When a Product Is Still Fictional: Anticipating and Speculating Futures through Concept Videos

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ABSTRACT
This paper explores corporate concept videos as a type of design fiction that embed a vision about the future of computing – including how computing should be done, for whom, and the norms that might exist – and allow for a discourse to explore and contest these claims. We introduce a method for critiquing and analyzing concept videos. Through an analysis of Google Glass' and Microsoft HoloLens' concept videos and a discourse analysis of media articles during the time period after the products were announced but before they were available to the public, we introduce a method of analysis that lets us surface values and critique the narratives presented in technology concept videos and in early media reactions. We also introduce the language of "anticipatory" and "speculative" orientations toward the future to better describe how people imagine sociotechnical futures.

Author Keywords
Concept videos; design fiction; discourse; imagination

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous

INTRODUCTION
In April 2012, Google announced a project called Project Glass, publishing a concept video on YouTube entitled "One Day" [44]. While not ready for public release, the video presented a first-person view of what using Glass could be like, showing a user's experience with an augmented reality-like heads up display. For the next year, early versions of Glass were used almost exclusively by people within Google, until the Google Glass Explorer project launched in April 2013, allowing a limited number of individuals from the public to purchase and use Glass. In January 2015, Microsoft announced its augmented reality head-worn display, called Microsoft HoloLens, publishing a concept video on YouTube called "Microsoft HoloLens – Transform your world with holograms" [56]. Some people drew comparisons between Glass and HoloLens [55, 58]. Both appear as head-mounted devices, like glasses or goggles (Figure 1). Both have cameras, allow for internet connectivity, and can overlay information in a user's field of view. While similar in some ways, the underlying designs, the companies' portrayals of the technology, and the emerging discussions and responses to the technologies differed. The depiction and discussion of Glass focused on its potential integration into everyday life as wearable technology, and privacy concerns emerged as well. Meanwhile HoloLens was often portrayed as a gaming device or work tool.

We argue that the concept videos for Glass and HoloLens can be thought of as design fictions. This allows us to look at an important period of time between the announcement of the technologies and their public release – at a time when the products were still conceptual or fictional to most people. This lets us see how people imagined what the world with these devices would be like, and how people's expectations about the technologies were shaped. Concept videos embed a vision about the social and technical future of computing: how computing will be done, for whom, by what means, and what the norms of that world will be.

This paper makes two main contributions. First, it introduces methods of analysis that allow us to surface values and critique the narratives presented in technology concept videos and in early media discourse about new technologies. Second, as a result of our findings, we introduce the terms "anticipatory" and "speculative" orientations toward the future to provide a more nuanced discussion about the ways futures are represented in discourse, design, and HCI research.

In the following sections, we trace related work that discusses the ways people orient themselves toward imagined futures. We then introduce a method for analyzing concept videos, and analyze the Google Glass and Microsoft HoloLens videos. We detail the discourses that emerged around Glass and HoloLens after their concept videos were released but before they were available for purchase. We then reflect on our methods of analysis and call on researchers to engage in values discussions and critique of early design representations of technologies.

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Figure 1. Top: Google Glass viewed in a box [54] and from above [41]. Bottom: Microsoft HoloLens viewed from the side and from the front [56]. Images CC-BY 2.0

RELATED WORK AND BACKGROUND

We discuss how the ideas of design fiction and processes of collective imagination inform our work.

Design Fiction

The concept of design fiction is still being shaped, yet it has garnered much interest. Julian Bleecker, in an early piece on design fictions, describes design fictions as an authorial practice that exists in the space between science fiction and science fact [3]. The artifacts of this practice exist in an imagined speculative world or narrative [21]. The focus is not just creating a single speculative artifact, but embedding that artifact in a broader world, story, or fictional reality. Design fictions are also discursive: they embody values and ideas (consciously or unconsciously) that may respond to or instigate a broader discourse [34]. They encourage discourse by often allowing viewers to construct multiple meanings from them. They are often seen as related to practices that draw on near future fictions [22] and practices that use design for provocation or subversion such as critical or speculative design [4, 11, 22, 34].

Design fictions can take on many forms. Fictional research abstracts and findings were written in text as a critique and reflection on a particular strain of research through design [4]. Others have analyzed the production of Steampunk-styled artifacts as types of design fictions [34]. Hybrid visual and textual forms [28] and short film [17] have also been used to express design fictions. While design fictions are often employed for the purposes of social critique [11], corporate storytelling, such as the Google Glass concept video, has been suggested as a type of design fiction [60]. Placing corporate concept videos in the realm of design fiction frames the video as something that is not predicting *the future*, but presenting a representation of *one possible future* out of many. It also allows us to interpret the video and investigate the ideas it promotes. Because design fictions are discursive, this suggests that such videos are best considered in dialogue with broader social discourses.

