonical Christian Bible, both of which exist in multiple versions, or with the Talmud, which annotates the Old Testament stories with rabbinical commentary, including interpretations and additional stories, in hypertextual form. Or we could start in the 18th century with *Tristram Shandy,* which interrupts itself and calls attention to its print delivery surface, or the 19th century with *Wuthering Heights* which tells overlapping parts of the same larger story from multiple narrators, or in the 20th Century with Frank Capra's *It's a Wonderful Life* which includes two play-throughs of the protagonist's childhood, or Borges' stories, or the fragmented rule-generated texts of the Oulipo group or from multiple other cultural or media traditions that pre-date computer-based storytelling. Each of these implied genealogies would be a useful spin of the kaleidoscope, assembling artifacts and narrative strategies that speak to one another across media and across time. There are multiple such intersections and genetic strands twining through IDN practice from a rich heritage of sources.

But by dedicating a new research organization to Digital Interactive Narrative we are provided with a very useful demarcation point. We can start with the moment when storytelling begins is interactive and built out of computational bits. We may discover multiple contenders for this moment, but from my perch looking out on the landscape as someone who spent over 25 years at MIT, there is only one candidate. To my mind, digital interactive narrative practice can be traced to 1966 – a little over 50 years ago—when Joseph Weizenbaum's *Eliza* program introduced the first interactive digital character to world [1].

As I have described written elsewhere [2, 3], Eliza succeeds in creating the illusion of a character by virtue of the conversational structure which scripts the interactor into the role of patient to the Eliza, the automated psychotherapist. Weizenbaum did not invent the conversation by trying to recreate an actual therapy interview. He drew on

contemporary narrative tropes – the neurotic seeking help and the absurdly "non-directive" therapist who followed the often mocked teachings of Carl Rogers who advocated neutral and echoing responses. It is the interactive equivalent of sketch comedy. *Eliza* was surprisingly effective in creating the illusion of an actual person, causing her creator to have to warn people against accepting the possibility of actual automated therapists [4]. But now we would see her as a weak version of the familiar narrative genre of the chatbot.

This disruptive invention of *Eliza* was followed over the next 25 years by a rich but heavily siloed set of digital narrative communities of practice. Computer science nerds working on mainframes, inspired by dungeons and dragons created *Adventure* [5] , which MIT researches expanded with AI techniques to *Zork* [6], which spawned an energized cult of text-adventure games which continues to this day and which sometimes claims the sole right to the descriptor "Interactive Fiction (IF)." One group of such practitioners created a briefly successful story-game company Infocom (1979-1989), whose games introduced technical innovations such as the heartbreaking sacrifice of Floyd the companion robot, which no save-and-replay strategy could prevent (Planetfall [7]), or the second murder that happened at a particular timestep (Deadline [8]) if you did not solve the initial crime by going to the right rooms in the right order. The parser-based stories, based on later authoring systems, were an important entry point for IDN practice of a specialized nature, and its influence can still be seen in the sardonic narrative voice of the "art game" *The Stanley Parable* [9].

In another silo during the first wave of IDN, academics developed hypertext for educational purposes, creating stand-alone systems before Tim Berners-Lee invented the World Wide Web. One of these, *Storyspace* (released 1987) is still maintained by another dedicated company, Eastgate Systems. The aesthetic of Storyspace stories like *Afternoon*, *A Story* [10] by Michael Joyce (one of the inventors of Storyspace along with Jay David Bolter and John B. Smith) favors associational linking. When we look at the community of practice around Twine today we can place it in a symmetrical kaleidoscopic pattern with the Storyspace community of the late 1980s and early 1990s.

In a more commercial silo, the video game company Sierra On-Line began producing the earliest graphical adventure games starting in 1980 with *Mystery House* [11] and *Wizard and the Princess* [12], the first adventure in their signature, beloved *King's Quest* series. The introduction of graphics into adventure games were greeted at the time by the fan communities around Infocom text adventures and later by hypertext writers in somewhat the same way that the introduction of sound and color were greeted by movie purists. But as Laine Nooney has pointed out, exaggerating these distinctions leads to a distorted history of game development [13]. This is an area where the affirmation of IDN as its own evolving form can provide a useful new perspective, by ignoring questions of "literary" versus "game" pleasures and looking for the development of a repertoire of techniques that support the common pleasures of interactive narrative, and that have been carried forward within story-driven interactive artifacts. Clara Fernandez-Vara's work in tracing the close alignment between story and game mechanics in adventure games provides a useful framework for understanding graphical adventures [14].

