Interactive Storytelling in V.R.: Coming Soon?

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Abstract. There have been many smart people throughout history who have misidentified the potential, or lack thereof, of new technologies. Thomas Edison, for all his genius, failed to anticipate the market for cinematic entertainment. His company's early films lacked storytelling, and its film display technology, the Kinetoscope, permitted only one person to watch at a time. Perhaps there are lessons here for Virtual Reality (V.R.). Some have assumed that as entertainment becomes increasingly immersive, movies will somehow be absorbed into V.R. Even as many of the technical preconditions for this vision have fallen into place, there remain logistical and practical problems. Translating conventional forms of story authorship into the immersive, interactive context may not be sought-after. What is an interactive movie, after all? Even if strategies can be found to write and produce interactive V.R. movies, the results may be different from what people have been expecting.

Keywords: Interactive · Virtual Reality · Storytelling

1 The Confusing Evolution of V.R. Movies

1.1 A Comparative Approach

There are a number of promising applications for immersive V.R. media that don't involve storytelling. The virtual camera opens up thought-provoking new views of human anatomy and the stars. One may learn about the past by traveling in time and space to explore historical events and civilizations. Whether it's synthetic views of historical reconstructions, or the 360° video of V.R. documentaries, the user's ability simply to turn and navigate may constitute sufficient interaction within these "spaces" of discovery.

The distribution of Google's "Cardboard" (a cheap, head-mounted display system for cellphones) in editions of the New York Times in late 2015 signaled the arrival of emotionally moving documentary V.R. content for a wide audience. After donning a Cardboard and opening *The Displaced* (2015), one was transported into an immersive video recording of children displaced by war. But documentaries – whether immersive or conventional – don't generate the amount of buzz that has surrounded V.R. in recent years. The same can be said about historical reconstructions of ancient cities and monuments that can be explored through V.R. They are not the kinds of V.R. applications that genuinely excite venture capitalists.

That Facebook paid $2.3 billion for Oculus suggests how serious Mark Zuckerberg is about V.R.'s social media potential. V.R.'s head mounted display technology also

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has enormous potential for video games, where it offers a rich, immersive virtual presence. While immersive social media and video games are mostly beyond the scope of the present paper, there is little question that V.R. can flourish in those contexts.

But despite the existence of such promising applications for V.R., there's just something about V.R. that makes people believe that, beyond gaming, it will also become a medium for telling stories. Somehow "V.R. movies" will become a big thing, rather than a fantasy born of Hollywood science fiction. Some might object that talk of "people" believing in the inevitability of V.R. movies amounts to a straw man argument, but it's just not true. Anyone who has been to a V.R. conference or trade show knows that the popular imagination of the future of V.R. is expansive. Cinematic, interactive V.R. is a dreamy technology that is supposed to arrive before the flying car. And if you don't believe it, check out the streams of venture capital for emerging concerns like V.R. animation [1]. What follows is not simply an analysis of why this dream remains unfulfilled. It's also an attempt to imagine a realistic version of this whole V.R. movie scenario. Charting a course for the advancement of interactive V.R. storytelling is not just a technical problem: it demands a deeper look at V.R. as a storytelling medium.

1.2 Beyond the Bells and Whistles

In a sense the Netflix V.R. app does bring movies into V.R. But reviews for this very limited V.R. experience reflect considerable frustration and disillusionment. There is certainly no interactive storytelling involved in this display adaptation: streams of movie and television video are simply texture mapped onto a rectangular surface in a 3D environment. If you don't want anyone else to know what you are watching, maybe there's a reason to trade a flat screen for a head mounted display with Netflix V.R. Otherwise don't bother.

When intoxicated with technological novelty, people are often mislead by appearances. Head mounted displays, after all, seem like an advancement over the 3D glasses that appeared in 1950s movie theaters. They both make three dimensional illusions possible. Nevertheless, intriguing photos of theaters full of V.R. spectators (e.g. promotional photos of the "Samsung Galaxy Studio Gear VR Theater") can't change the fact that in true V.R. the camera's point of view is identical to the spectator's point of view, and that's just not how movies have worked since the 19th century. Letting the spectator aim the camera is a radical change in the orientation of cinematic content.