Collective Imagination Processes

Another line of work shows that representations of technology affect broader perceptions, reactions, and debate. Collective processes of imagination are expressed through and facilitated in part by processes of cultural production. For instance, Harmon and Mazmanian investigate the ways commercials and news articles create sociotechnical narratives about smartphones and smartphone users [16]. The circulation of stories and the discourses that arise frame a debate about what it means to be a smartphone user, and associate moral values with using a smartphone. Dourish and Bell explore how imaginations and narratives of ubiquitous computing create a shared narrative of the "proximate future," which exists "just around the corner" in the future [1]. This narrative is embedded, expressed, and reinforced through the actions and products of researchers and practitioners in the field, as well as through cultural expressions of the future, like science fiction [10]. Representations of technologies influence the way people imagine future technologies, build broader collective narratives about what technologies mean, and influence technological development and use. Work by Jasanoff and Kim shows how these broader narratives about technology affect science and technology policy decisions [18]. This also suggests that we should not look at the concept videos' representations of technology in isolation, but rather in relationship to broader discourses.

Analyzing Corporate Concept Videos

We extend these lines of work by looking at concept videos for Google Glass and Microsoft HoloLens as design fictions. Each video creates a narrative world that takes place in the future, depicting technical artifacts and how humans interact with them. Furthermore, the public release of the videos provides a starting point for public discussion and discourse about the technologies' social implications. Both videos offer a particular sociotechnical vision of the future and allow a broader public audience to engage with and contest the politics and values of the presented futures.

Yet corporate concept videos differ slightly from design fictions with critical ends. Unlike other design fictions which invite users to into a narrative world to imagine technologies *as if* they are real, many corporate concept videos portray technologies that *will be* real in some form. These videos more directly serve corporate purposes. While these videos do not explicitly direct users to purchase a particular product, they do reflect advertising imperatives. Utilizing imagery helps these videos help fuel demand and create markets for these novel products [12, 27]. The concept videos also share qualities with "vision videos," corporate research videos that represent possible future sociotechnical worlds (rather than a specific product), such as the "future of productivity," bringing a vision of a possible future into the present [20].

These videos serve further purposes beyond advertising. They contain elements of video prototyping, which can help designers brainstorm, communicate, and explore the functionality and contexts of new technologies [8, 23, 35]. Video prototypes may also have marketing purposes, such as Apple's 1987 Knowledge Navigator video [36].

The Google and Microsoft videos serve exploratory and probing purposes as well that support collective imagination processes. Google's Glass Explorer Program [53] and Microsoft's HoloLens research grants [51] were both announced before the products were commercially available, inviting early users and researchers to find and explore novel uses of the technologies. Thus the videos invite the viewer to imagine new uses and possible futures; they open a conversation to talk about a technology that is not fully defined yet. During the time period after the concept videos were released, but before they were commercially available, the Glass and HoloLens videos were fictional in the sense that the worlds and technologies they portray did not yet fully exist at the time of their publication. Yet as they neared their public release dates, the devices became "more real." This suggests that "fictional" and "real" exist on a spectrum, rather than being binary qualities.

The lens of design fiction lets us concurrently analyze the videos' explanatory and exploratory purposes, and their future-oriented narratives. Analyzing corporate uses of design fictions helps surface aspects of the companies' narratives that may not be at their central focus, but could have significant implications for people if those narratives come to fruition. Analyzing the creation – and contestation – of narratives by companies and the media response also provides insight into the practice of "infrastructuring" [31], making visible processes that embed or associate social and political values with new technologies.

The sections that follow offer two case studies that trace the discourses that emerge once a new technology has been announced and a concept video has been released. We then discuss themes found through our analysis of the videos and then reflect on our analysis and on the implications of analyzing concept videos as design fictions.

METHODS

Looking at discourse at a time when products are still conceptual allows us to see the emergence of cultural narratives surrounding new technologies. Advertisements and news articles do not only promote products or inform the public, but also influence people's perceptions of products and instruct users on the "proper" ways to use the technologies [13]. Looking at companies' concept videos and at articles from the media and popular press indicates what types of hopes, fears, concerns, and other narratives were created and used while imagining the roles of new technologies. We can see how an initial framing of a technology set by the company through the concept video interplays with a broader cultural discourse represented by the media and press articles. From these sources, we can see how the discourses around these technologies engage in imagining the future.

Google Glass and Microsoft HoloLens were chosen because they share high-level some similarities (both are head worn computing devices), and because some media authors drew comparisons between the technologies and their launches when HoloLens was announced [55, 58]. These comparisons may seem curious to some because their purposes, form factors, video narratives, and underlying technology differ. While people understood them as different technologies, they used their prior experience with Glass to interpret HoloLens. We present Glass and HoloLens as two separate cases, but we note that the broader social context in which the videos are interpreted and discussed are temporally connected.

Data Collection and Analysis

This analysis draws on two collections of sources. The first set consists of the first publicly released concept videos from Google and Microsoft about Glass and HoloLens, respectively. We drew on semiotic analysis techniques by looking at signs – objects and concepts in the video, and what they mean or signify [29]. In particular we followed Dyer's method for investigating visual signs in advertisements [12] by focusing on five main signals: physical appearance of people, people's emotions, people's behavior and activities, props and physical objects, and settings. We identified these elements in each video, and interpreted what types of values they may signify. We further follow Dyer by paying attention to visual camera techniques such as camera angle and focus. Beyond our own analysis of the videos, we were interested in understanding how others responded to the videos. Viewers do not passively receive these videos but bring their own social experiences and beliefs to shape their understandings and interpretations [12]. As we studied the videos retrospectively, we could not analyze people's reactions in situ. We instead turned to media discourse to see how people in a collection of media sources discussed the products after the concept videos were released.