During the 1980s and early 1990s, the critical discourse around digital media was as siloed as the different fan communities. Hypertext was embraced by postmodern literary theorists as a subversion of linearity [15]; computer scientists explored formalist approaches to narrative as an extension of the larger effort of creating artificial intelligence by imitating human cognitive processes [16]; Ted Nelson argued for hypertext [17] as an augmentation of human associative thinking, following the example of Vannever Bush [18]; and the pioneering designer-theorist Brenda Laurel applied Aristotle to argue for computer-based interaction as "theater" [19]. In 1992 I taught what I believe was the first university course in interactive narrative (an undergrad/grad course at MIT called *Structure and Interpretation of Non-Linear and Interactive Narrative*, whose name echoed the intro CS course, *Structure and Interpretation of Computer Programming*). Within a few years I was able to teach it using HTML and the new web technologies, but originally the course was based on Apple's desktop application *HyperCard* (1987-1998) (and its clones) as were my own group's interactive video projects of the 1980s and 1990s [20, 21]. *HyperCard* was also the platform for *Myst* [22] a widely successful narrative-driven puzzle game which many saw as a turning point in commercial games as a new media form.

HyperCard, *InForm* (for parser-based fiction), *Storyspace*, and *Director* (which was based on the temporal framework of animation-authoring software and was a forerunner of Flash) are in themselves important milestones to consider in the history of IDN, and part of the context in which we should consider contemporary platform-based groups . Twine practitioners, for example, are often demeaned as unskilled game designers. But when we take the perspective of IDN as a evolving craft developing over multiple decades and highly responsive to the availability of stable authoring and delivery platforms, we can see the Twine community of practice as one of many such groups, which may appear siloed but which over time have collectively produced a rich repertoire of narrative strategies. In addition, game-oriented professional authoring environments like Unity and Unreal, are a rich area for exploration from the perspective of how their affordances constrain and support interactive narrative.

3 A Turning Point in the Late 1990s

3.1 Stories as Simulations

The first 30 years of active IDN development, then, were marked by a diverse and diffuse effort, from isolated Artificial Intelligence projects modeling character and plot to beloved niche gaming traditions like parser-based fiction and adventure games, to educational simulations and experimental interactive videos. Starting around 1997, around the same time that email became a preferred method of communication outside of academic circles, and newspapers were opening their first websites, these separate communities of practice in IDN began to reach critical mass, and books began to appear that were explicitly directed to the active new boundary between games and stories, including my own *Hamlet on the Holodeck: The Future of Narrative in Cyberspace* [2] and Espen Aarseth's *Cybertext* [23]. The Tamagotchi came out the same year, bringing

the concept of the interactive character, which had moved from Eliza to chatbots in online multi-player environments, into the mainstream as a best-selling commercial toy. A few years later, Nick Montfort published a definitive history of the parser-based story form [24].

The block-buster success of *The Sims* [25] in 2000 emancipated interactive characters from the confines of adventure conventions and win/lose structure of conventional videogames and transported them into the everyday world, translating the story elements of the bourgeois bildungsroman into interactive procedural form. Moving from inventories of weapons to household appliances meant inventing new conventions of interaction, such as the backrub, and the icon-driven wordless conversation. These innovations should be seen not merely as game mechanics but as part of the growth of conventions for IDN, building on the repetitive feeding and cleaning structure of the *Tamagotchi*. They are not just a refinement of simulation games like *Sim City,* but part of a community of practice that includes works with similar temporal organization of home-and-work, like Molleindustria's "Every Day the Same Dream" [26] which interprets successful bourgeois life of home-commute-job as alienated labor.

