The Internet of Things:

A Content Analysis of Semiotics in Wearable Fitness Tracker Advertising

By

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Abstract

The purpose of this paper is to analyze advertising content as it pertains to wearable fitness tracking products to better understand the current themes present in marketing for the Internet of Things (IoT). The goal of this study is to reveal if and how elements of IoT are being marketed in wearable fitness tracking devices. The research is grounded by a content analysis under the scope of semiotic theory to reveal how companies are using symbols and language to persuade consumers into not only purchasing wearable fitness tracking products but also living a connected lifestyle.

Keywords: Internet of Things, semiotic theory, connect devices, wearable fitness tracking products

Introduction

According to Vermesan and Friess (2014), "The number of Internet-connected devices surpassed the number of human beings on the planet in 2011, and by 2020, Internet-connected devices are expected to number between 26 billion and 50 billion" (p.8). From email to social media, the Internet has become a part of everyday life for most people. Much of this ubiquity is related to the rise of mobile technology. Today, the number of internet connected devices exceeds the numbers of humans, and the increase in internet use on mobile devices is staggering. According to the Pew Research Center, "64% of Americans now own a smartphone, up from 58% in early 2014" (Mobile Technology, 2015, para.1). Many smartphone owners forgo traditional home internet service and only use their mobile internet.

According to the Pew Research Center (2015), "nearly two-thirds of Americans own a smartphone, and 19% of Americans rely to some degree on a smartphone for accessing online services and information and for staying connected to the world around them" (Smith, 2015, para. 1). While the invention of the mobile phone was not reliant on the Internet, the merging of the two has sparked a phenomenon. The ability to access the Internet from a mobile device seems almost instinctive when less than twenty years ago dial up Internet was the norm.

One of the next advancements on the horizon is the rapid movement toward the Internet of Things (IoT). The Internet of Things refers to the ability for everyday objects to communicate with other objects when connected to the Internet (Donovan, 2014). For example, the Philips Company created the Hue lighting system, a wireless system enabling users to control their home lighting from a mobile device. The Hue lighting system also includes an alert feature that the user can set for a variety of notifications; the user might want the lights to blink three times when

their favorite television show is airing. IoT offers technological advancements and solutions for the home, individual health, and entire city transportation systems.

A primary element to the current success of IoT is humans. The process of IoT begins with the communication between man and machine, which then evolves to machine to machine (Burrus, n.d.). Since consumers play a role in the functionality of IoT, it is only natural to assume they will be a prominent factor in marketing these products. Due to the newness of the market and its expensive nature, "to win in the approaching World Cup of Marketing where IoT is a factor, marketers will have to understand and implement more relevant, personalized, integrated omnichannel strategies" (Tahir, 2015, para.7). The current market for IoT products is competitive; for instance, AT&T and Xfinity are competitors in the connected-home market (Bulik, 2013). According to Bulik, "the connected-home market is seeing an influx of marketing for ready-made 'bundled' solutions from companies ranging from AT&T to Comcast's Xfinity, which are trying to use their existing in-home presence as a foothold in a blossoming market" (Bulik, 2013). This example is one of the many future market tactics used by companies trying to succeed in the IoT market. The fact that both companies reported an increase in advertising costs means there is more attention being paid to the area of IoT, which supports the need for research in the IoT advertising field.

Of the products currently available in the category of the Internet of Things, wearable computing devices are trending (Anderson & Raine, 2014). Wearable fitness trackers, a type of wearable computing device, monitor activities such as running, walking, heart rate, and sleep. These devices are becoming popular among consumers, and "with many millions of global consumers stepping, sleep monitoring, and syncing to the IoT ecosystem, they make a good example for a discussion of the complex nature of the IoT" (Davenport & Lucker, 2014). On

average wearable fitness trackers are available at a "surprisingly narrow range of prices" (Perry, 2014). Moreover, "the activity tracker is typically connected to one or a few other devices for simple actions and data gathering," which further supports the argument that wearable fitness trackers will be a foundational product for the beginnings of a lifestyle in IoT (Davenport & Lucker, 2014). Even though IoT is a growing market, "companies still have to figure out what consumers actually expect and want from smart products" (Infographic: Why the 'internet, 2015). Therefore, research regarding the marketing of such products is timely.