Our second set of sources consists of articles referencing Glass and HoloLens from *The New York Times*, *Forbes.com*, and *Wired.com,* found in online news databases using the search terms 'Google Glass' and 'Microsoft HoloLens'. This includes 137 articles related to Glass published between April 4, 2012, when Project Glass was first announced, and April 15, 2013, the day before Glass was released to a number of people in the public, called Google Glass Explorers. The set also includes 33 articles related to HoloLens published between January 25, 2015 when HoloLens was publicly announced, and June 29, 2015, when HoloLens was scheduled to be sent to the International Space Station to be used by astronauts, marking a point when HoloLens would be used by a community outside of Microsoft. At the time of writing, HoloLens is not commercially available to the public. Note that the evolution of products from fictional to real is a gradual change in state, not a binary one. The end dates of the articles in the set are not intended to mark when the devices become real, but rather indicate one point when the devices move in the direction from fictional to real.

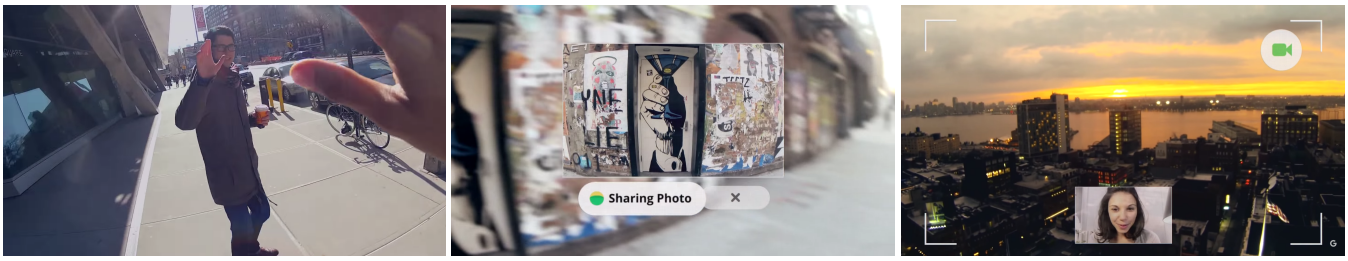

Figure 2. Screenshots from the Google Glass concept video [44] which shows a first-person point of view of Glass. Left: the user continues wearing Glass while interacting with a friend. Middle: the user uses the built-in camera to take a photo of his surroundings and share it on social media. Right: the user shares his point of view with his girlfriend while using video chat.

We are interested in how public narratives constituted meanings and concerns about these new technologies. We looked to discourse analysis to better understand the situations when HoloLens and Glass emerged, as language both reflects and constructs realities [15]. While discourses build and reflect numerous dimensions of social situations, we focused on understanding how media articles: foregrounded and made significant certain ideas; invoked politics and values; and made connections with other conversations [15].

We manually coded the text of media articles for these themes and those found in the videos in our initial analysis, but also allowed new themes to emerge from the media articles [6], such as the ways companies were discussed and portrayed or how the future was discussed. We primarily used sentences as our unit of analysis. Acknowledging that it is difficult to view these materials while ignoring retrospective knowledge, the materials were viewed in order of publication during the initial round of analysis, as to follow a similar temporal trajectory that the people involved would have experienced.

This collection of media sources privileges certain viewpoints, but they are chosen because they target a wide set of people who have an interest in these technologies: interest from a general public viewpoint, a business viewpoint, and a technological viewpoint. These sources also contain a combination of opinion pieces that may more explicitly engage in imaginative discussion, and reporting pieces that provide insight on how discussions about these technologies are framed. The content of the articles, rather than the type of article, is privileged in this analysis. They also tend to focus on the ways that potential users perceive the technologies, rather than the designers or engineers behind the products. While the viewpoints expressed in the concept videos may not be the same ideas expressed by the technologies' designers and engineers, what the videos say and how they are framed provide important discursive pieces to investigate because they were an important way that people first learned about the technologies.

CASE 1: IMAGINING GOOGLE GLASS

Google's concept video "Project Glass: One Day…"[1] was released on April 4, 2012. The video portrays a day in the life of a male Glass user, as he makes his way around New York City (Figure 2). The video shows the user's point of view while waking up, eating, walking around the city, meeting a friend, shopping, and completing a video call to his girlfriend at sunset. The user uses Glass for: setting calendar events, weather information, looking at directions with live traffic and transit updates, sharing and receiving current locations with friends, taking photos, using social media, playing music, and having video conversations. But more important than the features of Glass is how the video frames and envisions the prop of Glass and the user.

First, the perspective of the video renders the actual Glass device invisible. This is done visually, as the video's continuous first-person point of view never allows the viewer to actually see the device or any other users' viewpoints, positioning the single Glass user in the video as the actor with agency and authority. The user interactions shown also render the physical form of Glass invisible. The user only interacts with the device by voice commands, or information is automatically and contextually displayed. There is no indication from this video of needing to touch the device in order to interact with it.

Second, the video frames the user of Glass as a young white male in New York City who lives alone in a sizeable apartment, indicating some level of affluence. Furthermore, he uses Glass for personal and social activities, spending the day walking around New York City; Glass is not something used at work, but rather to be used out in the world in daily life. This representation of glass evokes the image of a savvy technology-oriented male of financial means in an urban space with an emphasis on sharing his life through social media. Furthermore, he is the only person in the video using Glass; bystanders and others in the video never wear it. While it appears that there are privacy controls for the Glass user – when making a video call, he can decide whether or not to share his camera view with the person he is talking to – it is unclear whether any bystanders would be able to know if the camera is on or off.

