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Through the Looking Glass: Perspectives from Three Stakeholders in the Google Glass Debate

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Through the Looking Glass:
Perspectives from Three Stakeholders in the Google Glass Debate

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Introduction

On April 4, 2012, Google introduced the new concept of a wearable technology to the public through their newly created Google+ account, Project Glass, and posted a video of what Google Glass *could* become. They also released the following statement: “We think technology should work for you — to be there when you need it and get out of your way when you don’t.”¹ The Google Glass team worked to integrate those interested into the Google Glass community, mainly through the Explorer Program which allowed individuals interested in becoming an Explorer to apply to buy Glass through a subscription form.² In January 2015, less than three years after the initial announcement of Google Glass, Google withdrew the device from the market and quickly responded to the hundreds of articles claiming that Glass was over by issuing the following statement: “we’re continuing to build for the future, and you’ll start to see future versions of Glass when they’re ready. (For now, no peeking).”³ What happened in between these three years that caused Google to shift from an open-feedback Explorer program to “no peeking”?

Google created a very specific marketing strategy for the introduction of Google Glass. It was a strategy that, at first, allowed them to assume complete control over the product. Whether or not Google assumed they would be able to maintain complete control of the product after its release is unclear. Despite what Google’s master plan for

¹ Matt McGee, “The History of Google Glass - Glass Almanac,” Accessed April 20, 2015.

² Ibid.

³ Matt McGee, “Google Glass Is Dead? Google Glass Is Reborn? Yes. Both,” Marketing Land, January 15, 2015. Accessed January 16, 2015.

Glass entailed, the public quickly started taking some of the control of Glass and coproducing the device.

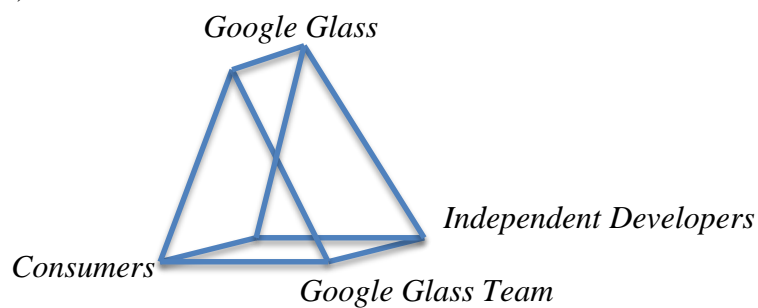
The development and integration of a technology into a social environment is completely contingent on the moment in time. The years between 2012 and 2015 were, and continue to be, a time period where individuals who have the necessary resources can “jump onboard” the technologies of certain companies that are available to them. Google is no exception. Consider Android: a company that began as a start-up and was bought by Google in 2006. Android developed into one of the world’s most widely used operating systems and instituted a “come one come all policy” where any application would be accepted into the Google Play store.⁴ As a result of open-source which allowed independent developers to code freely for Android, Google released much of the control that the company originally had and stopped trying to govern the applications. One might assume that since Google went about Android’s development by sharing control, they would do the same with Glass. Instead, Google actively tried to control the device for as long as possible.

Because integrating a cutting-edge technology into a social environment is an ongoing process, it is nearly impossible to believe that Google had created a master plan for Google Glass from the beginning of its introduction since they depended on feedback loops from the public. In fact, Google claimed that they were fully aware that the version of Glass was not going to be the final version available for the public but in order to successfully create a prototype, they needed to see how it was going to react in the social

⁴ Fred Vogelstein, "Headline: How the Android Ecosystem Threatens the iPhone," Wired.com, April 14, 2011. Accessed April 20, 2015.

environment.⁵ Technologies evolve through society and in turn, society evolves through the technologies. These series of developments cannot be foreshadowed because ultimately, the product will undoubtedly evolve much more once it has had time to adjust to an environment. Why then, did Google try to control Glass so intently if they knew how important feedback was going to be?

This thesis will explore the timeframe from April 2012 to January 2015 in an attempt to understand what happened that caused Google to release some of the control on Glass towards the end of its short lifespan and then withdraw Glass from the market. To better understand Glass's development, I explore the coproduction between the Google Glass team/Google, the public, and the independent developers. Throughout the thesis, I explain how Google, the public, and the independent developers are co-producing Google Glass and, in turn, Google Glass is co-producing all three of them (refer to diagram):



First, I discuss the basics behind Google Glass and what the technology does. Next, I discuss the problems associated with predicting the future success of a technology and releasing a product while it is still in beta testing and before it is relatively well established. Afterwards, I analyze the stakeholders involved in the complex Google Glass web including the makers of Glass, the users of Glass, and the independent developers of

⁵ Greg Priest-Dorman, telephone interview with author, February 5, 2015.

Glass. Following this, I discuss the feedback loop between Google and the public by studying the action/responses of these two groups in regards to Glass's aesthetics and uses. I then analyze the feedback loop between independent developers and Google and attempt to further understand the Glass team and the connection they have with independent developers. This chapter focuses on the lack of control that Google exerted on certain applications that seemed out of the normal realm of what Google Glass was to Google. This is followed by a discussion of the "what-ifs" of Google Glass by looking at the Extended Mind Hypothesis; if Google was allowing certain applications that were life-altering to develop, what were their *actual* plans for Glass? Finally, I conclude by attempting to make sense of the short three-year life span of Google Glass in the conclusion.

Because Google Glass is one of the leading cutting-edge technologies at this moment, most of the sources in this thesis come from blogs, newspapers, personal interviews, and twitter feeds about Glass. Google is very limited in the information they can share about the product. To help the readers of this thesis have a better understanding of what the general public used, and continues to use, Glass for, I included a post written by a Google Glass user from the Google+ community page for Glass at the head of each chapter.

"Ok Glass, begin..."

Chapter 1: What is Google Glass; Determining a Technology's Success

*"Stunning morning hiking to the top of the Diamond Head Volcano crater, snapping photos with +Google Glass as I went"*⁶

1.1 What is Google Glass?

Google Glass falls under the category of wearable technologies, meaning technologies that are *worn* by the purchasers. There are many different types of wearable technologies ranging from smartwatches to headsets. Google Glass



Figure 1

looks like a pair of regular glasses, however there is a cube sticking above the right eye which, while wearing Google Glass, appears as a mini screen with a clear background (Figure 1).⁷ In other words, the consumer can use Google Glass while simultaneously looking at scenery since the image or text is displayed “over” the person (Figure

2).⁸ As TIME Magazine states, “Glass is, simply put, a computer built into the frame of a pair of glasses, and it’s the device that will make augmented reality part of our daily lives. With



Figure 2

the half-inch (1.3 cm) display, which comes into focus when you look up and to the right, users will be able to take and share photos, video-chat, check appointments and access maps and the Web.”⁹

⁶ Cathie Reid, "Glass Explorers - Community – Google," Glass Explorers - Community – Google, Accessed January 16, 2015.

⁷ Fig 1, “Google Glass,” photograph, PCMagazine, <http://www4.pcmag.com/media/images/423989-google-glass.jpg?thumb=y> (accessed April 26, 2015).

⁸ Fig 2, Chris Davies, “BikingMtTamVignette,” photograph, 2013, Slash Gear. <http://cdn.slashgear.com/wp-content/uploads/2013/09/BikingMtTamVignette.jpg> (accessed April 26, 2015).

⁹ TIME Staff, "Google Glass," Time, October 31, 2012. Accessed December 31, 2014.

Glass can be both voice-controlled and hand controlled by swiping forwards, backwards, down, and up with one finger on the temple of the device. The main attraction of Google Glass is the hands-free aspect which allows users to simultaneously live in the moment while still having access to their world of technology: both someone's visual and actual life is presented right in front of them. The screen is in fact, not intended to distract from someone's life; it can easily be turned off or avoided since it is in the upper right corner.