IoT is a movement that is becoming unavoidable. It has the potential to create many opportunities beyond individual and personal use. IoT consists of "multiple M2M connections," or the ability for machines to communicate with other machines, which if employed by consumers could begin to take on more than one aspect of a person's lifestyle (Tavares, 2014, p. 26). Due to the connected nature of IoT, marketers will have to evolve to sell the connected lifestyle. But, the ambiguity of IoT also presents challenges to marketers. This project will study advertising content as it pertains to wearable fitness tracking products to better understand the current themes present in marketing for IoT. I will be identifying themes in wearable fitness tracking product advertisements to unveil the marketing techniques for this new lifestyle. Through advertisements, I will observe patterns in the type of device being sold and the emotion the advertisement is trying to engage. The goal of this study is to reveal deeper messages in advertising of wearable fitness tracking products that persuade customers toward the "smart" lifestyle. It will also show consumers what methods of advertising are being used to enhance their experiences but also emotionally influence their purchases. This content analysis will ultimately reveal how companies are using symbols and language to persuade consumers into not only purchasing wearable fitness tracking products but also living a connected lifestyle.

Literature Review

The literature review will cover the following areas: the Internet of Things (IoT), advertising and marketing, and semiotic theory. The section devoted to the Internet of Things will provide a definition as well as current implementation around the world. This portion of the literature review will also discuss the effect of mobile technology on IoT and the future impact of IoT on society. Next, the marketing and advertising section will address mobile advertising and its ability to provide more personalized advertisements. Finally, this project will use the lens of semiotic theory to analyze wearable fitness trackers. Therefore, the current literature pertaining to semiotic theory and advertising and marketing will be assessed.

Internet of Things (IoT)

The Internet of Things, commonly referred to as IoT, is the integrated communications of electronic devices through internet connectivity (Steele, 2014). IoT facilitates the interactions and communications of human to machine and machine to machine. Therefore, IoT can simply be referred to as a network of devices (things) that interact with humans to complete specific tasks. For example, Smart televisions, microwaves, light bulbs, and watches, to name a few, are currently on the market for consumers. IoT is known mainly for its ability to take common tasks and increase efficiency; in addition, its ability to enhance internet-connected devices is creating new relationships between man and machine. For instance, homeowners who own a Smart thermostat like a Nest can adjust their heating and cooling system from their Smartphone if they are away from home. Smart refrigerators are able to detect when an item is low or out and notify the owner when replenishment is needed. Currently, consumers are able to purchase a variety of internet-connected devices for reasonable prices, and there are more extravagant products being

made for the future of this phenomenon. Therefore, IoT is being established as a connected lifestyle.

According to former brand manager for Procter and Gamble and MIT consultant, Kevin Ashton (2009), "I could be wrong, but I'm fairly sure the phrase 'Internet of Things' started life as the title of a presentation I made at Procter & Gamble (P&G) in 1999" (Ashton, 2009, para.1). Most scholars give him credit for coining the term. The Internet of Things, or IoT, is new in mainstream conversation, but it has been around for longer than most think.

Donovan (2014) cites Mark Weiser's 1991 article discussing, "hardware and software, connected by wires, radio waves and infrared" as the origin of IoT (Donovan, para.6). However, Steele (2014) says the first internet-connected device occurred in the 1980's when Carnegie Mellon University programmers and engineers made "a Coca-Cola machine to send status updates and messages about the availability of a can of Coke so that a trip to the snack area would not be in vain" (Steele, para. 8). While current researchers have their own ideas as to when IoT originated, there is no debate that the topic has evolved and hit a mainstream growth spurt in the past couple of years.

The capacity for global implementation of IoT is increasing dramatically. Watkins, Kitner, and Mehta (2012) predicted, "By 2015, four major regions (sub-Saharan Africa, Southeast Asia, South Asia, and the Middle East) and 40 countries will have more people with mobile network access than with access to electricity" (p.685). Like other statistics surrounding IoT, this statistic is baffling. Countries outside of the United States have also increased their mobile phone usage.

Japan's dominant method of internet access takes place on a portable device; the most notable is the mobile phone, which "has become the primary means of communication between

consumers and the wireless environment of information that surrounds them" (Ferris, 2007, p.28). According to Ferris (2007), "Putting it simply, in Japan the internet no longer resides on a PC --it is on the person and with them wherever they may be" (p.29). Ferris suggests that companies should be using this fact to guide their marketing plans to meet the needs of their customers more effectively. In addition to the advancements of mobile technology, the article mentions Japan's ventures into the realm of the Internet of Things (IoT). Due to the rise in mobile technology, Japan has been making strides to implement IoT. For example, Japan's Coca-Cola Company has created a vending machine that is compatible with mobile payments. Ferris goes on to include five case studies showing "how mobile phones are being used as a way to 'reach' consumers and gain an understanding of them" (Ferris, 2007, p.30). The first case study outlined the use of a video store database. By moving the database to a mobile platform, the company can now access more than half of its customer's online information. This has given the store the ability to retrieve data that reflects the behaviors of its clientele. Therefore, the impact on marketing capabilities increase and the opportunity for one-to-one marketing becomes possible. The article supports the evolution of IoT and the opportunities it creates for marketing that have not been available in the past. Ferris' findings indicate that the future of marketing includes a more personalized experience for customers.