Third, the context and settings of use of Glass are presented as mobile and seamless. Notably, most of the scenarios shown in the video take place outdoors, such as meeting a friend at a food truck, walking down the street with directions, or sharing pictures of something seen outdoors. These are things traditional personal computing would have

[1] Viewable at https://youtu.be/9c6W4CCU9M4

a hard time doing, and are instead similar to things a person would do on a smartphone. Yet the video presents an experience seemingly more seamless and effortless than a smartphone. Glass crosses multiple boundaries and contexts in the video, from home, to shopping, to seeing friends, to walking around. The continuous first-person viewpoint and day-long narrative suggest that the camera can continuously record in private and in public and that Glass is always turned on. The experience is also seamless in ease of use. While many of the scenario's features, like maps, take up the entire user's field of vision, the user is never bothered by it – there are no collisions or moments of frustration.

Fourth, the device itself is positioned as something that becomes invisible. Glass is framed as a device that invisibly fits into the daily life patterns of an individual. It is highly mobile, and augments a user's ability to communicate, navigate, and gather contextual information from his or her surroundings. Furthermore, no one that the user in the video interacts with in real life ever mentions or indicates seeing the device on the user's head, nor is the user ever seen putting Glass on or taking it off – it is always physically on the head and always turned on in the video.

Based on the video, Glass appears to fit well into the life patterns of young, rich, technologically-inclined males. Many of the functions could be conducted on a smartphone, but the video imagines Glass as a different experience, as the hardware is imagined as invisible, seamless, effortless, mobile, and "always on," reinforced in the video by using a continual first-person point of view and taking place over the course of an entire day. Even though the ultimate experience of using Glass was not the same as what was portrayed in this video, the video provides a starting point by Google for future-oriented discourses about Glass.

Glass Imagined in the Media

After the "One Day…" Glass video was released in April 2012, a broader media audience engaged in future-oriented discourses about Glass. Based on knowledge of the Google video, people outside of Google imagined what Glass would be like in the world, representing hopes and concerns about the technology as it related to a number of different societal and cultural issues. These represent the exploration of a range of possible futures, both positive and negative.

Several media authors identified Glass as a seamless, invisible, highly mobile, and always-on device, similar to its portrayal of the video. Some saw these as positive affordances of the technology. Part of the technology's appeal was its promise to "remove this barrier between living life and capturing it. Seemingly seamlessly, Google Glass wearers can capture their life while still immersed in the experience" [40]. As Glass was envisioned to be worn as an everyday object, it allowed people to imagine Glass's design and use through the lens of fashion. This was reinforced by referring to it as a "wearable," as well as its use by fashion designer Diane von Furstenberg in September 2012. Descriptions of Glass as "odd" "insane," "geeky," and even "ugly" [66, 64, 50, 39] matter because they indicate how people viewed Glass as a piece of fashion, not just a piece of technology. This envisioned Glass as something regularly worn all day, and that it would fade into the background of daily life and into the background of human interactions.

Using the video as a starting point, some authors imagined privacy concerns that might emerge in a world with Glass. A primary concern expressed that a world ubiquitous with Glass users would be a world in which surveillance by users would be commonplace. One author wrote "It's easy to imagine lots of other situations in which it'd be attractive to be able to snap photos all of the time, whether with friends, on the subway, on a road trip, walking down the street, at the beach, at clubs, at bars, on an airplane […] We could all become surveillance cameras, but with legs and Instagram filters" [48]. People envisioned certain technological capabilities, such as constant video or photo streams, combined with the vision of Glass as an invisible, seamless, and mobile technology. While taking photos with cell phones was already possible, one author noted that "The distinction is how covertly Google Glass will enable such privacy encroachments … an issue Google will need to address in detail before preemptive banning of its product goes viral." [43] Indeed, as time got closer to the launch of Google Glass Explorers, people and businesses began taking concrete actions in response to privacy concerns, including banning Glass in bars and strip clubs before it was available [43], and the formation of a campaign trying to ban Glass called Stop The Cyborg. Alternatively, a few authors viewed these qualities favorably, even likening Glass to a personal black box to provide safety for its users or owners [45].

Google's business models and place in the regulatory and market environment were discussed by media writers, providing a broader context to the video. Discussions occurred around the amount of data Glass could collect, envisioning a world where Google could perversely use this data for invasive advertisements, one author writing "Unfortunately, given Google's basic business model, this allows us to envision a world where ads are delivered directly to our eyes." [63] Others leveraged Google's privacy controversies occurring at the same time to envision a future where Google was not a wholly benevolent actor. In 2012, Google was fined for bypassing privacy settings in the Safari web browser, and in March 2013, Google paid a fine for violating people's privacy by collecting personal information during its Street View mapping project, leading some to call the company "a serial violator of privacy." [61]

Others responded to Glass by imagining alternate and unsanctioned uses of Glass through parody and critique. An early parody of the original concept video was created by Tom Scott entitled "Google Glasses: A New Way to Hurt

Figure 3. Screenshots from the Microsoft HoloLens concept video [56]. The first two shown a third-person point of view; the third shows a first-person point of view. Left: A woman walks in an office using Skype virtually while wearing HoloLens. Middle: A man plays Minecraft in augmented reality in his living room. Right: A woman sees a holographic display of a motorcycle she is designing.