Google Glass, like other wearable technologies, can be personalized with applications accessible from the MyGlass application page, downloadable on smartphones and available online. These apps make use of the hands-free aspect by promoting apps such as one that allows users to see guitar chords through the Google Glass screen enabling them to play guitar while actively learning chords to certain songs.¹⁰

1.2 Determining the Future of a Technology

Companies can never fully control a device since a majority of the development depends on coproduction for it to truly succeed. Technologies are rarely ever completely "ready" for a public since coproduction of technologies continues to happen well into a device's lifetime. There are different levels of coproduction that companies can use when introducing their products. Apple, for example, relies on closed source for their operating system (iOS) meaning that the code is not available to anyone. Apple chooses to limit coproduction in their products simply because their code is much less accessible to

¹⁰ Tejas Lagvankar, "Chords," Tejas Lagvankar, Accessed January 21, 2015.

developers and the public. Google, on the other hand, runs on open source software meaning the source code is available to the public.¹¹

Michio Kaku, a well-known physicist and professor of theoretical physics at the City University of New York,¹² published a book in 2011 entitled Physics of the Future. In a particular section of his book, Kaku outlined a wearable technology identical to Google Glass:¹³ “(The internet) might be attached to the frame of the glasses, like a small jeweler’s lens. As we peer into the glasses, we see the Internet, as if looking at a movie screen. (...) We could also simply move our fingers in the air to control the image, since the computer recognizes the position of our fingers as we wave them.”¹⁴ In 2011, Google Glass had not yet been announced, yet Kaku presented this product with a voice of inevitability that the technology would change the social environment. Kaku’s intentions, while defining future technologies in his book, were to show the “reasoned estimates of when the prototype technologies of today (would) finally reach maturity.”¹⁵ Kaku, however, failed to discuss the importance of coproduction necessary for this device; instead, Kaku examined the technology from a linear model whereby a company produces a technology and presents it to the public when it is “finalized.” It is no surprise, therefore, that Google Glass failed to thrive in the same way that Kaku envisioned.

An example of a technology that never quite took off because of a failure of feedback loops and coproduction is the Segway, an electric vehicle that is battery

¹¹ Fred Vogelstein, "How the Android Ecosystem Threatens the iPhone," *Wired*, April 14, 2011, Accessed March 27, 2015.

¹² “About,” Explorations in Science Official Website of Dr Michio Kaku RSS. Accessed November 21, 2014.

¹³ Michio Kaku, *Physics of the Future: How Science Will Shape Human Destiny and Our Daily Lives by the Year 2100*. (New York: Doubleday, 2011),

¹⁴ *Ibid.*, 24.

¹⁵ *Ibid.*, 9.

powered with two wheels. The user stands on the Segway and guides it by leaning forwards, to the left, to the right, or backwards. Before the Segway was introduced in a social environment, although it was difficult to predict its success, there was certainly reason to believe that it would be profitable: it is an efficient way of getting to a location that does not necessitate paying for gas or finding a parking spot which would appeal to a commuter consumer base. The Segway, however, topped TIME's list of the 50 worst inventions.¹⁶ Indeed, this is not to say that the Segway has not succeeded in certain areas but as a whole, the invention was not well received, partly due to the fact that there was no coproduction of the technology: it was introduced in its relatively final form.

Google Glass was introduced in beta testing meaning that Google was still actively developing the product but wanted the input of a small group of test consumers. The point of beta testing is to announce the device and receive input that the company can monitor and use to adjust.¹⁷ Google Glass, however, escaped outside of the small group because of the hype of the new wearable technology, both from Google and the public. Google set limits and exerted control at the start of Glass's introduction with the intention of showing *their* vision for Glass which was not to be misunderstood. Google set difficult barriers for interested users to pass through: Glass was available for a high price of \$1500, an unrealistic price tag for many consumers and developers. The intense control backfired at first, however, because the lack in users led to a scarcity of applications available on the MyGlass page.¹⁸ The news agency, Reuters, surveyed 16 companies that had designed applications for Google Glass and noted that nine of those

¹⁶ "The 50 Worst Inventions." Time. Accessed January 5, 2015.

¹⁷ Jessica Keyes, Marketing IT Products and Services. Boca Raton, Fla.: CRC, 2009, 95.

¹⁸ Rory Cellan-Jones, "Google Glass - a Fascinating Failure?" BBC News, May 27, 2014.

had ceased work on the applications due, in large part, to the absence of customers and device restrictions.¹⁹

As soon as Google made Glass publicly available, they lost some control over the device which paved the way for coproduction between its users and Google and the coproduction of Glass escalated. Glass evolved based on three main stakeholders: the public, the independent developers, and the Google Glass team. The following chapter will further explore these actors and their dynamics and how they might have foreshadowed Glass being pulled from the market.

¹⁹ Alexei Oreskovic, Malathi Nayak, and Sarah McBride, "Google Glass Future Clouded as Some Early Believers Lose Faith," Reuters, November 14, 2014. Accessed January 4, 2015.

Chapter 2: The Stakeholders in the Google Glass Game

“OK Glass...get along with my Nexus 6 please. It doesn't look all that big. Maybe because of my freakishly large hands?”²⁰

Although Google Glass was first announced on April 4, 2012, it was not formally released until April 16, 2013 when a select group of people received the device.²¹ There have been, I believe, three categories of Glass user groups from its initial announcement in 2012: the Google Glass team, the independent developers, and the public. These three stakeholders have experienced Glass very differently from one another simply because the groups had different motivations for the technology. These different motivations led to an unclear future for Glass which contributed to it being pulled from the market. This chapter explores the history of all three groups focusing on their interactions with Glass, how these interactions differed from the other groups' interactions, and how Google tried to control the groups.

2.1 The Google Glass Team: The First Stakeholder

The Google team responsible for creating Glass was, evidently, the first user group that had the opportunity to experience Glass and they have remained a constant force in the development and promotional tactics of Glass.

When Glass was first announced—before people could pre-order a pair—the Google team controlled the promotional aspects to influence the consumer's view of the device and properly market it as a technology that could be used in day-to-day life. I spoke with Greg Priest-Dorman, a member of the Google Glass team, about Google's

²⁰ Robert Hamilton, "Glass Explorers - Community – Google," Glass Explorers - Community – Google, Accessed January 16, 2015.

²¹ Matt McGee, "The History of Google Glass - Glass Almanac," Accessed November 21, 2014.

decision to make the product public when it was still entirely in the beginning stages.²² Mr. Priest-Dorman explained that initially, Glass was extremely confidential which prevented the developers for Google from using the device outside the restricted confines of the room where they were working. This made the preliminary development stages of Google Glass very difficult because the team was supposed to foster a technology for day-to-day life without actually experiencing everyday life with the device. In an effort to better understand how to develop the technology, Google decided to announce the project so the Glass team, themselves, could experience what it was like living with Glass and the necessary components it needed to include. By collecting public opinion, Google could have a better idea of Glass's potential.²³

To do this, Google introduced the Explorer Program which opened up Glass to the public but still allowed Google to maintain control over the users by restricting access: starting in June 2012, independent developers could sign up for the device through a subscription form and a price of \$1500 and beginning in November 2013, the general public could do the same.²⁴ The Google team had a very clear vision for how they wanted people to view Glass: the team's main emphasis was showing people that they were meant to live *with* Glass and not *through* Glass. When someone receives a text on a cellphone for example, it takes approximately 20 seconds for him or her to unlock the phone and check the text. Google Glass, however, would showcase the text in the upper right corner of the lens and minimally distract from someone's life.²⁵

²² Greg Priest-Dorman, telephone interview with author, February 5, 2015.

²³ Ibid.

²⁴ Matt McGee, "The History of Google Glass - Glass Almanac," Accessed November 21, 2014.

²⁵ Greg Priest-Dorman, telephone interview with author, February 5, 2015.

Promotional videos of the device fixated on the “with” aspect by focusing on simple daily tasks made easier with the hands-free aspect of Glass (Figure 3).²⁶ In one promotional video, Glass directed one user to a bookstore, another user was using Glass to video chat with a friend (Figure 4),²⁷ and another user was checking the weather through Glass. Through this promotional video, Glass was represented as a device that allowed its users to fully focus on their environment and *not* get distracted by technological devices that required them to alter their attention.²⁸



Figure 3



Figure 4

Glass was presented as a way to enhance experiences as opposed to simply capturing them. Although this highlighted Glass focusing on daily tasks, Google also proved that Glass could be used to share incredible moments while still engrossed in the moment. In fact, during the keynote speech at the Google I/O conference for developers in San Francisco in June 2012, Sergey Brin, the co-founder of Google, disrupted the speaker to “introduce a group of professional skydivers that (were...) above the Moscone Center and ready to skydive down while wearing Glass.”²⁹ Mr. Brin revealed the skydivers jumping from the plane and landing on top of the building where the

²⁶ Fig 3, Nudd, Tim, “A Woman's Day, Seen Through Glass, Ends Brutally in This Shocking Video.” Photograph, 2014, AdWeek, <http://www.adweek.com/adfreak/womans-day-seen-through-glass-ends-brutally-shocking-video-156158> (accessed March 27, 2015).