Another milestone of the first decade of the 21st century was the commercially and critically successful *BioShock* [27] whose morality-driven multiple endings created a strong sense of dramatic agency in the interactors by making them feel that their decisions had dramatic consequences. Ever since, the creation of morally challenging decisions in narrative-driven games have become an important design strategy that caters to mass audience expectations. Framing IDN as a discipline can motivate scholars to trace this practice backwards and forwards in other digital artifacts, and perhaps to develop a critical vocabulary for describing important distinctions in the structure and expression of the moral physics of interactive narratives.

The open-world games of this period, including the urban gangster mayhem of *Grand Theft Auto3: Liberty City* [28] and the cowboy gunslinger survival challenges of *Red Dead Redemption* [29] would be important objects of study in this regard, for the ambiguous moral physics that evokes pleasure and discomfort from licensing anti-social behavior. They also advance the practice of interactive narrative design by offering the model of an IDN as a fictional landscape with modular genre-driven actions (steal a car, shoot a mountain lion) rather than a series of plot events. In the important critical task of differentiating amongst different manifestations of IDN, open-world games provide important reference points.

Another crucial reference point for such a taxonomy would be *Façade* [30] which announced itself as an "interactive drama." *Façade* is a virtuoso computational object, that generates a story with great variation of individual beats and story structure while maintaining the coherence of each playthrough [31]. It is a crucial milestone in IDN evolution, for what it achieved in its brilliant substitution system of story elements. It is equally important for its failure to create the experience of dramatic agency because of its interaction design which relied upon open input natural language, in mistaken emulation of open world game design. By telling the interactor they could enter anything they pleased in conversation with the two main characters, the designers set the level of expectation for what the system could understand and respond to much too

high, making its actual responses, which were the result of great computational complexity but not adequately responsive to the input, seem arbitrary. Among other things to be learned from *Façade,* which remains unmatched in its story generation aspect, is the need for both scripting the computer and scripting the interactor to create the experience of agency.

3.2 The Current Moment

In the second decade of the 21st century where we currently find ourselves, it is harder to see the pattern in the kaleidoscope because the individual pieces are so much larger to us at this close distance. One artifact that looms large to me is no longer playable though it was released in 2014. Emily Short's *Blood and Laurels* [32] was created on an experimental platform called *Versu* that was meant to scaffold AI-enhanced authoring for non-programmers. Short offers a complex narrative structure that is very text-heavy (200,000 words!) and multi-variant, and which invites us to experience its rich story world (a tale of political intrigue in ancient Rome) by playing through all its variants. The achievement of *Blood and Laurels,* which I would rank in importance to that of *Façade* or *The Sims,* though it is not as widely known, is its coherence. The multiplicity of the variations creates the design problem of making sure that the interactor is not confused about where they are in the story, which Short solves by clear parallelism of story beats and a dramatically appropriate division of time steps and story locales – design strategies intrinsic to the diegetic world. She also makes all of the variants the result of the interactor's choices. In addition, Short provides orientation for the interactor at the non-diegetic meta-level with the appropriate use of the game convention of unlocked achievements (Figure 1).

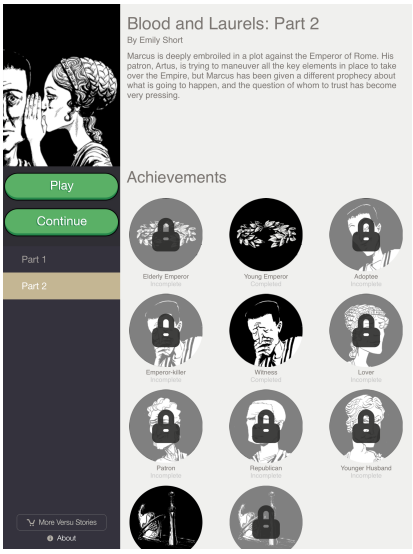

Figure 1 Emily Short's *Blood and Laurels* uses the game convention of locked achievements to help the interactor keep track of potential variants, and to excite curiosity about unlocking them