Yourself,"[2] one writer describing it as how Glass "would actually look like for the rest of us" [62]. This parodied the original video's depiction of a user's experience with Glass. Scott instead portrayed a user bumping into objects because of obstructed vision, accidentally recording malapropos comments, advertisements appearing at inopportune times, and nonconsensual access of data by the police. Another author critiqued the imagined user shown in the original concept video, particularly that it only showed a "New York hipster's trip to The Strand to find a how-to ukulele book" [52]. Others envisioned alternate form factors such as a computerized walking stick to critique the perceived silliness of computerized glasses [59]. When the Google Glass Explorer project was announced, some people expressed alternative scenarios using Google's #ifihadglass hashtag, such as accidentally recording their own ATM PIN, surreptitiously watching pornographic videos in public, or leaving Glass in a drawer next to other unused gadgets [49]. Together, these provide an alternative set of speculative futures vastly different from the one Google presented.

CASE 2: IMAGINING MICROSOFT HOLOLENS

Microsoft's concept video "Microsoft HoloLens – Transform your world with holograms" was released on January 21, 2015.[3] (Figure 3) It shows HoloLens as a set of head worn goggles that projects holograms around the user. The video's narrator says "your digital world is blended with your real world." The video imagines various settings in which different users may use HoloLens' augmented reality holograms, including: a man in a kitchen interacting with holographic maps and weather reports; a woman in an office virtually designing and interacting with a motorcycle part; a woman using HoloLens conversing with a man over Skype sharing virtual architectural designs; two non-collocated men exploring a holographic representation of Mars; a man playing Minecraft in a living room; a man annotating woman's field of view via Skype to help fix a pipe; and a father virtually modeling his son's drawing.

First, the perspective of the video utilizes a third-person point of view, allowing the viewer to see the physical design and form factor of the device. It appears similar to a large pair of black ski goggles. The video also augments the third-person point of view, displaying the world filled with holograms, providing the video viewer the ability to see users immersed in a world of holograms, even though in reality one would need to wear the device to see them. Sometimes the video shifts into different users' first-person view, to show what various tasks might feel like.

Second, the video shows multiple users of HoloLens. But while there are multiple male and female users, some stereotypical gender roles are reinforced, such as a male assisting a female to fix a sink pipe. Users of HoloLens are portrayed as adults who are well off financially, working in relatively luxurious offices and living in spacious and well-furnished single family homes. The video evokes images of relatively affluent, professional workers as HoloLens users.

Third, the context and settings of use of HoloLens are portrayed as being attached to traditional computing environments. Every use of HoloLens shown in the video takes place indoors, either in an office or home. Furthermore, the video shows multiple users doing separate things: a woman uses HoloLens to design a motorcycle at work, while separately a man uses it to play Minecraft at home. HoloLens is not used by one person for doing everything in multiple places, but rather it is used by many people for doing one thing in specific places.

Fourth, the device itself is portrayed as a tool for particular tasks. HoloLens is not presented as always being on; users are sometimes seen not wearing HoloLens. The first user in the video is shown the device putting on. Furthermore, HoloLens is a normal occurrence in the world of the video, and not a strange technology. However, the video never shows people interacting with other people in face to face contexts while using HoloLens. Instead people either interact with others digitally through Skype or a holographic representation, or people are shown not wearing HoloLens while interacting face to face.

HoloLens Imagined in the Media

After the HoloLens concept video was released, a broader audience engaged in a discourse about the device, representing an exploration of imagined futures. This discourse used Microsoft's video as a reference point.

Reflecting the video portrayal, the physical design of HoloLens was described as "a space-age-looking smoke-

[2] Viewable at https://youtu.be/t3TAOYXT840
[3] Viewable at https://youtu.be/aThCr0PsyuA

tinted visor a bit bigger than a pair of ski goggles" [42] or a "face-computer that looks like a pair of space-age sunglasses" [47]. Authors explicitly described HoloLens unlike a fashion piece and as something not meant to be always on or omnipresent, but rather to be used for specific tasks indoors. Comparing the design to Glass, one author writes "Google Glass tried to be hidden, good at everything and to be worn all day and it failed. HoloLens is big, designed to accomplish a certain task, and worn for a few hours." [58] These comparisons reiterate the notion that HoloLens should be used for traditional PC tasks.

Using the video as a basis for further imagination, the HoloLens concept video was interpreted as extending current computing metaphors into the future. One author wrote "you used to compute on a screen, entering commands on a keyboard. Cyberspace was somewhere else. [...] In the very near future, you'll compute in the physical world. [...] What will this look like? Well, holograms." [46] The vision of computing portrayed by Microsoft's concept video is neither weird nor wildly different from what people experience today. One author wrote "it's taking the way you interact with your device, be it a laptop or PC, to new levels" [55]. HoloLens was viewed by some as an evolution or continuation of traditional personal computing tasks, either in the home or office. HoloLens' potential as a home gaming platform was often discussed, leveraging new possibilities with augmented and virtual reality, often describing Minecraft or other games. The potential for HoloLens to serve as a tool in an office context or as a platform for enterprise services was also commonly discussed. In one author's analysis, "I like that the headset is only designed to be worn for a few hours a day for a very specific purpose […] That is one reason why I am considering the HoloLens as a productivity device first and entertainment second" [58]. Together, these identify two potential audiences for HoloLens – gamers and businesses – and also portray HoloLens as a device for specific types of purposes and tasks.