²⁷ Fig 4, "How It Will Feel to Wear Google Glass," photograph, 2013, International Society for Presence Research. <http://ispr.info/2013/02/25/how-it-will-feel-to-wear-google-glass/> (accessed March 27, 2015).

²⁸ Greg Priest-Dorman, telephone interview with author, February 5, 2015.

²⁹ Matt McGee, “The History of Google Glass - Glass Almanac,” Accessed November 21, 2014.

conference was being held, all filmed live from Google Glass. The skydivers then joined Sergey Brin onstage while still wearing their diving suits and the Google Glasses. This emphasized Google's efforts to show people living *with* Glass: it was a device that people could use to share their unique experiences from their perspective without diverting their attention or it could be used to accomplish simple daily tasks while still completely engaged in one's surrounding. After its introduction into the social environment, however, Google changed the way they went about promoting Glass because of the reactions from the public.

2.2 The General Public: The Second Stakeholder

The general public's first interactions with Google Glass were very controlled and monitored by Google. At first, they were abstract experiences where users hypothesized what they would do with Glass. As Glass developed, however, the general public found new and unique ways to use Glass, outside of the Google Glass team's idea.

At the beginning of Glass's introduction, when Google was still completely in control of the device, the general public had opportunities to *share* how they would interact with Glass. Even before the first developers had access to Glass, the Google Glass team advertised Glass to the public by creating the #ifihadglass contest. This contest was an opportunity for the general public to describe what they would do if given Glass by tweeting or posting on Google+ and including #ifihadglass in their post.³⁰ The posts ranged from someone explaining that they would use Glass for directions while biking so they could avoid having to stop and check for directions to someone stating that

³⁰ Ibid.

they would “make an app that plays the Peanuts adult voice via bone conduction when anyone with a Klout score of 60 (was) speaking.”³¹ The 8000 selected winners paid \$1500 to receive their Glass and had to travel to New York, Los Angeles, or the San Francisco Bay Area to claim them.³² Before anyone could pick up their Google Glasses, the Google team had complete control over Glass and appeared to have a mastermind plan to fully unveil the device to the public seeing as the introduction of Glass up until this point was very methodological.

Explorers who had preordered Glass started receiving Glass on April 16, 2013³³ and for the general public, it was still an extremely restrictive process to obtain Glass: the price remained at \$1500 and people had to apply through a subscription form.³⁴ The public receiving Glass was the true beginning of the coproduction loop because Google lost the restrictive control they had. The public could now start experimenting as they wished. Google might have had a plan all along to release slight control as the public became more accustomed to Glass, however the development of Glass went in areas that Google could not have anticipated.

After Google let some of their control go and allowed Explorers to fully explore, they reasserted some control in October 2013 when the team started taking Glass “on the road” within the United States.³⁵ Google attempted to retake control by emphasizing the aspects of Glass that they wanted to see flourish, which at this point in time focused on

³¹ “#ifihadglass,” Twitter, Accessed January 2, 2015.

³² Michael Liedtke, "Google Glass Winners Picked In #IfIHadGlass Contest," The Huffington Post. March 26, 2013, Accessed April 15, 2015.

³³ Matt McGee, “The History of Google Glass - Glass Almanac,” Accessed November 21, 2014.

³⁴ Ibid.

³⁵ Ibid.

life made simpler with Glass. Coproduction was starting to form between Google and the public at this stage, as the public started to form their own critiques on Glass.

2.3 The Independent Developers and Coders: The Third Stakeholder

The third major user group of Google Glass was the independent developers and coders. Although the independent developers were technically part of the larger public, they approached the device very differently than most users of Google Glass who do not code. The independent developers and coders were people who had a specific interest in Glass and its potential. They had the necessary knowledge to build off of the software that Google created for Glass and they created applications for the general public.

The Google team and independent developers had a different coproduction relationship than Google had with the public. The Google team and the public were involved in more of a back-and-forth feedback loop where one stakeholder would directly respond to the actions of the other. The independent developers and the Google team, however, had much less direct response with one another. This could be because Google introduced Glass when it was still in beta testing and therefore depended on the independent developers to work with the numerous different editions of Glass to make it successful and in demand. For a majority of Glass's short lifespan, independent developers found themselves on their own without much guidance from Google.

At the end of October 2014, I attended a Google Glass Developers Conference which was an independent conference held solely for independent developers to learn about easier methods to code for Glass and the important technical aspects to know while coding for Google. Although there were a few speakers at the conference who worked for

Google, the main point of the conference was for individual developers to learn from other individual developers about techniques they used to code for Glass.

The coproduction between developers and Google seemed less controlled than with the general public, as will be discussed later, since the independent developers were changing Glass through applications, not through its specific uses and responses to it like the general public was. To some extent, Google controlled the developers less because they depended on the developers' applications to create a truly successful Glass while the public needed more control because they could "misuse" Glass more so than developers, at least in the eyes of the Google team.

As soon as the independent developers and the general public were given access to Glass, these three heterogeneous groups all took the device in different directions. The disconnect between Google, the independent developers, and the public occurred because technology surpassed ownership and allowed anyone with the necessary skills and materials to build off of it (refer to Figure 1 for coproduction diagram). What developed was a sequence of actions and reactions from Google, specifically in regards to the public's response which shifted Glass's purpose.

Chapter 3: For Every Action, There is an Equal (but not Opposite) Reaction...

“My brother in law +Lorne Rosenfield M.D. is an excellent plastic surgeon. If the addition of Google Glass can lead him to ‘perfection’ as this article suggests it might be time for me to consider a procedure (suggestion?)!!!”³⁶

This chapter focuses on the action-reaction relationship that Google formed with the general public’s response to Google Glass. Part I focuses on the aesthetics of the device while Part II concentrates on Glass’s use in the workplace. In reality, there were infinite paths that the general public could take with Glass and there were therefore infinite coproduction loops between the different groups of the general public and Google; this thesis focuses on a small sector of the coproduction possibilities.

3.1 PART I: Fashion

Glass received many negative sentiments about its appearance from the general public and specifically from nonusers who found no use for it in their lives but saw the device in their social environment. Google took measures to control the negative opinions some people had about Glass’s fashion by working in tandem with influential companies or people that were not connected to Glass in anyway beforehand. While simultaneously trying to control the negative image, Google was also coproducing Glass with people that could heavily influence its image. The result of a more fashionable Glass, therefore, was coproduced by both Google and the public.

³⁶ Jonathan Rosenberg, "Glass Explorers - Community – Google," Glass Explorers - Community – Google, Accessed January 16, 2015.

3.1.1 Aesthetics of Google Glass

There is a difficult balance in creating something that is both useful and aesthetically appealing because the combination of the two can be very expensive. People created blogs with the sole purpose of poking fun at how Glass looked, for example the blog *White Men Wearing Google Glass* showed images of just that.³⁷ Because the aesthetics of Glass were one of the reasons that Google was failing to create a solid customer base for Glass, the company desperately needed to take pro-active measures to counter the attacks and recreate a version of Glass that was more aligned with the public's idea of how Glass "should" look; even if the public lacked a single concrete idea of the optimal form, the majority of users were certainly not happy with Google's current choice of style. This is one example of the coproduction of Glass because the following steps Google took were arguably for the sole purpose of appearance and increased attention and desire from consumers. Although on the one hand this could be seen as Google releasing control, they were actually reasserting their control.