IoT devices will provide marketers with "additional data from smart devices to enhance existing information about customers and improve personalized communication, engagement and experience across all channels" (Tahir, 2015, para.4). However, with every new technology comes challenges, and IoT is not without potential hurdles. The Internet of Things, IoT, is said to present "opportunities and challenges resulting from amplified connectivity will influence nearly everything, nearly everyone, nearly everywhere" (Anderson & Rainie, 2014). Security is one of

the largest threats to consumers using connected devices due to the amount of devices being connected. Every additional device used by a consumer that shares personal information opens a new outlet for hackers to penetrate. The Target security breach incident in 2014 was an example of security issues as well as privacy. Hackers were able to gain access from the third party payment processing company in order to retrieve customer information (Kocher, 2014). While there are other barriers to IoT, they are manageable, and the benefit of "providing masses of information both about human behaviour and the immediate surroundings" is greater (Tavares, 2014, p.29). Despite its inevitable obstacles, IoT will change the way the world lives.

IoT will change they way we think about our homes. Consumers like Jim Butler have completely joined the Smart home lifestyle. According to Bergen (2015), "For Mr. Butler, like most in the digital ad world, those avenues are not yet clear. His affection for connected living comes largely from the 'peace of mind' it brings" (Bergen, 2015, para. 10). Bulter argues the connected lifestyle can offer a sense of security by allowing users to control some aspects of your home even if you are away. Many homeowners appreciate products like Smart pipe technologies because it allows the individual to monitor pipes and replace before damages occur; this occurs through sensors that upload data "to a cloud-based data collection and analysis service, and a person can check the status of a sensor using the Web and a smartphone app" (Greene, 2015, para.4). Similarly, the Smart thermostat allows users to schedule and control the temperature of the connected home from an internet connected Smart device at any location (Kastrenakes, 2014). Additionally, Smart appliances such as LG's ovens and refrigerators and Whirlpool's washers and dryers. Interestingly, Nest and Whirlpool have created an additional pairing of their products to alert users when energy hours are at their highest, which will allow users to plan their tasks accordingly ("Smart Appliances", 2015).

IoT will change how we monitor our health. Currently, products like the Apple Watch and FitBit give users the ability to monitor their activity levels as well as sleep patterns. Wearable devices use to be a futuristic idea; however, they have become a very real device that enables individuals to be preemptive with their own health. The need for constant connection is increasing, and some would argue that it is more of an epidemic. Scholars have studied the addictive nature of the Internet for quite some time. Walsh, White, and Young's (2008) research data revealed, "mobile phone addiction could occur and participants identified that behaviours, such as compulsive checking and inappropriate use, may be symptomatic of addictive use" (p.88). However, their study also revealed many of the benefits surrounding communication and mobile phones. Consequently, these behaviors are the marketing point for most companies. For instance, "Fitbit has tapped into our need to be constantly connected by giving you live data – on your wrist – of how much you have walked each day" (Delgado, 2014, para.3). Wearable fitness trackers are of the most known technological advancements brought about by IoT, but there is more to these devices than personal use. Hospitals are adopting new technologies to take healthcare to the next level. For example, "there will be hospital optimization, where we have sensors that can detect bacteria on the equipment and smart scrubs that can detect viruses that may have traveled from a sick patient" (Burrus, n.d., para.8.). IoT is creating the possibility to save more lives.

IoT will change the daily how towns and cities function, and it will change governing policies. According to Presser (2015), "With the increase in ever more detailed knowledge about our world, and in particular our environment, policy decisions can be made based on real data" (p.5). Therefore, IoT will enhance the functionality of a city based on real, up to date data. Recently, Cisco released details of the plan to make Kansas City a Smart city. An example of

one of the advancements included in Cisco's plan is "'smart lighting' and 'video as sensors' in collaboration with Oakland-based LED lighting company Sensity Systems" (Alonzo, 2015, para.6). Moreover, Cisco plans to implement "the new CityPost network will broadcast real-time, location-based information and alerts through a network powered by the "interactive Smart Signs" — city posts — and on smartphones through a mobile application" (Alonzo, 2015, para.13). Technology such as this will increase security as well as energy saving.