1.3 Accommodating the User's Perspective

The pioneering filmmaker, James Cameron, who has worked extensively with motion capture and the integration of photography and simulation, articulates an important distinction concerning 360° videography and "true" V.R.:

> [W]hat most people are calling V.R. right now isn't V.R.. It's really omnidirectional camera. And because you don't really have any spatial control – any spatial movement is baked in – you [only] have the ability to look around in an environment, and that's not true V.R.. [In] true V.R.,

> you can move around. And you have a lot of control over where you are spatially in the environment [2].

This critique applies to a number of contemporary V.R. movie experiments. For example, *The Limit* (2018), directed by Robert Rodriguez and billed as a Virtual Reality Film, uses a passive V.R. approach that locks the user to the position of the 180° camera throughout. Its first person style resembles *Hardcore Henry* (2015) in this respect. One reviewer said of it "The constant jumps and forced head turns quickly cause motion sickness and take you out of the film …. the whole experience was literally nauseating" [3].

There are also some exceptional works of V.R. that rise above the struggles of innovation, like Patrick Osborne's short format *Pearl* (2016), which uses music and editing effectively. The spectator's point of view in *Pearl* is fused to the passenger seat of a car throughout, providing a fairly restrained visual field. Making head rotation the user's only notable freedom allowed the director to rely more on traditional filmic problem solving.

Although V.R. production contains elements of movie production, the similarities can overshadow remarkable differences. The use of omni-directional cameras represents a significant challenge to movie making. It's no wonder that many V.R. movie directors today opt to constrain viewers to an "on the rails" point of view, or to employ devices like a shark cage. If V.R. movies trend toward "true" V.R. with spectator mobility, the disruption in how movies are made will be even more profound.

Today most mainstream movies still employ live action and traditional camera work. Yet that mode of production with its lights, dollies, hydraulic jib arms, and microphones doesn't really lend itself well to immersion. Computer generated imagery removes all that visual clutter of film production, and the focus shifts to modeling, virtual lighting, and virtual set design. Under these circumstances of virtuality, where the camera's point of view becomes the spectator's, the discipline of cinematography disappears.

This subtraction represents a loss of control for the storyteller. Consider the pre-production process. In a conventional movie, a storyboard is often used to plan for framing, composition, editing, and camera angles. But for an immersive movie in which a user controls the camera, many of the concerns of a storyboard are swept up in uncertainty. The visual language of editing and camera angles is overcome by unknowns. A user could be staring at the sky or at his own navel. Each moment of a storyboard needs to be drawn as a spherical panorama in order to encompass the user's potential visual experience. Such indeterminate conditions for aiming and framing make it very difficult for a director to anticipate a spectator's visual experience of a story.

2 Adding Interaction to V.R.

2.1 The Mobile Observer

The implications of V.R. described to this point, as radical as they are, do not encompass giving spectators much more than the ability to control the camera. Can

wandering around an open world, and being visually immersed, satisfy the expectations of progress that people may bring to V.R. movies? Since 2011 an off-Broadway theater in New York City has been running an experimental production called *Sleep No More* that illustrates one approach to interactive drama. It presents Shakespeare's Macbeth in a spatially distributed way that lets spectators move from room to room, where actors enact scenes as though they were looping. There is a notable rule: spectators are not meant to affect the scenes. Visitors just circulate among actors as if they were walking past artifacts at a museum. This raises important questions about what forms of interaction belong in V.R. movies.

If viewers can skip scenes, or affect them, the resulting stories are non-linear. This means that there's no official version. The shared experience people associate with reading the same book or watching the same movie does not apply. With non-linear V. R. movies, two participants could come away from a viewing with the sense that they didn't watch the same movie. Instead they might feel that they experienced a similar genre, or that their stories took place in some of the same places. Would the Oscar for Best Picture go to the version that happened when spectators took the staircase to exit the opening scene?