3.1.2 Google Glass Breaking into the Fashion World

Google's first step in reacting to the public's sentiments and trying to "save" the fashion of Glass was during the New York Fashion Week in September 2012. Google created a partnership with the celebrated designer, Diane von Furstenberg. She included Google Glass in her spring 2013 line as the models walked out sporting both the new outfits and Glass. Additionally, the models wore Glass behind the scenes throughout the week to give an exclusive insider's perspective of the most anticipated fashion week of

³⁷ "White Men Wearing Google Glass." *White Men Wearing Google Glass*. Accessed November 21, 2014.

the year.³⁸ Continuing the partnership that Google had established with Ms. von Furstenberg, on June 2, 2014, Google published “DVF Made For Glass” (DVF short for Diane Von Furstenberg) which focused solely on Glass frames and shades for women.³⁹ The partnership with Diane von Furstenberg acted as a solution to the public’s demand for a more fashionable Glass. Von Furstenberg explained in a *New York Times* article that she ran into the co-founder of Google, Sergey Brin, while he was wearing Glass in Sun Valley, Idaho. After trying them on, she was completely fascinated with the technology and decided to bring it to fashion.⁴⁰ The feedback loop started when the general public complained about the aesthetics of Glass which prompted the Google team to reach out to another member of the general public (Von Furstenberg) to help them further develop this aspect of Glass. In this situation, Glass coproduced part of the public as well since Von Furstenberg’s designs and approaches towards the New York Fashion Week changed due to Glass.

Of course, Google appeared much more in control if they acted as if their partnerships and reactions to the general public’s sentiments were all part of a master plan for Glass; one partnership for Google was not enough for them to prove that a master plan existed and that they were not simply reacting to the public’s demands. Less than one year after the New York Fashion Week, on March 24, 2013, Google publicized that they were working with the major eyewear manufacturer, Luxottica. Luxottica is well known for their brands Ray-Ban and Oakley. The collaboration between these two

³⁸ Joanna Stern, "Google Glass At New York Fashion Week," ABC News, September 10, 2012, Accessed January 6, 2015.

³⁹ Matt McGee, "The History of Google Glass - Glass Almanac," Accessed November 21, 2014.

⁴⁰ Claire Miller, "Women at Google Looking Past the Glass Ceiling," *The New York Times*, August 24, 2013, Accessed January 6, 2015.

companies ensured that future designs of Glass would incorporate the latest trends in the fashion industry⁴¹ and it convinced the public that Google was following a plan.

The previous two examples show partnerships that were mutually understood. Von Furstenberg wanted to bring Glass to fashion and Google wanted people to view Glass as being fashionable. Even though the “public” (Von Furstenberg and Luxottica) coproduced with Google, the goal was purely aesthetics for all parties involved. Even if Luxottica were eager to sell to a wider customer base, to accomplish this, they would have to focus on aesthetics. In the following example, however, despite Google working to coproduce Glass with another major fashion mogul, the coproduction went in separate directions because of varying ideas of what Glass represented to the different user groups.

3.1.3 Google Glass and Vogue



Figure 5

On August 21, 2013, Vogue magazine published a 12-page photo spread in their September issue (one of the most anticipated Vogue issues of the year) that highlighted Glass.⁴² Vogue’s 12-page dedication to Glass was not in line with Google’s marketing tactics for Glass. Glass was not presented as a device that allowed people to stay present in their current environments; instead, Glass was presented in an estranged, ultramodern world (Figure 5).⁴³ Even the models sporting Glass appeared alien-like with the novelty of Glass standing out in the images, more so than the fashion: “In one unnerving image, a

⁴¹ Matt McGee, “The History of Google Glass - Glass Almanac,” Accessed November 21, 2014.

⁴² Ibid.

⁴³ Fig 5. Steven Klein, “Google Glass and a Futuristic Vision of Fashion,” photograph. 2013. Vogue. <http://www.vogue.com/865212/the-final-frontier-google-glass-and-futuristic-fashion/> (accessed March 5, 2015).

Glass-less model lays unconscious on the floor while a pair of cyborg-like models watch on through their headsets. Not exactly in line with Google's desire for Glass to blend invisibly into our present-day lives"⁴⁴ (Figure 7).⁴⁵ Clearly, even though Vogue's cover was a promotion for Glass,

Figure 6



Google and Vogue had vastly differing opinions on the attraction behind Glass: Google pushed for Glass to be seen as an extension of its consumers while Vogue saw Glass as a futuristic technology that perhaps did not have a place in the current social environment



Figure 7

(Figure 6).⁴⁶ As a result of the miscommunication between the public (Vogue) and Google, Glass became powerful enough to coproduce itself in the sense that it presented itself beyond Google's view and caused Google to lose

more control. Often times, in order for a technology to truly succeed in a market, there needs to be a solid understanding of what the technology represents among all of its coproducers which did not seem to be the case for Glass.

⁴⁴ Aaron Souppouris, "Google Glass Is in Vogue, but Not Yet in Vogue," The Verge, August 28, 2013, Accessed January 6, 2015.

⁴⁵ Fig 7. Steven Klein, "Google Glass and a Futuristic Vision of Fashion," photograph. 2013. Vogue. (accessed March 5, 2015).

⁴⁶ Fig 6. Steven Klein, "Google Glass and a Futuristic Vision of Fashion," photograph. 2013. Vogue. (accessed March 5, 2015).

3.2 PART II: Glass in the Workplace

In April 2014, about two years after the initial announcement of Glass, the Glass team changed their promotional tactics from the general public to working environments. The Google team's emphasis shifted from seamlessly fitting into somebody's everyday life to seamlessly fitting into someone's work life. At the Google Glass Developers Conference in Burlingame, California, Steven Willinger from Google delivered the keynote speech focusing solely on the significance of Glass in the work place because of the hands-free component. Perhaps Google creating programs for Glass in the workplace was Google's way of regaining control over the coproduction aspect that spiraled in different directions with the Vogue cover shoot.

3.2.1 Glass in Medicine from Google's and the Public's Perspective

Who came up with the idea to use Glass in the workplace: Google or the public? Since Google continues to be very private about their information, the most accurate way to answer this question is by studying the timeframe: on June 20, 2013, about one year before Google publicly pushed for Glass in the workplace, Dr. Rafael Grossman became the first surgeon ever to use Glass while performing a surgery at the Eastern Maine Medical Center in Maine.⁴⁷ The surgery was, according to Dr. Grossman's blog, a relatively simple surgery where he wanted to ensure the patient's privacy while testing the future influences that would result from having Glass present during surgery.⁴⁸ The following day, on June 21, Dr. Pedro Guillen performed knee surgery while wearing Glass at Clínica CEMTRO de Madrid in Spain. The purpose of this surgery was to test

⁴⁷ Matt McGee, "The History of Google Glass - Glass Almanac," Accessed November 21, 2014.

⁴⁸ Rafael Grossmann, "'OK Glass: Hand Me the Scalpel, Please...' GoogleGlass during Surgery!" ZGJR Blog. June 20, 2013, Accessed January 5, 2015.

the ability of Glass to live stream to other viewers in different locations and, indeed, Dr. Guillen streamed the live surgery to 150 observers around the world.⁴⁹ Approximately two years later, Google reasserted their control with regards to Glass in the workplace by issuing the “Glass at Work” program in April 2014 to formally transition from Glass’s use in daily life to its use in the workplace.⁵⁰

In the “Glass at Work” program, Google focused on connecting businesses with Glass to see the potential of the technology thriving in that specific workplace. The workplaces that Google chose to control through the process of “Glass at Work” were technologically focused companies such as APX, Augmedix, Crodoptic, GuidiGQ, and Wearable Intelligence.⁵¹ The program proved very beneficial for some of the companies, in particular for Augmedix, a startup company in San Francisco. In the beginning of January 2015, Augmedix announced that it had garnered \$16 million for funding to immerse Google Glass into the healthcare world. Augmedix claimed that the transition to using Glass in the medical field would help doctors gain access to and register data so that they could spend more of their time with patients as opposed to filing information. The data would be collected and filed automatically by the built-in audio-visual device that would “listen” to the conversation between the doctor and patient and note key points from the discussion.⁵² In this situation, Google purposely planted the seeds for the coproduction to take place by encouraging these companies to find useful ways to incorporate Glass into their work. Although it seemed like the companies were taking on the projects alone, Google still had a major presence behind the decision to incorporate

⁴⁹ Matt McGee, “The History of Google Glass - Glass Almanac,” Accessed November 21, 2014.