IoT will change the agricultural landscape. According to Bandyopadhyay and Sen (2011), "with the application of identification systems, animal diseases can be controlled, surveyed, and prevented" (p.19). This technology alone could decrease waste and increase production rates. Bandyopadhyay et. al. also suggests a potential shift in distribution and sale directly and "not only in a small region like in direct marketing or shops but in a wider area" (p.19). Not only does IoT create efficiency but also the ability for individual farmers to grow their business with a more hands on approach by widening the buyer selection.

Smartphones and "smart" home products are slowly introducing IoT to consumers. These devices will impact daily activities, but there is more to IoT than personal use. While many IoT technologies are being created for personal use, the impact will also transform industries such as healthcare and government. In fact, "the concept of the IoT is expected to be integrated into our society and support our daily life in the near future (Technology, 2015, p.145).

In addition to an increase in consumer use, IoT is also being assimilated into organizational culture. Many companies are predicting an increase in the IoT market and have already began integrated the concept in their business structure. For instance, Cisco believes the market will have increased rapidly by 2020 and "there to 50 billion things connected to the Internet -- up from 10 billion last year -- and the company believes the majority of these

connected things will be applied to industrial uses, and not the commercial market" (Neiger, 2014, para.10). With this kind of foreshadowing, the business of IoT seems endless.

IoT has been a fast growing market for many technology companies, and research on the need for IoT has been explored in regards to the technology field. As of now, when the general public thinks of IoT, their mind produces an image of a phone or tablet. However, the technology inclined consumer is thinking on the scale of a smart city, which suggests there is a huge gap in the functionality and possibilities of smart devices and IoT. There is a need for further research on the topic of IoT and how companies are going to market IoT, what was and still is, a futuristic idea to the general public. The lack of research currently available on this topic alone provides the grounds for research in order to educate consumers.

Advertising and Marketing

In an article published by the Interactive Advertising Bureau, Joe Laszlo (2009) outlines the landscape for mobile advertising and proposes, "that mobile communication devices will become the next great advertising medium" (p.28). The research presented by Laszlo shows a favoring for the youth demographic, but he warns advertisers to not dismiss the adult users since they are showing an increase in use. This data as well as other mobile customer data presented in the article shows the potential for connecting with this audience and moves the conversation to advertising. The article defines the difference between mobile advertising and internet advertising with an emphasis on mobile phones in order to preface how current marketers are using each area. Mobile advertising consists of text advertisements, graphical banners, videos, and commercials. Another aspect of mobile advertising includes off-device, which refers to digital coupons and image downloadable applications. According to Laszlo, "The mobile phone is the one device consumers are likely to always have with them, giving it a unique ability to knit

together messages delivered via other media" (2009, p.32). Targeting is listed as a primary benefactor of marketing on mobile devices.

Mobile advertising has become an effective strategy for many companies. A study conducted by Okazaki and Barwise (2011) revealed a lack of research pertaining to mobile advertising in the United States. Due to the rise in mobile device usage, push and pull advertising such as: SMS text messages and interactive message displays have also seen an increase. According to Okazaki and Barwise, "mobile devices would enable firms to personalize content by tracking personal identity and capturing customer data" (2011, p.61). On the other hand, their findings revealed that users were less likely to participate in advertising offers when they felt their privacy was violated.

Before there was mobile advertising, there was online advertising, which is a component of current mobile advertising. While online advertising is still a viable option for companies, studies show its overuse can cause it to be ineffective. According to Kim and Sundar (2010), "Some ads, which provide information that is unrelated to Internet users' interests, might interrupt users' specific goals and therefore cause annoyance" (p. 346). This data suggest that today's consumers are more interested in tailored advertisements, which can be achieved monitoring consumer data. Mobile advertising has the ability to produce more personalized advertisements.

Search marketing firms have been extremely successful in the marketing industry. Organizations know the benefit of increasing their online presence, so they hire search marketing groups who implement a variety of tools to cultivate customer data for companies. According to Pingel (2005), "No matter what a client company's search marketing goals, they want results that

transform their online presence to the bottom line" (p.38). Search marketing has seen a decrease since the popularity increase of mobile advertising.