2.2 Interacting with a Movie

Since adding any sort of interactivity to movies breaks with convention, it stretches the definition of a "movie" to make audiences do something other than watch (applaud, laugh, etc.). Are viewers who are accustomed to traditional movies and television primed for this empowerment? It's worth noting that the DVD already adapted movies into one interactive format. Through the DVD menu users discovered options for languages, deleted scenes, and director voice-overs. This interactive overlay did not bother many people, perhaps because it was "bonus" material – there was always a comforting and prominent button that began playback of a regionally-specific default version of the movie. Could a V.R. movie provide a similarly interaction-free default, enabling a conventional movie experience if one faced forward and watched? Such a gentle introduction of V.R. could follow the path of the 3D movie in becoming a generally accepted optical enhancement.

Limiting the spectator's control of the point of view would have the added benefit of keeping spectators in their seats and maintaining continuity with the director's traditional practices of framing the story for the viewer. Even so, it's hard to imagine that user curiosity could be bottled up by treating head mounted display systems like glorified 3D glasses.

The very nature of V.R., which reacts fluidly to a user's movements with sensors, suggests that a V.R. movie must explore interactivity more deeply. Yet, from the point of view of the filmmaker, how could one manage the unruly spectator's desire for control? The invention of a navigable virtual space in a "movie" is a radical departure from tradition. Letting wandering viewers tear down the fourth wall wreaks havoc with the visual language of cinema in so many ways. Jump cuts from locale to locale, which are normal in conventional editing, compete with spectators' sense of camera control, making them feel as though they're being teleported all over the place. And just where should people don their head gear? Which "tracking mode" is best? Should users watch

a V.R. movie from inside a spherical hamster wheel so that their actual confinement doesn't spoil illusions of virtual space?

Of course anyone familiar with contemporary video games knows it's possible to feel movement in a virtual space from a seated position. But do people really want to navigate V.R. movies with a mouse or a game controller? It's certainly not intuitive for non-gamers.

2.3 Interface Innovations

While there is no universally agreed-upon mechanism for enabling a spectator's participation in an interactive story, there are a number of possible solutions, some of which are already being used in games. The exhilaration a player feels while driving a video game experience has its own intrinsic appeal, to be sure; but importing that "player" involvement into a story that feels like a movie is something of a riddle. Movies in theaters have essentially no user interface: eyes are paired with a luminous image. In V.R. there are several possible forms of feedback, including gestures. With head mounted displays there is no definite need for things like buttons, game controllers, or menus, although these are often used now. A spectator's gaze to the left or right can trigger changes in the movie. This type of activating gaze is implemented nicely in the *Land's End* (2015) puzzle game, for example. Although theaters have discouraged talking during movies, the voice is another way to interact with V.R. movies.

2.4 Identity Problems

With the appearance of more and more V.R. games, some are beginning to emphasize storytelling more. The V.R. movie short *Blade Runner 2049: Memory Lab* (2017) – which uses a game controller – can be considered a game, too. Just not a good one. The narrator often calls attention to the game controller and how it must be used in order to advance to the next chapter. Although it is a tie-in for a feature film, its distribution, reviews, and documentation belong to game ecosystems in which terms like "Game Play" and "Game Mode" frame the user's expectations. Is it a game? An interactive movie? It can be a little bit of both with immersive game-movie hybrids. But in the end it's hard to care when the story is as perfunctory as the game play is tedious.

It is tempting to apply "duck test" abductive reasoning to this ambiguity. If it walks like a duck, swims like a duck, and quacks like a duck, it's probably a duck. In other words, if the types of interaction in V.R. look and feel like game play, it's probably a game. Likewise, if a V.R. user's actions situate her imaginatively in a drama, comedy, or thriller, then the interaction belongs to a V.R. movie. But this approach is problematic because the many permutations of game and cinematic elements seem to defy rigorous taxonomy. The awkward marriage of cinema and game interaction has led some industry commentators to wonder what can be done. The V.R. reviewer Jaime Feltham cites a quote from Hideo Kojima as "a touchstone" for his reporting on V.R.:

> [Kojima] said that game developers "see VR as an extension of traditional games, but I think it is not." While I've always agreed with that sentiment, I've also longed to know what he thinks V.R. is. And maybe it's this; maybe it's not an extension but a splicing of both games and film,

> something that takes their core attributes and builds on top of them to deliver media that is genuinely new [4].