⁵⁰ Ibid.

⁵¹ Ibid.

⁵² Carly Okyle, “Augmedix, the Google Glass App for Medical Data Entry, Raises \$16 Million,” Entrepreneur, January 12, 2015. Accessed January 15, 2015.

Glass. Interestingly enough, Augmedix is continuing with their funding and mission despite Glass no longer being publicly available. This shows that even though Google Glass is off the market, the coproduction continues.

The companies that were included in Google's "Glass at Work" program were part of the public but they were supported by Google. Other members of the general public, however, used Glass in the workplace without the immediate supervision or acceptance of Google.

3.2.2 Glass in the Workplace by the General Public's Perspective

The following examples show how people, independently from Google, helped to coproduce Glass through their work. The general public would see what people did with Glass and started to understand Glass through their perspective as opposed to through Google's. Google did not control these experiments with Glass and as a result, Glass started to produce the work people did and produced Google since Google released some of its control.

Other surgeons have since experimented further with the device in the medical field, similar to Dr. Rafael Grossman and Dr. Pedro Guillen's experiments with Glass. A study presented at *The Fourth International Conference on Ambient Computing, Applications, Services and Technologies* analyzed the uses of Google Glass for "augmented point-of-view sharing during surgery."⁵³ A group of six researchers conducted tests with a surgeon using Google Glass: the surgeon used voice commands to change the Glass display between the electronic medical record of the patient and

⁵³ Lauren Aquino Shluzas et al., "Mobile Augmented Reality for Distributed Healthcare," *AMBIENT 2014, The Fourth International Conference on Ambient Computing, Applications, Services and Technologies*, no. 2326-9324 (2014): Accessed November 19, 2014, 34.

pictures of the injury with added information to aid the doctor through the surgery.⁵⁴

Additionally, the surgeon and medical staff were in contact through Glass with a group of coworkers located in Germany and the Netherlands.⁵⁵

Glass proved to be very useful during the surgery for a number of reasons. Firstly, the surgeon was able to access vital information through voice commands but still maintain the hands-free aspect.⁵⁶ Additionally, medical students who were training for surgery by shadowing the doctor were able to more precisely learn certain techniques used in surgery because they were seeing exactly what the surgeon was seeing, as opposed to observing from another angle and watching a distorted view.⁵⁷

There were hardware issues that the subgroup of doctors found with Glass, however these were issues that would not be a necessary fix for other users: “Based on feedback from consulting surgeons, in addition to software development, we aim to physically enhance the Glass hardware for surgery in three ways. We intend to add a transparent splash shield that surgeons may adhere to the front frame of the Glass display for protection from infectious disease, attach an optical loupe to the frame (in front of a surgeon’s left eye) in order to increase magnification for surgical procedures, and encase elements of the head-mounted display in a protective cover for improved cleaning and robustness during routine clinical use.”⁵⁸ If one group of users makes physical changes to Glass to cater towards their uses for the technology, the coproduction of Glass expands in even greater ways: coproduction no longer becomes a unique path for Glass’s use but it

⁵⁴ Ibid., 36.

⁵⁵ Ibid., 36.

⁵⁶ Ibid., 37.

⁵⁷ Ibid., 37.

⁵⁸ Lauren Aquino Shluzas et al., “Mobile Augmented Reality for Distributed Healthcare., 36.

becomes a unique path for its appearance as well. The Luxottica and Vogue deals were general steps for Google Glass's aesthetic, not individual changes.

Like many other technologies, a major component of Glass is the ability to connect people to the world in which the Glass user is living. Journalist Tim Pool was able to provide this type of connection while reporting on the protests in Istanbul in July 2013. He live-streamed the footage he captured with Google Glass to hundreds of thousands of viewers online. Additionally, NBC and Al Jazeera, two well-respected news sources, selected some of the videos to publish.⁵⁹ The general public who did not have a connection to Glass prior to reading the article, therefore, understood Glass through Tim Pool's perspective.

David Bryan, the keyboardist for the American rock band Bon Jovi, also found a way to incorporate Glass into his profession. In July 2013, Bryan wore Glass while performing before 55,000 fans during a concert.⁶⁰ The footage filmed through Glass was then produced for fans to access and allowed them to feel a more personal connection to Bryan's stage experience. Again, for fans who had never been introduced to Glass, their first exposure was through David Bryan.

Google Glass was also used in an art installation. David Datuna, a New York artist, created an artwork called "Viewpoint of Billions" that incorporated Google Glass into his project. To integrate the technology into this art piece, Datuna worked with Det Ansinn from BrickSimple (a company that develops for wearables, among other things) whom I met at the Google Glass Developers Conference in October. I was fortunate

⁵⁹ Matt McGee, "The History of Google Glass - Glass Almanac," Accessed November 21, 2014.

⁶⁰ Ibid.

enough to conduct an interview to discuss the process of integrating Glass into Datuna's vision for "Viewpoint of Billions."⁶¹

Datuna has always been interested in what lenses can represent and in 2012, he unveiled a piece called "Due Date" where he covered a collage with lenses. Datuna explained that "the lenses (represent) people's vision – people's soul and with each piece, all these lenses have different prescriptions, like we do. So behind each lens you see a story."⁶² Using Glass in his next piece, as Ansinn explained, would allow the viewer to experience the art through an interactive experience. There were four cameras inserted into the art work which would instinctively connect with the Glass that the viewers were wearing; depending on where the viewer was standing, they would receive different images and videos that reinforced themes.⁶³ According to Ansinn, the result from this artwork was astonishing. The Smithsonian, where the piece was displayed, broke a 30+year attendance record and people were spending at least 20 minutes in front of the art simply because they wanted to engage with it and observe the minute details that Glass provided.⁶⁴

These examples show the public taking Glass and using it for their own purpose but also using it in order to connect with a larger audience. They were able to do this because of the control that Google gave to the public. Undoubtedly, Google was aware that the individuals were coproducing Glass for that larger audience which helped them expand their bases. What Google did not account for, however, was the fact that Glass was beginning to have agency. Glass coproduced the public's work and experiences and

⁶¹ Det Ansinn, personal interview by author, October 27, 2014.

⁶² Graham Hiemstra, "David Datuna: Viewpoint of Billions," Cool Hunting, December 2, 2013, Accessed January 5, 2015.

⁶³ Det Ansinn, personal interview by author, October 27, 2014.

⁶⁴ Ibid.

coproduced Google's vision, since Google loosened their control. This was not detrimental to Glass, in fact it opened it up entirely which made the future more unpredictable. I would assume, like any major company, that Google does not like uncertainty.

Chapter 4: Let's Talk about the Independent Developers

"Casting the Glass screen to your mobile allows your subject to see what +Google Glass sees. Does that make this an indirect selfie?"⁶⁵

The past examples of coproduction were straightforward in defining who was considered a member of the Google Glass team versus who was a member of the public. Diane von Furstenberg, for example, is a member of the public while Google itself and the specific members on the Google Glass team are all part of Google. The distinction between independent developers and the Google Glass team, however, is much less clear. Some members of the Google Glass team, formerly called Project Glass, also hold full time positions in other fields. This could be an indicator of why the Google Glass team forcefully responded to complaints by the public but they rarely responded to the new coding and applications for Glass. Most of the past examples explored have had to do with Glass's use and how the Google Glass team responds to the public, not so much to the independent developers of Glass. The independent developers, however, played a crucial role in the co-productivity of Glass because they had the ability to literally change the software of the device. Because of the unclear distinction between the Google Glass team and independent developers, the coproduction suffered clarity as well, which caused confusion in trying to understand Google's position. Perhaps this was yet another tactic to regain control.

⁶⁵ George Paine, "Glass Explorers - Community – Google," Glass Explorers - Community – Google, Accessed January 16, 2015.

4.1 What does it Actually Mean to Work for the Google Glass Team?

Although Google prides itself on its widespread availability of knowledge and its open source, in reality, the company hides a lot from the public. A Google spokesperson refused to share how many people were on the Google Glass team, adding that “(Google doesn’t) generally comment on team sizes.”⁶⁶ Some sources have reported that the Google Glass team is on the smaller side, with approximately 50 employees.⁶⁷ Within these employees, however, there are both independent developers who work for the team and developers who work purely for the team. Who, then, is the “Google Glass team” that attempted to control the coproduction of Glass?