Microsoft's role was a prominent part of the discourse, providing a broader context to interpret the video. Microsoft was framed as an underdog, for example one author wrote "At least with HoloLens, Microsoft appears to be skating to where the puck could be headed in technology, rather than where it has been" [65]. In part because Microsoft was the developer, HoloLens was viewed in a positive light, as a new innovative and bold development by the company. Furthermore, Microsoft was recognized as a software and hardware company rather than a data-oriented company, leading to a focus on the software and hardware aspects of HoloLens, and less attention to the types of data the device might collect.

Glass was compared to HoloLens, generally to distinguish between the world envisioned by Glass and the one envisioned by HoloLens. One author compares HoloLens to Glass's perceived awkwardness, writing "The professional setting carries few of those social pitfalls. If you're wearing HoloLens as part of your work, you're not being rude, you're simply… doing your work" [38]. Another author separates HoloLens from the notion of an always-on wearable as represented by Glass. "You could use [Glass] while walking outside so there was the ability to overlay information and take photos and videos but HoloLens takes a different approach in that it seeks to replace a mouse, keyboard, tablet and even your PC screen" [55].

FINDINGS

In this section we discuss three main findings. The first explores different orientations toward imagining the future. Second, we discuss how the discourses' imagining the future with Glass and HoloLens and interpretation of the videos rely on broader narratives about computing and understandings about Google and Microsoft. Third, we look at how the analysis can surface values discussions, using the example of surveillance concerns.

Imagining the Future

After both concept videos were released, media authors used the videos as a starting point to further imagine the future world with Glass and HoloLens, and the implications of living in those worlds. Yet they portrayed the future in two different ways: some discussed the future by critiquing the world depicted in the companies' concept videos, while others accepted the depicted worlds. We distinguish between these two orientations, terming them speculative and anticipatory.

Speculative orientations toward the future acknowledge multiple possible futures, often with a critical lens. People utilizing this orientation may critique the future that the video depicts or present an alternate future. We use the term "speculative" as we found this orientation similar to speculative design's exploration and construction of multiple futures. These orientations are more likely when the fictional future is more provocative, violating today's norms and practices, and when the fictional future seems further away. We read media articles that acknowledged the futures presented by the companies, but contested them or presented alternate narratives. These were especially present when Glass was first announced and seemed further in the future. Written critiques, alternate subversive scenarios, and parodies provided reflections on what social experience and intimacy might mean with Glass, questioned Google's motives, and explored how new social norms enabled by Glass may raise privacy concerns.

Anticipatory orientations toward the future foresee a singular future. We use the term "anticipatory" finding inspiration from the concept of anticipation work, where practices in the present work to maintain and move toward a *particular* vision and expectation of the future [33]. Some of the articles we read expected the particular fictional world presented by companies as the expected future reality. This orientation is more likely when the fictional world follows familiar norms and practices, like those

found in the present. We saw this in many HoloLens articles, as the HoloLens video utilizes familiar computing norms and contexts. They anticipated how HoloLens might be deployed in ways similar to what was portrayed in the video, but there was little critique of Microsoft, nor were there many expressions of alternative or subversive uses of HoloLens.

Anticipatory orientations are also more likely as a technology shifts from being more fictional to more real. We saw more anticipatory articles about Glass over time, the closer Glass got to commercial release. More articles focused on imagining a world with a Glass app economy, and how developers might use the Glass API, rather than critiquing Glass. With less space for critique or reconsideration of the design, some people began taking other types of concrete steps to prepare for the arrival of the anticipated future, such as bars and other private establishments that pre-emptively banned Glass due to privacy concerns.

These two orientations are not mutually exclusive, but rather lay on a spectrum. However, distinguishing between them allows us to be more precise about ways people discuss and imagine the future. When people adopt a speculative orientation toward the future, it suggests an opportunity to change and refine designs, and to consider other future sociotechnical worlds. The adoption of anticipatory orientations may suggest greater acceptance of a particular envisioned future, but it may also signal lessened space and receptiveness for critique or discussion.

Narrative Framing through Corporate Authorship and History

While the discourses surrounding Glass and HoloLens were forward looking, they were also informed by prior knowledge about the companies that created them. Google's business model of collecting user data to provide online advertising was projected onto Glass, as people imagined ways Google might try to continuously collect data for advertising, or continuously overlay ads over a user's field of vision. Prior privacy concerns around Google's use of data and the 2013 settlement over Google Street View for violating privacy were also cited as heightening privacy concerns about Glass.

Prior perceptions of Microsoft influenced how optimistically people viewed HoloLens. A common perception held that Microsoft was once a technology leader, but had failed to introduce compelling and innovative products recently. Microsoft was also viewed as a hardware and software company, not a data one. Given Microsoft's experience with the Xbox gaming system, many people imagined potential gaming uses of HoloLens. Against this backdrop, HoloLens is seen as innovative and exciting hardware, viewed with cautious optimism.