It's unsurprisingly that emergent V.R. animation and V.R. movies borrow from gaming in many ways, relying on game logic, button pushing, and other game elements to accommodate the spectator's participation. Opinions are bound to differ about how much of the gamer's toolkit belongs in a V.R. movie, but there's no denying that today it's mostly gamers who own head mounted display systems. The distribution networks and production tools for V.R. and video games are virtually the same phenomena. But borrowing doesn't always work if the goal is to make something new.

While it may seem like injecting interactivity into the story structure of movies transforms them into interactive games, there is ample evidence from the domains of Net Art and media art that interaction does not magically turn user experience into game experience. As more people who are not interested in games begin making V.R. movies, they will find ways to use interactivity that are unrelated to gaming.

2.5 Incompatible Parts

Immersive and interactive storytelling "that is genuinely new" will remain elusive until directors and developers gain a stronger grasp of what works well in V.R. As V.R. storytelling finds its identity, the influence of cinema can be as problematic as the influence of games. The embedded plot-expository video ("cutscene"), is an example of one problematic technique. It is a cinematic storytelling device that appears in both video games and V.R. experiences. Transplanting it into an immersive, interactive context may serve the storyteller. But at what cost? Cutscenes feel like canned elements that interrupt the user's sense of being in a scene. Writer Danny Bilson has called them the "last resort of game storytelling" [5]. When cutscenes stall the usual interactive dynamics of an environment with unavoidable story development, it can feel intrusive and superficial. While cutscenes, which are sometimes called "cinematics," can inject some cinematic flavor into a V.R. environment, a reliance on them to orient the spectator can feel like a collision of two creative forms. As interactivity becomes a more common cinematic element, the embrace of film language will continue to evolve.

2.6 Translations and Mis-translations

There are already countless game and movie hybrids. The struggle for the V.R. movie to emerge from the shadows of cinema and video games is taking place at a time when games are being adapted as movies, and movie elements are being integrated into games. In an interview with *Fortune* in 2015, the gaming legend Shigero Miyamoto said "Because games and movies seem like similar mediums, people's natural expectation is we want to take our games and turn them into movies…" [6]. His skepticism about this conversion is rooted in his feeling that games are interactive whereas movies are passive.

An array of poorly-rated game-inspired movie crossovers support Miyamoto's view. Movie adaptations of popular video games reveal that script writers often struggle to translate the quest and task preoccupations of game users into a

conventional movie format. The variability of game play doesn't seem to map well onto the dependable sameness of the playback of linear movies.

2.7 The Non-linear "Page Turner"

By comparison, adapting novels to the silver screen is a piece of cake. It is done all the time. Even though the visually-oriented language of film differs from the textual novel, there is a direct parallel between the beginning, middle and end of stories in each medium. Movies may not excel at some of the things that a novel can do well, like internal monologue, but at the end of the day they are both linear media.

Adapting a novel to an interactive, non-linear medium is a trickier proposition. Riddles like "What happens in the race sequence if the main character hasn't yet met his adversary?" are problems that belong to authors wrestling with non-linearity. Orchestrating a complex non-linear story is not for the feint of heart.

In a 1936 letter to novelist John O'Hara, F. Scott Fitzgerald advised young novelists to start with a big outline: "put down an outline of a novel of your times enormous in scale … and work on the plan for two months. Take the central point of the file as your big climax and follow your plan backward and forward from that for another three months" [7]. For Fitzgerald, laying the foundation for a solid novel meant five months of heavy lifting.

In order to achieve a tight plot – a page turner – the author Michael Crichton committed his story ideas to note cards. Later he would anguish over the sequencing of scenes and dialogue. This deliberation was a crucial first step in crafting his best selling novels. These details about writing process just go to show what many failed authors already know: writing a linear story that dazzles readers is very difficult. Creating reconfigurable non-linear stories with alternative plots, each of which feel similarly resolved and suspenseful, is an even bigger challenge. Moreover, this arduous conceptualization process is an aspect of V.R. "authoring" that is treated as a bit of an afterthought in the curricula of many college programs where students are learning to make V.R. content.