Another important milestone of this period for many people is Anna Antropy's *Dys4* [33] for its use of interaction mechanics associated with games for the narrative purpose of an autobiographical interactive essay. *Dys4ia* is a much simpler artifact, a kind of a memoir focused on the subjective experience of gender non-conformity and of moments in the transition of a trans-gender male-to-female person. Anna Antropy uses retro game conventions to allow the interactor to enact experiences that serve as explicit models (awkwardness in shaving) or abstract metaphors (fitting a Tetris like piece into a non-conforming space) for the situation of being in a body that does not correspond with one's gender identification. Anna Antropy calls this artifact "an autobiographical game" but I would argue that it is better understood as a narrative artifact that uses game mechanics with a striking fluency, making clear that game elements have now passed into general use as a vocabulary for emotional and political expression. Anna Anthropy's easy appropriation of game mechanics to describe a marginalized social experience is of the kind envisioned by Gonzalo Frasca in his 2001 master's thesis "Videogames of the Oppressed" [34] and very similar to the narratives of Tetris players about how that game reflected their frantic state of mind [2]. These ideas were not commonplace at the turn of the century, but twenty years later, abstract game actions are routinely invoked in conversation (e.g. "I feel like I'm playing whack-a-mole!" "This is a real power-up."), and, as *Dys4ia* shows, even in practice, to describe subjective emotional experiences.

Other unmistakable recent milestones that make clear that we are at a new plateau, in the practice of IDN are the celebrated mass market release of *Gone Home* [35], and the whole body of Telltale Games releases (2004-2018), especially the highly successful *The Walking Dead* (2012-18) (initially released 2012 [36], further episodes in the following years). *Gone Home* builds on a tradition begun with *Zork* [6] and elaborated in *Mystery House* [11] from Sierra On-Line, and *Myst* [22] in which a story is revealed through the examination of a space. Telltale's Walking Dead releases provide a model for episodic storytelling, and for creating parallel paths to a canonical story with a shared story world. It also succeeds in structuring moral choices (whom shall I save from the zombies?), and it establishes new conventions for responding to differences in player choices (e.g. "Clementine will remember [you did] that"), while still funneling the plot into the same outcomes.

Although these examples are generally described, and even labelled by their creators, as "games," they cannot be fully understood within that framework. The design challenges they engaged come into clearer focus when they are juxtaposed with one another and contextualized by earlier examples of interactive narrative innovation. They also reward examination as potential sources for future innovation in their refinement, adaptation, and invention of conventions that are not merely "game mechanics" but mechanics of interactions suitable for games but even more suitable for interactive narratives.

4 The Disciplinary Advantage

4.1 Turning the Kaleidoscope

Although the works that may appear particularly salient to me or to other scholars as milestones in IDN may already have been exhaustively analyzed as hypertexts or videogames or feminist/transgender/LGBTQ manifestos, they will reveal new symmetries, across disparate communities of practice when viewed in the new landscape of investigation implied by the founding of a new research organization dedicated to IDN.

When we discuss *Afternoon* or *Myst* or *Gone Home* or *The Walking Dead* in other venues they become part of other discourses -- post-modern cultural discourse, legacy media discourse, feminist discourse, or the multiple conversations around game studies. Each of those discourses has its own critical and interpretative vocabulary, and so makes visible different aspects of the same artifact. In game studies in particular, interactive artifacts that prioritize storytelling can be demeaned by a discourse that pits the satisfaction of playing games against the conventional satisfactions of legacy storytelling forms. The popular discourse around games is even more demeaning, dismissing some of the most successful IDNs as "walking simulators." In post-modern contexts interactive fictions are often praised for their disruption of conventional narrative expections. In other words, IDNs are judged precisely by the elements they have chosen to leave out, and the storytelling itself is often evaluated by unreflected legacy-oriented notions of what a story is.

When we see IDNs as part of older narrative traditions, then the common story patterns are foregrounded – the bildungsroman, the cowboy story. When we see them as contextualized by videogames then the common game patterns are foregrounded, such as acquiring collectables, leveling up, shooting enemies. When we see them through the lens of traditional narratology we are stuck with a notion of story as something that is told (by narrator or camera) rather than enacted by an interactor within a procedural environment. But when we see them as their own tradition we can put our energies into an emerging set of more specific questions, of strategies for creating interactive plot with dramatic compression, procedural characters with readable emotional depths, dramatic segmentation that motivates replay, variation that reinforces immersion, and so on. We can start to recognize canons of critique as well as canons of creativity, and to share vocabulary that will help us to understand better how we can leverage the work that has gone before to foster more expressive creative practices. We have had over 30 years of focused effort in theory and craft and we have convened a global community of practice around this kind of an artifact. We can therefore see the *Eliza, Zork, Mystery House, Myst, The Tamagotchi, The Sims, Façade*, *BioShock, Dys4ia, Gone Home* and thousands of other interactive digital narratives as part of a diverse but connected community of practice. We can ask evaluative questions appropriate to the aesthetics of digital interactive narrative rather than comparing them to successful games or movies.