HoloLens also more closely fits into a historical narrative of the desktop computer. Other work has also noted the roles of historical narratives in affecting forward-facing outlooks [33]. Much of Microsoft's corporate history is associated with the use of Windows in the American workplace. Many of the imagined uses in Microsoft's concept video show desktop activities translated into an augmented reality world. Microsoft's HoloLens video seems to be an extension of prior visions of personal computing. A commercial for Windows 95[4] conceives of computing as allowing users to start: "discovering; learning; doing; organizing; connecting; managing; creating; playing; moving." In a similar way, the narration of the HoloLens video says that HoloLens allows people to: "visualize work; share ideas with each other; more immersive ways to play; new ways to teach and learn; collaborate and explore; and create."

Google Glass fits into a broader history of ubiquitous computing originating from the Silicon Valley lab Xerox PARC, outlined in Mark Weiser's 1991 article which conceptualizes the future of computing as ubiquitous, always present, and invisible, weaving itself "into the fabric of everyday life" where computers "pose no barrier to personal interaction" [37]. Like PARC, Google is similarly geographically headquartered in Silicon Valley, whereas Microsoft's Seattle location seems separated from the Silicon Valley culture. Dourish and Bell note that Weiser's vision of a world where the technology fades into the background still centers on technology use in the office, imagining new technologies but extending familiar social norms and forms of workplace organization [9]. Google's concept video reflects the technological aspects of Weiser's ubiquitous computing, while the contextual and social elements are broadened to non-workplace environments. More specifically, Glass fits into a tradition of research on wearable computing. Early wearable computing explored goggle-like computing interfaces that would understand the user's context by using a camera to identify objects surrounding the user [32], much like Glass.

Glass and HoloLens both present future visions that shift the location of computing from the screen into the physical world through the use of head-mounted devices. But each relies on a different broader historical narrative of computing, influenced by the ways that Google and Microsoft as companies were situated in popular thought.

Values in Imagined Futures: Surveillance Concerns

Looking more closely at the intertwining of the concept videos, the media's imaginings of the future, and authorial narratives provides a way to surface discussion of values in imagined futures. We focus on the way surveillance concerns were imagined as one such example.

Discussion about who has (and does not have) power and agency with these technologies affected surveillance and privacy concerns. Work in film studies describes how the

[4] Viewable at https://youtu.be/5VPFKnBYOSI

gaze, sometimes shown visually through point of view, can ascribe power, often projecting male or western power [19, 25]. Both the Glass and HoloLens videos present the viewpoints of the professional working class, but the Glass video's continuous first-person point of view serves to empower the white male user, as his view of the world is the only one we get to experience. Glass only provides him agency. No one else in the video wears Glass, and non-users are instead the object of his gaze. In the discourse, Glass was often seen as empowering when people imaged themselves as users by augmenting their capabilities to interact with the world. However, when people imagined themselves as non-users, Glass is disempowering, as they become objectified by Glass users. This becomes more concerning when Glass is portrayed as invisible and always on. A lack of mutuality between parties with respect to surveillance decreases the subject's ability to appropriately respond [2, 7]. Because not everyone gets to wear Glass and it is imagined as invisible, it becomes imagined as a tool of surveillance and power over others. Mutuality is lost and non-users fear that they will not be able to know when they are being recorded, what about them is being recorded, or how collected information is used.

While HoloLens only presents professional class users, it does show a variety of people using the device, distributing who has power and agency. The third-person point of view in the video allows the viewer to explicitly see the people wearing HoloLens, making the device and its users visible. HoloLens is portrayed as augmenting reality through holograms, rather than augmenting the abilities (and by extension, power) of an individual user. Imagining use cases in the contexts of work and home frame the device as familiar and mundane – it becomes just another computing device to assist with productivity and entertainment that anyone can use. Its physical visibility also creates a type of symmetry and mutuality that affords non-users agency: it is easier for non-users to know if someone wearing HoloLens is looking at them. Furthermore, HoloLens is not imagined or discussed as being continuously worn, creating a lesser power difference between users and non-users.

This illustrates how an analysis of concept video portrayals, speculative and anticipatory oriented discourses, and corporate authorial narratives can surface the ways in which they contributed to people's imagination and framing of surveillance concerns related to Glass and HoloLens. We note that the video and discourse analysis could also lead to further discussion of other values-centered debates such as questions about differential access and use of these technologies, norms of social interaction, isolation, constant connectivity, or productivity.

REFLECTIONS

We provide some reflections about our method of analysis, and what we gain by analyzing and critiquing corporate concept videos as design fiction. Our goal in analyzing concept videos is not to argue that our interpretation is the only "correct" reading. Rather our goal is to present a method that allows viewers to surface ideas, questions, and reflections while watching concept videos, and to consider how the presentation of technologies relates and responds to public discourse around their introduction into society.

We found that the video analysis is best done over several iterations. It took several viewings of the videos to identify the various elements in the videos and to draw connections and meanings between the elements. We suggest researchers conducting this type of analysis first look for the elements mentioned by Dyer [12]: people's appearance, their emotions, their behaviors, their activities, props and physical objects, and settings. Identifying visual techniques such as camera angle and focus, and any narration in the video is also useful. After identifying these elements, we found that asking several questions allowed us to surface further questions and insights. We note that this is not an exhaustive list, and is likely to expand as more analyses are done on different types of concept videos.