Given this bias, it is unsurprising that a celebrated V.R. movie like the short-format *Jurassic World: Blue* (2018), which is advertised as "stunning" and "groundbreaking" by its creators, has essentially no story whatsoever. Like the earliest and most provisional films ever made in the 19th century, which also lacked conceptual savvy, it only delivers an impressive feeling of presence. In the absence of a story, the spectator just gets to look around at dinosaurs that play and fight inexplicably. It needs a genre title, so let's call it "gawker V.R."

2.8 The Illusion of Meaningful Interaction?

In the early 1990s experimental "hypermedia" interactive stories were common. They often confined users to a few forking paths. Although it was fun for a while, the market for CD-ROM-based hypermedia – always small by comparison with DVDs – was short-lived. The tendency to reduce storytelling to a series of mundane choices (clicks) probably contributed to the decline. The experiences often felt more labyrinthine than fictional. Ultimately it just wasn't a very compelling form of storytelling.

With V.R. some similar storytelling habits have emerged. Limited user control of stories is the path of least resistance for interactive V.R. production. It's easier to script V.R. that offers few plot-triggers, and that funnels users into a mostly linear story. Given the state of the art, it's understandable that developers would want to coax spectators onto a linear path: the production of multiple plot lines is time-consuming.

Before long people will become tired of the illusion of choice. Should developers then go the extra mile to invent non-linear stories for users to navigate? It's worth asking whether there's even a demand for V.R. movies that have branching stories. After all, it hasn't been an especially popular format in other media.

Netflix made a notable effort to explore the potential of user-controlled branching stories in 2017. The streaming format required viewers to control animated stories every few minutes by choosing either a left or right directional button. One title, *Puss in Boots: Trapped in an Epic Tale,* was produced by Dreamworks Animation Television. Far from earning accolades, by 2019 it had yet to earn a score from Rotten Tomatoes for lack of audience and critic ratings. Another offering, produced by American Greetings Entertainment and named *Buddy Thunderstruck: The Maybe Pile*, generated such a tepid response that by 2019 there were no reviews on either the Internet Movie Database or Rotten Tomatoes.

If there really were audience demand for movies with multiple endings, wouldn't the phenomenon have surfaced in more ways? The existence of multiple editions of movies demonstrates that at least some *directors* want different endings than their studios. But director's cut DVDs and Bluray editions – featuring new edits, deleted scenes and alternative endings – have only ever been a minor, niche market. Often a studio will opt to leave an alternative ending on the cutting room floor, after conducting focus group testing to establish which conclusion audiences like best. What's more, the audiences that watch both endings are compensated with free tickets: their contribution to the production is treated like a chore.

2.9 After the Hype Settles

At some point the limitations of branching V.R. stories and gawkers will become more apparent than they are today, when all things V.R. still feel brand new. The allure of omni-directional cameras will wear off, as will watching conventional movies with head mounted displays. What then?

Low-hanging fruit approaches to doing stories in V.R. may never generate the audience interest that venture capitalists are hoping for. Sure it's not too hard to make V.R. stories in the form of *Sleep No More* that restrict user interaction to wandering in an open world where movie scenes transpire. But it doesn't sound like the next big thing in cinema. It's also easy to ignore the demise of early 1990s hypermedia, and Netflix's interactive animation failures. V.R. movie directors can keep trying to find an audience for branching stories that offer periodic choices, or a few different endings. But that doesn't look like a recipe for a popular revolution in film arts, either. In the near term, as V.R. tie-ins for feature films, studios will probably continue to fund free-to-download gawkers that keep spectators glued to the cameraman's point of view. But these spectacles will leave people wanting more.