The problem of colonization by Games Studies is in itself a sufficient reason for affirming the independence of IDN studies as its own discipline. Interactive Digital Narratives have many features that overlap with videogames, and they are often distributed and labeled as games. But when we establish a discipline around IDN, we are

affirming that IDNs are designed and experienced as a distinct, valid, media tradition which deserves its own name and its own focus as a field of study. Creating a professional organization centered on Digital Interactive Narrative takes us out of several tedious and repetitive conversation such as ludology v narratology and games v movies. We turn the kaleidoscope, and see interactive narratives as creating their own patterns, contextualized not by legacy narratives like movies or interactive artifacts like games, but by other digital interactive narratives.

4.2 Aesthetic Vocabulary for IDN

I have written elsewhere [2, 3] about how to create and assess interactive narrative based on an aesthetics rooted in the affordances of the underlying digital medium. But I want to conclude by pointing to a few terms, and to one compelling long-term goal that I see as particularly helpful as an educator and designer [37].

The most important term to evaluate the success of any IDN is "dramatic agency." I have defined agency as

> an aesthetic pleasure characteristic of digital environments, which results from the well-formed exploitation of the procedural and participatory properties. When the behavior of the computer is coherent and the results of participation are clear and well motivated, the interactor experiences the pleasure of agency, of making something happen in a dynamically responsive world. The term is meant as a corrective to the inexact use of "interactive" as both a descriptive and an evaluative term.

Dramatic agency is the

> experience of **agency** within a procedural and participatory environment that makes use of compelling story elements, such as an adventure game or an interactive narrative. To create dramatic agency the designer must create transparent interaction conventions (like clicking on the image of a garment to put it on the player's avatar) and map them onto actions which suggest rich story possibilities (like donning a magic cloak and suddenly becoming invisible) within clear story stories with dramatically focused episodes (such as, an opportunity to spy on enemy conspirators in a fantasy role playing game).

We can apply this principle to any choice point in an IDN, asking if the interactor has been appropriately motivated by the storyworld to anticipate specific consequences to an action, and whether the interactor has had reason to expect a choice that is not actually provided by the interactive experience. Note that, unlike in a game, an interactor does not have to have the opportunity to find a "winning" or successful choice. The choice does have to be consistent with the moral physics of the story world, so that the consequences, like the "bad" ending of *Myst,* or the inability to prevent the brutal mur-

der of a child in a Telltale *Game of Thrones* [38] episode, makes sense within the fictional universe. Dramatic agency is also unrelated to whether or not we can change the events of the story, since we can experience narrative anticipation and pleasure in a navigational choice, such as from one point of view to another in a story made up of fixed events. The concept of dramatic agency can help us to analyze our own experience as interactors, considering, for example, why abstract presentation of dialog as assembling miniature jigsaw puzzles in *Florence* [39] (Figure 2), is so satisfying, despite the fact that we have no choice and the narrative never changes.