- *How are technologies portrayed?* This includes looking at the design and form of artifacts, their technical affordances, and possible values they embody.
- *How are humans portrayed?* Who are users and non-users of the technology? This draws on factors like behaviors, appearance, emotion, and setting to see what types of people are imagined to be interacting with the technology.
- *How is the sociotechnical system portrayed?* This focuses on how humans and the technology interact together, the settings and contexts in which they interact, and raises questions about who or what has agency over different types of interactions.
- *What is not in the video?* What populations or needs are unaddressed? What would it look like if certain technical capabilities are taken to the extreme? Can we imagine alternate futures from what the video depicts?

By analyzing and interpreting the corporate concept videos as viewers, we do not know about the process behind the creation of these videos, making the creators' intent difficult to discern. Unlike design fictions published in other venues or formats, there is no accompanying paratext, essay, or academic paper describing the authors' intent or process. This leads us to focus on how the videos act in dialog with broader media discourses. Regardless of intent, we find that the futures portrayed by the videos are ideological and express cultural values, whether consciously or unconsciously. We also found that by looking beyond the design fiction artifact itself, to the ways others further imagined the concept videos (media authors in our case), we could surface these values and see how people interpreted and responded to them.

We used discourse analysis in service of understanding how media articles discussed the narratives and themes we surfaced in our video analysis. When conducting our

discourse analysis of media articles, we focused on how authors made certain ideas significant, how politics were invoked, and how it related to other conversations, such as existing conversations about privacy, Google, or Microsoft. Further work might investigate the role of language in other aspects of social situations, such as: engaging in activities, creating identities, signaling relationships, or identifying particular ways of knowing [15].

While we privileged content-relevance over type of article when building our media corpus, we still kept track of each article's context, following Gee's statement that words have specific meanings in different contexts [15]. Knowing where articles were published (both what publication and what section of the publication), the intended audience, and what other types of articles were written by the author helped provide clues on how to interpret the articles. For instance, without taking into account contextual information, it could be difficult to understand whether an author's proposed apps for Google Glass were serious business propositions or humorous critique. We found value in not decontextualizing articles and not taking words only at face value. Rather, we recorded and took into account knowledge about how the articles were contextually situated to interpret the written content.

Concept videos depict narratives which imply what technical affordances technologies have, but there may be gaps between portrayal and actual capabilities that we do not know about. The videos also do not show the technical mechanisms that enable the design and function of the technology. However, these ambiguities should be viewed as features, not bugs, of concept videos. Concept videos' usefulness, like design fictions, comes from their narrative features and their ability to elicit multiple interpretations, reflections, and questions. Concept videos' representations of technology should not be seen as final design solutions, but a work in progress still amenable to change.

Commercial concept videos help us acknowledge and explore the ways artifacts represent values at a time before the design of a company's product is finalized. Analysis and critique of these videos conducted earlier in design processes, rather than years later, can surface potential problems at a time when designs can still be changed. Given that, we call on the HCI and design communities to leverage their expertise and engage in this type of critique. In particular, by promoting speculative oriented discussion, they can open a space for the discussion of cultural values embedded in the concept videos, and promote or explore alternative values. This would be beneficial when addressing privacy, among other values. Furthermore, our analysis began raising issues around the portrayal of other cultural values, such as power, agency, gender, and class. Surfacing and addressing these values would be useful to many in the HCI community as well as technology studies scholars. Further analyses and critiques of concept videos should investigate these and other cultural values as well.

CONCLUSIONS

In this paper, we have posited that we can look at the concept videos of Google Glass and Microsoft HoloLens as design fictions. We make two main contributions. First, we introduced a method for analyzing the narratives presented in concept videos and in the media echo of those narratives. Like an echo, the media response may resemble the narratives in the video at some times, while other times the media response may shift or modulate to create a different narrative. Analyzing the creation and contestation of narratives and the values they promote provides insight into "infrastructuring" practices of new technologies. Through this type of analysis, the HCI and design communities can proactively contribute to values discussions when products are still fictional – that is after they are announced, but before they are publicly released. Future research should investigate how these methods can encourage reflection and discussion of values from the *beginning* of the design process, building on value-centered design processes like value sensitive design [5, 14] or privacy by design [24, 30].

Second, from our findings, we introduced the terms "anticipatory" and "speculative" orientations to the future to provide a more way to discuss the variety of ways futures are portrayed and responded to, and to acknowledge the ways corporate design fictions are often created in service of real future products. Speculative orientations acknowledge multiple possible futures, often in a critical fashion, while anticipatory orientations foresee a single particular future. Future work should explore how acknowledging and designing for these orientations can be used to benefit design practice.

Some recent media articles critique Glass's lack of public adoption as a failure, and at the time of writing it is still unknown how HoloLens will fare once it becomes widely available. Yet a focus on user adoption overlooks the discursive and imaginative work these technologies and their early video representations do. Design fictions can be powerful when they are seemingly close enough to reality that people have to contend with their claims or provocations as if they are real. Viewing the Glass and HoloLens concept videos as design fictions highlights new time periods when the values embedded in and promoted by products can be contested and debated. By seeking and taking part in this discourse, we can actively engage in and shape discussions about future cultural values while emerging technologies are still fictional.

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