Thad Starner, for example, is a professor at Georgia Tech, however he is *also* a Technical Lead/Manager for Google Glass. He worked on several applications for Glass but it was unclear if he was working on them for Google’s development or as an independent coder. The applications were certainly out of Google’s usual realm for promoting Glass; they focused on people becoming “fully-functional” through Glass. In one application, Glass aids people who have paralysis in all four limbs: “Glass makes a sound that is conducted through your cheekbone to signal the arrival of a text or email, which can be sent from your phone via Bluetooth or over Wi-Fi. A tilt of the user’s head, or a wink, tells Glass’s sensors to display the message. ‘They can then respond by voice and their words are sent to Google servers, converted to text and transmitted as SMS faster than their friends can text,’ says Starner.”⁶⁸ This application for Glass enriched a quadriplegic woman’s experience while on a camping trip with friends because she used

⁶⁶ Owen Thomas, "The Google Glass Team Is Just 50 People," Business Insider, February 21, 2013, Accessed April 24, 2015.

⁶⁷ Ibid.

⁶⁸ Paul Marks, “A Healthy Dose of Google Glass,” New Scientist 219, no. 2936, 22.

her Glass to help navigate and capture videos.⁶⁹ Another application helps blind people uncover what is in their food “by taking a picture of the label and sending it, with a question, to crowd workers on Amazon’s Mechanical Turk.”⁷⁰ In just a few seconds, the people receive a result that answers their question, such as “no, the can does not contain nuts.”⁷¹

When I asked Thad Starner via email whether he developed for Google’s vision specifically or if he developed based on what he had in mind, he responded “what you see me develop as a Georgia Tech professor has very little bearing on my job at Google.”⁷² Was the entire Google team in agreement (and are they still in agreement) with Starner’s applications, then? Independent developers who have no immediate affiliation with Google were also working on similar applications compared to Thad Starner’s and there was a lacking reaction-response from Google to these applications. Why would Google indicate that they were supporting this developmental area of Glass without publicly acknowledging plans for future development in this category?

4.2 Independent Developers Working on Google Glass Life Changing Apps

Subrai Pai created an application for people dealing with diabetes. The application allows diabetic people to access all of their health data on Glass which could include information from pedometers, heart-rate monitors, or even nonstop glucose monitors.⁷³

Pai, however, is an external agent since he has no apparent link with Google. Similarly,

⁶⁹ Ibid., 23.

⁷⁰ Ibid., 22.

⁷¹ Ibid., 23.

⁷² Thad Starner, email message to author, April 28, 2015.

⁷³ Paul Marks, “A Healthy Dose of Google Glass,” 23.

Kim Xu developed an application to allow parents to communicate with their deaf children, called SmartSign. The app permits a child's family to inquire about the sign language translation of a certain word. Glass then transmits a quick video on the subject being questioned.⁷⁴

These applications still need to be further developed but, again, applications such as these are the ones that will change Glass from simply another technology to something that people become dependent on in order for them to function at their full capacity. Since the Google team did not publicly responded to these applications, is it safe to assume that the team was allowing Glass to have leverage as a device and take on different entities depending on the application? This would indicate a complete lack of control on the Google Glass team's part and it would be a major signifier that Glass was starting to co-produce the Google Glass team. Perhaps Google was taking a twofold approach to the coproductivity process: on the one hand they were responding to the public's reactions since they want to appeal to a wider consumer base and on the other hand, they were giving free reign to the independent developers and to their staff to see the potential that Google Glass had. If this were the case, why pull the device from the market?

⁷⁴ Ibid., 23.

Chapter 5: The Potential of Google Glass

“Thought I’d share some of my photos of Ireland last summer, all shot #throughglass. They really were a big hit there and we spoke to lots of folks about them!”⁷⁵

If the Google Glass team is allowing Glass to develop on its own from the independent developers’ perspective, it seems unlikely that the Google team would have a master plan for Glass.

If the next version of Glass focuses more on the life-altering applications for the device that are being developed, the public could view the technology as a completely different entity than what it currently is. Already, just in terms of the applications that could be life-altering, Google seems to have taken a step back and given in some of the control. As a result, Glass is coproducing itself because Google is not trying to desperately control its production. Could Glass, then, coproduce itself to a level that Google would not understand? To further grasp what I mean by this, I introduce the concept of the Extended Mind Hypothesis.

5.1 The Extended Mind Hypothesis

Glass is one of many technologies that are in the process of pushing the boundaries of current technologies. Technology is most certainly going to get more and more complicated in the upcoming years. The Extended Mind Hypothesis allows for the public using these technologies to understand the relationship they could develop with the specific technology. Establishing a relationship between “us and the technology” is not attempting to predetermine the technology because the relationship is dependent on the

⁷⁵ David Polinchock, "Glass Explorers - Community – Google," Glass Explorers - Community – Google, Accessed January 16, 2015.

fact that the technology succeeds, it is not predicting its success. With the evolving technologies that involve an immersion of the brain and the technology, there is often an unclear boundary of where the brain ends and where the technology begins. One of the reasons that I am focusing on the Extended Mind Hypothesis is because one of the engineers of the theory, Andy Clark, mentioned Google Glass as a stepping-stone towards the complete interpretation of the Extended Mind Hypothesis.⁷⁶

The Extended Mind Hypothesis was developed by Andy Clark and David J. Chalmers in 1998. Andy Clark uploaded a seminar online in 2014 explaining the most important concepts in the Extended Mind Hypothesis. The overarching question of the Extended Mind Hypothesis is where the boundary lies between one's mind and the world.⁷⁷ As Chalmers and Clark explain, "the question invites two standard replies. Some accept the demarcations of skin and skull, and say that what is outside the body is outside the mind. Others are impressed by arguments suggesting that the meaning of our words 'just ain't in the head', and hold that this externalism about meaning carries over into an externalism about mind. We propose to pursue a third position. We advocate a very different sort of externalism: an *active externalism*, based on the active role of the environment in driving cognitive processes."⁷⁸

The Extended Mind Hypothesis is extremely applicable in our current technological boom because the theory is crucial to fully understanding who we are, not as biological beings but as a society who has come to embody technology: as technologies continue to evolve and interact with human beings, it is crucial to

⁷⁶ Andy Clark, "The Extended Mind," Lecture, from IS Learning, Teaching and Web Division Media Team, December 22, 2014.

⁷⁷ Ibid.

⁷⁸ Andy Clark and David Chalmers, "The Extended Mind," *Analysis*, no. 58 (1998): 10-23. Accessed 2015.

understand where the human mind lies in all of this. As we begin to understand where our minds fall in relation to the rest of the world, our “special self-image (and with it our laws, educational practice, and social policy) must increasingly recognize the extent to which the human minds can, and do, extend beyond the ancient bounds of skin and skull.”⁷⁹

The Google Glass team has shown no signs of stopping independent developers or their own developers as they create applications for a more dependable Glass. Viewing Google Glass through the lens of the Extended Mind Hypothesis is an opportunity to see what could potentially happen to the public’s relationship with Glass if it does develop into something more dependable. *If* Google really had in mind a Glass that would eventually turn out under the category of the Extended Mind Hypothesis, then withdrawing Glass from the market after they had introduced the beginning stages of it and its potential would make sense. Although Google first created Glass with the intention of having it as an addition to someone’s life and not get in the way of someone’s life, perhaps that was their method for slowly introducing the impact Glass could have in its social environment.

First, I explain what the Extended Mind Hypothesis is, then I attempt to analyze Glass through the main requirements of the Extended Mind Hypothesis, and finally, I discuss Andy Clark’s idea on Glass and the Extended Mind Hypothesis and whether Glass could develop in this direction.

⁷⁹ Andy Clark, "The Extended Mind," Lecture, from IS Learning, December 22, 2014.