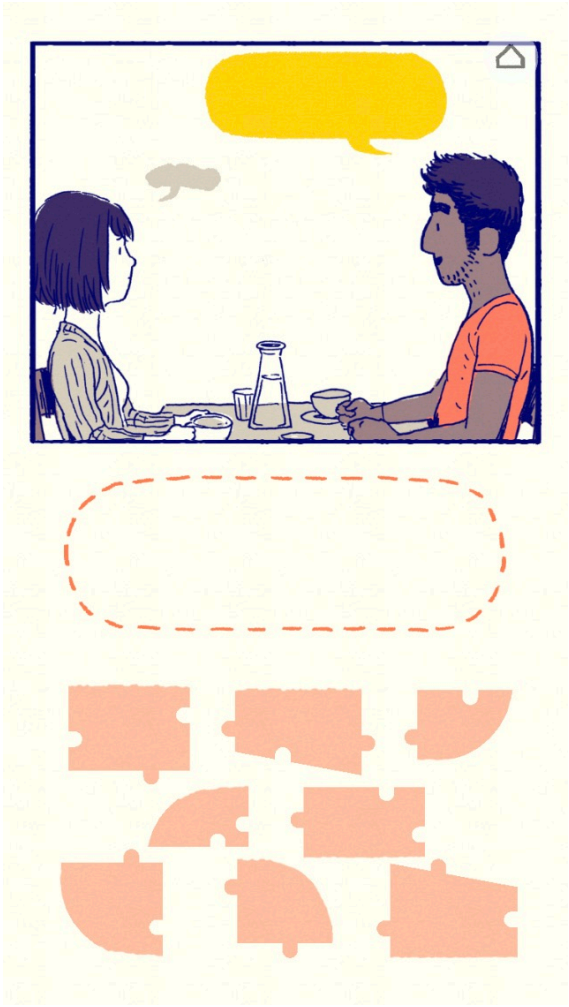

Figure 2 In the mobile interactive story Florence (2018) the interactor cannot change the story but they can enact gestures that represent the protagonist's subjective experience. Here she is experiencing making conversation on a first date as a puzzle. As the conversation progresses, the number of puzzle pieces decreases.

A related aesthetic value for a narrative form that affords variation is whether or not it motivates replay and whether the variations are trivial or dramatically meaningful. For example, in *Façade,* we are motivated to try multiple paths in order to find out the secrets of each of the two quarreling partners, secrets that are hinted at but not revealed in other play-throughs. We are also motivated to note the various ways in which the conflict can end, since that comports well with our sense of open possibilities in conflicts with intimate partners, and with our sense of the poignancy of moments in which the way how we behave can bring us closer or farther apart.

In assessing interactive narratives I would suggest that it is useful to avoid the term "non-linear" since it is very hard to design for a negative quality, and in the context of narrative (as against mathematics) it suggests incoherency. Instead I differentiate between legacy formats as "unisequential" and digital formats as potentially "multisequential." IDNs may be multisequential whether or not the interactor can play a role in the story world and whether or not they can change the outcome of events, both of which are separate and useful distinctions for which others have proposed useful terms. "Multisequential" is a substitute for "non-linear" that emphases the coherence of all of the paths through a story with variable parts.

"Multiform" is for me a useful way of referring to a story system composed of parameterized elements within a fixed scenario, so that the same overall pattern can produce multiple parallel instantiations. For example, the distinct endings of *Bioshockcl* closely resemble one another but differ in ways that are all the more dramatically powerful because of the underlying parallelism. Emily Short's *Blood and Laurels* makes the most of this sort of well-constructed parallelism, not just for the ending but for multiple episodes of the story.

I bring these terms forward not to insist upon them as prescriptive of practice or critique, but as examples of the kind of vocabulary we need to describe design strategies originating from the desire to tell a story in way that could only be told through interaction and computation.

In addition there are lines of analysis that should be revisited from the perspective of IDN, including authoring systems thought of as specialized for games or hypertext that have served as platforms for storytelling, and artifacts subsumed under "art games" or "interactive videos" or "museum installations" or "location-based games" or "electronic literature" or "augmented reality" that may turn out to have more in common with one other and with commercial narratives when assembled within this context.

4.3 Kaleidoscopic Form

Finally we come to the most promising aspect of reframing IDN as its own cultural form and envisioning the multiple siloed communities of practice as collaborators in a common enterprise: the fostering of more coherent and expressive storytelling.

I have described the process of assembling this new research community as a gathering of its objects of study into new patterns, like beads re-assembled within a kaleidoscope. But the metaphor of the kaleidoscope is also my own vision for the internal structure of each of the IDNs. By moving storytelling from the unisequential genres of print-based novels and conventional films and TV shows to the new digital medium

capable of multiform and multisequential genres like procedural scenarios and branching narratives, we open up the possibility of expanding our understanding of the world and our cognitive capacity.