2.10 Dynamic Interactive V.R. Movies

A phenomenon that deserves the name "V.R. movie" needs more than just a navigable virtual space – what Cameron calls "true" V.R.: it ought to have a compelling interactive story that is impacted – even *transformed* – by user behavior. The ability to interact in profound ways with a story that's unfolding would undoubtedly feel new and different. The question is how to accomplish this, practically speaking. Producing V.R. experiences that give spectators creative control of a story is hard.

Transitioning to this form won't be a simple matter of adopting a new breed of camera. Ceding control over a story's sequence and the viewer's point of view requires a major rethink of the whole production process. Each option given to spectators could demand more work for content developers. Empowering spectator co-creators to pursue personal interests in a story framework also raises quality control issues. If spectators are allowed, somehow, to co-author a story, they will still want to feel that "their" story ends well. Who is responsible for the resulting story? Can audiences be relied upon to do the heavy lifting to resolve the narrative consequences of their (potentially haphazard) interventions? Wrestling with the user interface and user experience problems of weaving interactivity and immersion into the movie form is already a lot to ask. Should the responsibilities of the movie makers expand to include every potential story arc, too? It seems that the desires of spectators for control may overwhelm the abilities of V.R. movie makers to satisfy them.

You might think that these kinds of dilemmas would concern V.R. investors. Given that the transition to interactive V.R. movies is disruptive and difficult, it's reasonable to wonders whether the motivations to fight through logistical challenges are strong enough? For the moment, at least, the race to monopolize this new terrain continues. Disney, for one, has been pouring money into interactive animation even though the near-term results don't appear to be profitable [8].

3 Making Interactions Movie-Like

3.1 Being Present but not Passive

How can V.R. spectators become participants and co-creators of a story? How do content developers accommodate greater freedom of user interaction without generating a crazy work-load for themselves? It may help to look to the past for some answers.

Traditional live theater has always allowed actors some communication with the audience, permitting them to respond to laughter, shock, tears, or boredom with nuanced performances. This could be automated. It is possible for sensors to detect when a user laughs or cries, and then to apply this feedback to the story. But instead of automation it might be more interesting simply to bring more of the live, human element of theater into V.R.

Perhaps interactive storytelling in an immersive context is well suited to actors and writers. The actor Walter Matthau once claimed that his true talent was performing in theater rather than in films. "On the stage I could move with freedom and ease. And I had something: presence. On screen, all the power is in the hands of the director or the

editor" [9]. Shifting the balance of power towards actors and letting them *ad lib* could be worth watching. If a cast of actors convened in an immersive setting, interesting movie-like experiences could be enacted. The loosely-scripted ensemble comedies directed by Christopher Guest in the 2000s (Best in Show, A Mighty Wind, etc.), demonstrate that actors are capable of ingenious improvisation. Even so, the results in this scenario would only be as good as the participants. It's hard to envision this phenomenon being very popular because most people are not talented improvisational actors.

Of course amateurs could also behave as actors in cyberspace, engaging in play that resembles live theater. Maybe this type of participative V.R. could work despite a lack of talent, like karaoke. Variations on this general idea, like historical reenactments, or a Rocky Horror Picture Show style of fan participation in V.R., could become popular, too. But in some ways these kinds of collaborative behavior seem more closely related to social media applications for V.R. After all, when people get together to screw around, it usually doesn't result in something that feels like a movie.

3.2 Movie Machines

Jonathan Swift, in his 1726 book *Gulliver's Travels,* described a mechanical device capable of generating sequences of words. He attributed the engine to ridiculous inventors; and with it, he relates,

> … the most ignorant person, at a reasonable charge, and with a little bodily labour, might write books in philosophy, poetry, politics, laws, mathematics, and theology, without the least assistance from genius or study [10].

In the spirit of Swift's Academy of Lagado, every gathering devoted to advancing V.R. includes a contingent of believers who will dismiss every deficiency in contemporary V.R. as a technical challenge. At the risk of bolstering this dubious analysis, it's worth entertaining the possibility that technical innovations will indeed reshape some of the problems of authorship and interactivity in V.R. movies. Perhaps it's wrong to ask *who* will be responsible for the work of resolving storytelling problems. It may be more a question of *what* will govern the interactive stories.