5.2 Specifics of the Extended Mind Hypothesis: Thought Experiments

To fully understand Clark and Chalmer's theory, there are certain thought experiments to refer to. The first one is the simple example of a computer with a built-in calculator as well as a web-browser that shows that the mechanisms don't necessarily all need to be inside the computer. If someone claimed that the calculator was not inside the computer, they would be correct if the person computing were using a calculator on the web but they would be incorrect if the person computing were using the built-in calculator. To extend this to the mind, Clark argues that "the mechanisms of the mind are not all in the head."⁸⁰

The most popular argument for the Extended Mind Hypothesis involves two hypothetical individuals called Otto and Inga. These two individuals have both heard about an exhibition at New York's Museum of Modern Art. Inga remembers that MOMA is located on 53rd Street so she walks to the address in her head and attends the exhibit. Otto, on the other hand, has mild Alzheimer's disease and thus constantly carries a notebook with him allowing him to write the information that he learns. Otto also attends the exhibit at MOMA but learns the address by looking in his notebook. Clark and Chalmers argue that Otto wanted to attend the exhibit and he thought that the address was on 53rd street before confirming this was true by looking in his notebook, just as Inga referred to her memory. Otto can claim, then, that the notebook is an extension of his mind.⁸¹

People react differently to the example of Otto and Inga. Many argue that Otto is only aware that he can find the address of MOMA in the notebook, he is not aware of the

⁸⁰ Ibid.

⁸¹ Ibid.

museum's actual address. The counter argument is that Inga also believed that the address was saved somewhere in her memory however we are not given the steps that Inga took to locate the address within her memory. Because Otto carries the notebook with him wherever he goes, it is an automatic reaction for him to check his notebook like it is an automatic reaction for Inga to refer to her memory and locate the address.⁸²

Another issue people find with Otto's case is that Otto had to physically search for the address in his notebook as opposed to Inga who automatically recalled the address. Clark and Chalmers argue that it was a natural reflex for Otto to search in his notebook, as it was a natural reflex when Inga found the address in her Long Term Memory storage.⁸³ Other worries stem from the misinterpretation of Otto's notebook whereas Inga's memory cannot be misread, however, "Inga may misremember an event not due to an error in her memory store but because of some disturbance during the act of retrieval."⁸⁴

Another thought experiment that helps to better understand the Extended Mind Hypothesis involves three different situations of a person and a computer screen. All three cases involve a person in front of the computer screen playing a game similar to Tetris where there is a geometric shape prompted by the computer and the person needs to decide where to rotate and place this shape among other shapes. In the first case, the person is facing the computer screen and answering questions about which way to rotate the shape for it to fit with the others by mentally performing the rotations in his/her

⁸² Ibid.

⁸³ Ibid.

⁸⁴ Ibid.

head.⁸⁵ In the second example, the person is again in front of a computer that is displaying a Tetris-like game, however the person now has a choice to rotate the shapes either through a rotate button or mentally, as in the previous example.⁸⁶ The third and final example takes place in the cyberpunk future. The person is playing the same Tetris-like game, however in this example, to rotate the shapes, the person must choose to either mentally rotate the shapes or use his/her neural implant which rotates the shapes at the same speed as the computer rotate button in the second example. The person is deciding between two internal reserves which each create separate requests from the brain.⁸⁷

Looking at all three cases together, Clark and Chalmers wanted to understand the amount of thought that took place within each case. They “suggest that all three cases are similar. Case (3) with the neural implant seems clearly to be on a par with case (1). And case (2) with the rotation button displays the same sort of computational structure as case (3), although it is distributed across agent and computer instead of internalized within the agent. If the rotation in case (3) is cognitive, by what right do we count case (2) as fundamentally different? We cannot simply point to the skin/skull boundary as justification, since the legitimacy of that boundary is precisely what is at issue. But nothing else seems different.”⁸⁸

The “coupled system” that is created from the interactions between the human and the external object are, arguably, a cognitive structure and a coproduction/feedback loop. Eliminating the external objects would cause the cognitive structure’s proficiency to decrease, similar to what would happen if the human brain were eliminated. Clark and

⁸⁵ Andy Clark and David Chalmers, "The Extended Mind," *Analysis*, Accessed 2015.

⁸⁶ Ibid.

⁸⁷ Ibid.

⁸⁸ Ibid.

Chalmers argue that these coupled systems are, then, comparable to a cognitive procedure.⁸⁹ Therefore, the coproduction discussed is also comparable to a cognitive procedure.

It is important to understand that an essential part of the Extended Mind Theory is that the coupled system needs to be dependable: the individual knows that they can easily access the information and it is an automatic response for them to find the information (like Otto's automatic response to finding information in his notebook). Another good example of reliable coupling is when person 1 asks if person 2 knows what time it is, person 1 automatically responds yes and *then* they check the time either on their watch or phone.⁹⁰ The future version of Google Glass, one of the more advanced hands-free wearable technologies, seems like it might have the necessary components to classify as blurring the boundary between mind and device.

5.3 Andy Clark's Thoughts on Google Glass

In an email conversation with Andy Clark, I asked him what he thought Google Glass's impact could be on the Extended Mind Hypothesis: he agreed that Glass had great potential for the Extended Mind Hypothesis but in his opinion, it would be truly groundbreaking "if material was presented in ways that avoided the need to directly attend to the information presented - that is, if the glasses flashed information so fast we didn't register it consciously, but came to rely upon it as we went about our daily business."⁹¹ Surprisingly, this aspect of a future Glass is in line with Google's first

⁸⁹ Ibid.

⁹⁰ Ibid.

⁹¹ Andy Clark, email message to author, January 14, 2015.

promotional tactics of a device that did not interfere with one's daily life. Having a Google Glass that flashes information in front of the individual without their full awareness would depend heavily on coproduction because the public would need to be accepting of Glass acting as a subconscious force on their minds. There is no concrete evidence to suggest that Google is taking Glass in this direction but perhaps they are planning on having Glass enter the realm of expansive minds and their Explorer program and three year introduction was a way to "prepare" the consumers for what is to come.

There are already devices in the works to create an unconscious relationship between the technology and the user; one such device is called Memory Glass which is working to create a device where the technology takes control of the user's mind without the users being aware that it is happening. The main goal for the Memory Glass is to create a technology that acts as an extra memory system and assistance but that, at the same time, does not demand the user's attention.⁹² The study on Memory Glass was conducted over 10 years ago, in 2003, and since then, there have been no major developments to the device. Perhaps this is due to the fact that the technology for these glasses is very advanced and not available yet. Regardless of where the Memory Glass currently stands in the technological world, however, the device places a major emphasis on the passive approach which is unlike Glass. The company designing this prototype is trying to "provide(s) a significant benefit beyond what is provided by innate memory alone and innate memory in combination with context-blind memory aids."⁹³ Before Glass was pulled from the market, although users were supposed to forget that they had the device on, it still required a conscious effort from them in order to properly use it.

⁹² Richard DeVaul, "The Memory Glasses Project," The Memory Glasses Project, October 28, 2003. Accessed January 15, 2015.

⁹³ Ibid.

Perhaps Glass will arrive at a point where users are receiving information without consciously processing it, therefore treating Glass as an addition to one's memory. Did the Glass team purposefully allow the life-depending applications to expand and coproduce Glass with little control so Google could build off of it in the future?

5.4 Relating the Three Main Aspects of the Theory to Glass

By analyzing three crucial aspects to the Extended Mind Hypothesis from the lens of Google Glass, we can have a better idea of the plausibility of the device fitting into the Extended Mind framework.

The first requirement is that *“the augmentation must be reliably available and typically invoked when needed (Otto always carries the notebook, and won't say that he doesn't know until he has consulted it).”*⁹⁴ Currently, Google Glass has not been available for long enough to the point where most people would be able to adapt to it and form automatic reflexes to check their Google Glass. In order for this to become true, most people would require more time so the novelty of Glass wears off. Notice, however, this is not the case for all people. One Google Glass user was treated by doctors for being the first Glass user addicted to the device. The patient entered into a rehabilitation program for alcohol and, as is custom in rehab programs, electronic devices were prohibited. After 18 hours per day of Google Glass use, however, the patient experienced withdrawal symptoms. He saw his dreams as if looking through the small cube and he would constantly tap his right temple, instinctively copying the gesture to control Glass. The patient even claimed that the withdrawal from Glass was harder than the withdrawal from

⁹⁴ Andy Clark, "The Extended Mind," Lecture, from IS Learning, December 22, 2014.

alcohol.⁹⁵ This is undoubtedly an extreme case but importantly, even with the relatively underdeveloped Glass, there is still a possibility of adjusting completely to the technology and becoming dependent on it.