Every external medium, from spoken language to written and printed words to recorded images expands our capacity to share our individual experiences and thoughts, to preserve them over time, and to benefit from our collective understanding by building upon it. Printed books expanded our ability to organize knowledge and to present through fictional and nonfictional narratives sustained descriptions of interconnected fates and psychological depths. Because of centuries of collective knowledge-creation we now increasingly understand the world as interconnected systems, and we look for the causes of everything from global climate change to specific instances of human suffering in multiple actions by collective and individual actors over time and distance.

IDN offers us a way of representing these interconnected chains of causation in increasingly coherent form, so that we can zoom in and out through time and space and abstraction layers, and across points of view and frameworks of interpretation. Just as print formats have allowed us to create more extensive arguments and refer to them and dispute them with more precision, so digital formats, and particularly interactive digital narratives can allow us to present the same story from multiple points of view and within multiple cultural and social patterns of cause and effect.

Creating such kaleidoscopic story structures even for fantasy worlds and genre fictions with unrealistic characters and events, will be an important component of building such a medium, because it will expand our cognitive capacity, our ability to keep complex systems of cause in effect and contradictory interpretations of the same scenario in mind. It could also foster greater flexibility of mind, by allowing us to see any set of circumstances as a scenario open to recontextualization and change.

I have elsewhere argued for this kaleidoscopic property of digital media in general [37] and for the power of parameterized stories to move us to a point at which we exhaust all the variations and as a result find a revelation of a new, more progressive and inclusive paradigm, to the point of transformation [2, 3]. Looking back at my selection of landmarks over 30 years of IDN practice I see moments that suggest this kind of transformation, in the implicit critique of consumerism in *The Sims*, for example, or the "he said/she said" presentation of a broken marriage in *Façade* or the multivocal presentation of a stressful family life in *Gone Home*.

The concept of kaleidoscopic form could be helpful in reframing critical discourse that is now hampered by the need to describe IDNs in language appropriate to game design. For example, consider Inkle's adaptation of Jules Verne's *Around the World in 80 Days* (1873) in the "interactive fiction game" *80 Days* (Days:2014vm}. One of the authors, Meg Jayanth purposely created situations in which the protagonist, and player's only character, a European valet accompanying the novel's hero Phineas Fogg, would be unable to get a truthful or openly confiding response from someone because they would be seen as a colonial stranger and therefore not to be trusted. This explicitly disappoints the interactor's expectations, but it is an expression of the moral physics of this retelling of the highly colonialist original. Meg Jayanth frames this difference as being purposely "unfair," to the "player," and justifies it on ideological grounds [40]. But if we reframe the artifact as an interactive digital narrative, then "unfairness" can

be understood as intentional procedural irony. We can ask whether the moral physics of anticolonialism is communicated well enough by other aspects of the game so that we can understand why a character is refusing to be communicative. And we can think about whether another version of such a story might allow us to switch point of view, so that the European character might not understand the interaction, but the interactor might abandon the whole adventure and choose to see the world through the eyes and goals and frustrations of the local servants rather than the European masters. From an IDN interpretive position, *80 Days* is not a peculiarly unfair "game" with an ideological argument for a different kind of gaming, but a well-formed interactive narrative with a coherent moral physics offering a new narrative mechanic that could be further developed as part of the collective enterprise of establishing the building blocks of kaleidoscopic form.

It is a common complaint against digital technologies, especially in the areas of journalism and social media that the ubiquitous internet is making us more isolated within our separate interpretive bubbles, unable and increasingly unwilling to hear opposing voices. Taking the long-term view, we can see how computational forms could help us address the problem, not by bringing each of us more of the opposite viewpoints, which could intensify antagonisms, but by promoting a more radical perspective on binary oppositions. For example, a kaleidoscopic habit of thinking could help us to reframe the questions that divide us so that the divisions fall in different places, and through greater insight into formulas of repetition it could bring us to the point of exhaustion at which we begin to wonder who is our common enemy and how are they benefitting from these divisions? It could help us identify the metastructures that foster repetitive patterns of social conflict, and to envision a more integrated transformational future. Newspaper and TV News formats and web-based versions of legacy news sources offer platforms for presenting repetitive story structures with a limited cast of characters. A more flexible and multivocal storytelling format could help us create new forms of shared representations that let us agree on common facts, and recognize that these facts can also be understood in multiple schemas of representation, each reflecting their own explicit values.