Story sequencing and plot dynamics of V.R. movies may become an interplay among conventional authors, participative spectators, and software constructs that leverage advancements in artificial intelligence. Indeed, A.I. may bring about an entirely new balance of "creative" control between authors and machines.

According to a New York Times report, many news organizations are already employing A.I. to "write" news articles.

> A.I. journalism is not as simple as a shiny robot banging out copy. A lot of work goes into the front end, with editors and writers meticulously crafting several versions of a story, complete with text for different outcomes. Once the data is in — for a weather event, a baseball game or an earnings report — the system can create an article [11].

While today's automated news articles represent a fairly basic automation of journalistic grunt work, they also demonstrate the potential of machines to encroach upon the role of the writer.

Years ago, as a graduate student focused on literature, I happened upon Dr. Wendy Lehnert's quirky A.R.P.A.-funded research entitled "Plot Units and Narrative Summarization" [12]. The ways that she abstracted and analyzed stories struck me as obtuse, and the article's hand-drawn diagrams seemed absurdly mechanistic. Yet with the passage of a generation since it was published, the approach looks more and more like groundwork for the emergence of artificial intelligence in the domain of stories.

With further developments in A.I. and natural language processing, encounters between V.R. spectators and bots could become indistinguishable from dialogue among human actors. Free-form conversations with artificially intelligent avatars could be folded into flexible plots. In addition, if the plots of a lot of existing stories could be effectively "learned" by an A.I., then it seems plausible that people could become actors within stories that are adaptively refactored according to their actions. In other words, an A.I. construct could draw upon many learned plots in order to generate a story that adapts spontaneously to user behaviors. The A.I. would introduce plot twists to drive the collaborative story toward a satisfyingly familiar conclusion. It may not sound like the kind of immersive, interactive movie that people have anticipated for V.R., but it does seem like an extension of the movie form that could generate a sizable new audience.

3.3 Limited Solutions

However, if software does begin to supplant the works of human actors, directors, and writers with artificial intelligence pastiche, the trend could be more objectionable than the V.R. mediocrity that prevails today. Whereas human writers and directors live in the historical moment and produce new work that is a reflection of feelings and analyses of the world around them, an artificially intelligent movie system that is taught to mimic existing work would not grapple with change, history, and mortality in a comparable way.

An A.I. capable of personalizing stories would also undermine the way one thinks of a movie as a discrete creative work. Choosing a V.R. movie would become like a self-centered a-la-cart configuration: after calling up "an action thriller set in Europe with a washed-up gambler as a protagonist and a comical villain," the A.I would drop you into the first scene. In some ways this resembles the dystopian future in the Wim Wenders film *Until the End of the World* (1991), in which everyone became screen-addicted to handheld devices that let them watch their own dreams.

But perhaps it's not the viewer's dreams that are most troubling. If people strap into virtual encounters with artificial intelligence on a regular basis, it matters who designed the A.I. and why. It's reasonable to question whether meaningful interaction and quality of storytelling even matter to the venture capitalists who are feeding the V.R. frenzy. At some point the question must be asked: to what limitation in existing movies does the move to interactive audiences respond? Is it that traditional audiences are not pressing BUY buttons fast enough? Does V.R. figure to improved yields from embedded advertising? Would giving moviegoers virtual guns attract more gamers? Maybe big companies are scared that they'll get left behind if they miss the next wave.

Despite the specter of cynical motivations, the future of the V.R. movie can only further "industrialize" people's minds, as Enzensberger has put it, with contributions

from creative workers [13]. There are now many thousands of people involved in building, evaluating, and imagining this new V.R. art form, summoning it into existence. Despite the many half-baked provisional experiments of the present, which seem incapable of sustaining interest for long, the V.R. movie is in its infancy. There is still a viable potential for V.R. to appeal to an engaged, impactful spectator/participant – a potential that could make inventing the V.R. movie worthwhile. Will the V.R. movie become a beautiful and vibrant new art form, or a blindingly seductive distraction that envelops us ever deeper in a cocoon of virtuality and e-commerce? It's up to the people who shape its further development.

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