The second requirement is that “*the information retrieved must be, mostly, automatically endorsed – not subject to intense critical scrutiny.*”⁹⁶ If an individual is retrieving directions to a location through their Glass or a contacts phone number or email address, then the information is, for the most part, automatically endorsed because the individual using Glass has inputted the information.

Finally, the third requirement is that “*the information is easily accessed as and when required.*”⁹⁷ This requirement would depend heavily if Google Glass became more accessible to individuals in terms of price. Because, however, Glass is hands-free, the information is easily accessible. It is more a matter of whether individuals will find a need for Glass in their lives.

5.5 The Issue with Glass Being Constantly Viewed as a Novelty

In reality, Glass might not classify as a technology that falls under the Extended Mind Hypothesis *yet*. The main problem that arose with Google Glass is that it was and continues to be a complete novelty: people are still not used to it and they have not formed the kind of dependent relationship necessary for it to be considered an extension of one’s mind. When people interacted with the Google Glass that I had for the duration of my thesis, they were stumped when I told them to use the device. People were

⁹⁵ Azeen Ghorayshi, "Google Glass User Treated for Internet Addiction Caused by the Device," The Guardian, October 14, 2014, Accessed January 12, 2015.

⁹⁶ Ibid.

⁹⁷ Ibid.

extremely intrigued by the device, especially since obtaining a pair was very expensive and they are no longer available for purchase, however people were more surprised with the aesthetics than the actual abilities of Glass. People asked to try it on so they could take a “selfie” of themselves while wearing Glass.

Issues in privacy all stem from the novelty of Glass as well. The privacy matter would gravely escalate if Glass became an extension of the user’s mind but even in the current time, users have experienced many issues. In February 2014, one Glass explorer was wearing the device in a bar which negatively affected other customers who then started harassing the Explorer. The incident in the bar triggered anxiety in non-Glass users and, as a result, certain businesses caught on to the apprehension towards Glass since everybody was not yet adjusted to the technology and started banning Glass in their enterprises.⁹⁸

The privacy issues became so extreme that Google issued a statement on May 31, 2013, stating that it would not allow facial recognition applications at that point in time because of the increase in public distress over the matter. Google even assured the public that future facial recognition applications would not be approved “without strong privacy protections in place.”⁹⁹

Despite how Google will tackle the future issues of privacy, the next generation of Glass or the next generation of wearable technologies could begin coproducing the public in ways that were never before imagined. Coproduction could take place unconsciously between someone’s brain and their device. Although the current version of Glass had leverage, these devices would be considered an entire different being of some sort

⁹⁸ Matt McGee, “The History of Google Glass - Glass Almanac,” Accessed November 21, 2014.

⁹⁹ Ibid.

because of their abilities to communicate subconsciously with the human brain. The visions for a future that involve devices like this are very vague, simply because it is impossible to predict. Perhaps, however, Glass was pulled from the market so it could become something closer to the Memory Glass.

Chapter 6: Conclusion

“Story of my little walk to Battery Point on Lake Masabesic #throughglass #googleglass #HandsFreePhotography”¹⁰⁰

Let’s jump to the present time of May 1, 2015, four months after the announcement that Google Glass would be withdrawn from the market and approximately three years after Glass was first announced. Despite the end of the public availability of Google Glass, the device still generates buzz.

Almost daily, there is a new article that highlights some aspect, sometimes positive and sometimes negative, of Google Glass. On April 28, Computer World published an article claiming what the future version of glass needs¹⁰¹ and Forbes published an article citing why Google Glass failed and why the Apple Watch could too.¹⁰² The reality of the infinite articles published about Glass, however, is that there are constantly changing opinions and reactions from the public while Google remains silent.

Around the same time that Google pulled Glass from the market, for example, three articles were published within twenty days of one another, all claiming different ideas about Glass. First, on December 30, 2014, CNBC wrote an article highlighting the potential end for Glass and the fact that Google might have muffed its chance to create a profitable technology with Glass.¹⁰³

The second article was published on January 6, 2015 and it announced that the Glass application store had published two new apps. The first one is called

¹⁰⁰ Don Schwartz, "Glass Explorers - Community – Google," Glass Explorers - Community – Google, Accessed January 16, 2015.

¹⁰¹ Sharon Gaudin, "Here's What Google Glass V2.0 Needs." Computerworld. April 28, 2015. Accessed April 30, 2015.

¹⁰² Ian Altman, "Why Google Glass Failed And Why Apple Watch Could Too," Forbes, April 28, 2015, Accessed April 30, 2015.

¹⁰³ Matt Clinch, "Google Glass: Triumph or Turkey?" CNBC, December 30, 2014. Accessed January 15, 2015.

MultiCamSync and the simplified explanation is that it allows users to record videos with Glass and then share them with other Glass users. The official description of the app is much more implicit: “MultiCamSync records a video with real time sensor and timing information for each frame, making it possible to later display several recordings with automatic perfect sync and display location on a map that updates as Glass moves.”¹⁰⁴

The other application that was published is called izi.TRAVEL which allows individuals to create personalized audio-video travel guides to share with other people. Again, the description explaining the app is more explanatory: “Live a full, exciting and virtually hands-free exploring experience with an innovative Glassware, that combines thousands of multimedia content shared by professionals and by travellers from all over the world, with the most advanced geolocalized technology. Whether you’re looking to go sightseeing, get a deeper knowledge of an artwork or simply enjoy the best attractions in town, this Glassware will enrich your every step with extra stories, images and audio files, that will turn your vacation into the next big discovery experience. With izi.TRAVEL, the whole world is at your... eyes. Just say “Ok glass, start a tour!”¹⁰⁵

The third and final article was published approximately one week after the two new apps were announced and focuses on the public’s experience as well. The article was published by Glass Almanac, a website dedicated to the newest information and updates on Glass, and claimed that approximately 51 percent of Glass explorers use Glass less now compared to six months ago. The statistic was not surprising since the developments

¹⁰⁴ McGee, Matt. "Two New Glass Apps: MultiCamSync and Izi.TRAVEL - Glass Almanac." Glass Almanac. January 6, 2015. Accessed January 20, 2015.

¹⁰⁵ Ibid.

of applications for Glass rapidly declined, however it still shows the roller coaster-like trends that Glass has had on its users.¹⁰⁶

At some point, all of the articles that are published on a weekly basis are unimportant. Throughout Glass's development, Google and the public have formed a partnership. Glass is where it is today due to the responses from Google to the public's experiments with and reactions to Glass. And in turn, Glass has coproduced the public and Google in the sense that the public has been able to do greater things through Glass and Google has seen a different potential in Glass due to certain applications from independent developers.

Was Google's plan all along to pull Glass from the market after introducing the Explorer program and investing a significant amount of time and resources into the project or is that what they will have the public believe? Did they allow the independent developers to continue developing certain applications that seemed out of the promotional realm that Google was originally going for to allow the device to coproduce itself and in a sense, allowing Google to regain control of the new object? Only Google, if even, has the answer to these questions. What is apparent, however, is the fact that the three-year span was an ongoing process of Google taking back control of Glass and releasing control at the same time. Closing the market for Glass was Google's way, in my opinion, of formally reclaiming most of the control that was lost and passed along to the co-producers in the process.

Glass is gone for the time being, Google has closed the doors and the device that has left many people wondering will remain behind closed doors until Google sees fit.

¹⁰⁶ Matt McGee, "Poll Results: 51 Percent of Explorers Are Using Google Glass Less Now Than 6 Months Ago - Glass Almanac," Glass Almanac. January 14, 2015. Accessed January 15, 2015.

Coproduction and feedback loops continue even behind closed doors, however, proving that Glass will constantly be a developing force, even when it is next introduced.

Eventually—if Glass finds true success—Google’s views of Glass and the public’s views of Glass will most likely converge. The feedback loops and coproduction will still take place but the idea of what Google Glass means to the public, to Google, and to the independent developers will be on a similar page.

“O.K. Glass, next version please.”

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