This is my own most hopeful scenario. My minimal expectation is that the scholarly study of IDN will improve the practice of IDN and make for richer and more complex stories. I invite you all, the audience/readers for this talk, to take similar advantage of this auspicious moment to make your own list of landmark IDNs and to investigate for yourself what common patterns across time and communities of practice such a kaleidoscopic view can provide.

References

1. Weizenbaum, J.: Eliza — a Computer Program for the Study of Natural Language Communication Between Man and Machine. Communications of the ACM. 9, 36–45 (1966).
2. Murray, J.H.: Hamlet on the Holodeck: the Future of Narrative in Cyberspace. Free Press, New York (1997).
3. Murray, J.H.: Hamlet on the Holodeck. The Free Press, New York (2016).

4. Weizenbaum, J.: Computer Power and Human Reason. W. H. Freeman & Co., Oxford, England (1976).
5. Crowther, W.: Adventure [Video Game], (1976).
6. Lebling: Zork [Video Game], (1980).
7. Blank, M.: Planetfall [Video Game], (1983).
8. Blank, M.: Deadline, (1982).
9. Wreden, D.: The Stanley Parable [Video Game], (2013).
10. Joyce, M.: Afternoon, a Story. Eastgate (1987).
11. Sierra Entertainment: Mystery House, (1980).
12. Sierra Entertainment: Wizard and the Princess, (1980).
13. Nooney, L.: Let's Begin Again: Sierra On-Line and the Origins of the Graphical Adventure Game. American Journal of Play. 10, 71–91 (2017).
14. Fernández-Vara, C.: Shaping player experience in adventure games. In: Extending Experiences. Lapland University Press (2008).
15. Landow, G.P.: Hyper/text/theory. Johns Hopkins Univ Pr (1994).
16. Schank, R.C., Abelson, R.P.: Scripts, Plans, Goals, and Understanding: An Inquiry Into Human Knowledge Structures. L. Erlbaum Associates, Hillsdale NJ (1977).
17. Nelson, T.H.: Computer Lib/Dream Machines. Tempus Books of Microsoft Press, Redmond WA (1987).
18. Bush, V.: As we may think. The Atlantic Monthly. 176, 101–108 (1945).
19. Laurel, B.: Computers As Theatre. Addison-Wesley, Boston, MA (1991).
20. Furstenberg, G., Farman-Farmaian: A la rencontre de Philippe, (1993).
21. Furstenberg, G., Murray, J.: Dans un quartier de Paris, (1999).
22. Cyan: Myst, (1993).
23. Aarseth, E.J.: Cybertext. JHU Press (1997).
24. Montfort, N.: Twisty Little Passages. MIT Press (2005).
25. Wright, W.: The Sims [video game], (2000).
26. Molleindustria: Every Day the Same Dream, http://www.molleindustria.org/everydaythesamedream/everydaythesamedream.html.
27. 2K Games: BioShock, (2007).
28. DMA Design: Grand Theft Auto 3: Liberty City, (2001).
29. Rockstar: Red Dead Redemption, (2010).
30. Mateas, M., Stern, A.: Procedural Authorship: a Case-Study of the Interactive Drama Façade. Presented at the Digital Arts and Culture 2007 (2005).
31. Mateas, M.: A Preliminary Poetics for Interactive Drama and Games. Digital Creativity. 12, 140–152 (2001).
32. Short, E.: Blood and Laurels, (2014).
33. Anthropy, A.: Dys4ia, (2012).
34. Frasca, G.: Videogames of the Oppressed, http://www.ludology.org/articles/thesis/FrascaThesisVideogames.pdf, (2001).
35. The Fullbright Company: Gone Home [Video Game], (2013).
36. Telltale Games: The Walking Dead [Video game], (2012).
37. Murray, J.H.: Inventing the medium : principles of interaction design as a cultural practice. MIT Press, Cambridge, Mass (2011).
38. Telltale Games: Game of Thrones, (2014).
39. Mountains: Florence, (2018).

40. Jayanth, M.: Practice 2015: Meg Jayanth. NYU Game Center, New York City, NY.