Mobile technology can be used to obtain specific data in order to personalize the consumer experience by telling "an organization where a customer is and what they're doing, making it possible to predict what they might want or do next" (Olavsrud, 2015, para.10). Branded applications "allow the user to access a catalogue of brand names, purchase products, or get added value usage of promotions or exclusive products through the branded application; so the app becomes a specific, unique and increasingly frequented communication channel" (Ruiz-Del-Olmo & Belmonte-Jimenez's, 2014, p.74). Ruiz-Del-Olmo and Belmonte-Jimenez argues that branded applications differ from other software applications because they include "links to commercial and social actions, and proposals for a wide range of services related to the activity and image of their brand" (2014, p.74). The data presented in their study shows how branded applications are revolutionizing mobile devices into personal devices. The format of this particular study is a content analysis, which Ruiz-Del-Olmo, et al. uses to show the relationship between user motives and mobile applications. One of the most significant benefits to using branded applications as discussed in the article is that the applications can be created to reflect cultural and personal values as of an individual user. However, Ruiz-Del-Olmo, et al. notes the "nonexistent critical capacity of these young users of mobile applications in terms of the advertising" (2014, p.78). Therefore, more research is needed to optimize brand applications as a source of marketing.

Anamaria Tomiuc (2014) suggests the need for more mobile technologies to enhance the experience of the new museum. The article acknowledges the evolved consumer by nodding to providing a personalized experience through interaction. According to Tomiuc, "The museum is

nowadays influenced by the consumption society and the entertainment era, aiming to transform art and culture in a spectacular performance" (2014, p.34). The museum employs the use of branded applications by "focusing on the use of smartphone applications and the characteristics of the museum experience that they share" (Tomuic, 2014, p.34). The relationship between customer and product is changing due to media technologies such as branded applications.

The future of marketing will inevitably change to serve the IoT market. Its new and unchartered characteristics alone make it fair game for marketers; however, its use of advanced technology creates a hurdle. The annual International Consumer Electronics Show that took place in January of this year listed several suggestions for marketers in the IoT business. When it comes to advertising, companies need to take into account the fact that IoT is more than selling one product; it is a lifestyle. For instance, anyone thinking of implementing a connect home "will need to replace their existing appliances with connected versions, which means IoT depends upon how often people buy a new fridge or dishwasher" (Bergen & Peterson, 2015, para.7). Meaning, advertisers will have to be more than creative if they are going to get consumers to replace items of large cost.

Florence's (2007) research argues the persuasive power of symbolism in advertising. Their study was aimed at identifying symbolic elements in a music store's advertisements. The advertisements in question all included images of legendary rock musician, Dimebag Razorback, who had passed away. In addition to the celebrity propaganda being used, a variety of the culturally assigned themes were utilized. For instance, the use of the color black and tombstone images both depict elements of death. According to Florence, "Consumers are persuaded to purchase guitars because their personal unconscious and collective unconscious identities with the advertising themes" (2007, p.70). The study revealed a clear use of signs and symbols to

connect with the audience by using a semiotic lens. However, more semiotic research is needed in other areas of media.

Semiotic Theory

Semiotic theory is broadly defined as the study of signs. Signs are created when an individual assigns meaning to a particular object. Under the scope of semiotics, a sign's meaning will change based on the situation. Depending on the theorist, the definition of a sign will also change. According to Littlejohn and Foss (2011), "Most semiotic thinking involves the basic idea of the *triad of meaning,* which asserts that meaning arises from a relationship" (p.45). This relationship is primarily influenced by the experience one has had with the object or his/her cultural connection to the object. For instance, one individual might think of the beach as a place of relaxation and solitude, but someone who was stung by a jellyfish will not feel the same.

The study of semiotics originated in Ancient Greece, but most scholars denote Ferdinand De Saussure and Charles Sanders Peirce as its founders (St. Clair, 2002). Saussure is known for his linguistic work in semiotics; his work spawned a plethora of scholarship in semiotic theory. For example, Fauconnier's (1985; 1996) research is also grounded in linguistics; he focuses on the study of metaphors and "further articulates how the complexities of meaning and form are related to each other (St. Clair, 2002, p.7). Saussure's work is centered on linguistics; he believed that language was the common denominator to organizing signs. Saussure argued that language or langue was "at the same time a social institution and a system of values" (Barthe, 1964, p.14). Even though language is a vital part to Saussure's model, his belief that "there is no language without speech, and no speech outside language" adds the language aspect to the model (Barthe, 1964, p.15). His concept that language was a system of signs is paired with idea that a sign is made up of the signifier and the signified. The signifier is the form in which the sign is in, which

can “can be expressed through other forms of expression such as language, dance, music, or art” (St. Clair, 2002, p.2). The signified is the perception or meaning of the sign. In Saussure’s view, we use signs in everyday life, but it is language that communicates the relationship between the signified and signifier. For instance, if the signifier were a crown, the signified would be royalty. According to Noth (1995), “Saussure had the mentalist concept of the signifier as a ‘psychological imprint,’” which further supports the idea that signs are culturally assigned and change overtime (p. 80). However, Noth posits that today’s research in semiotics is grounded less in Saussure's model.

According to Porcar (2011), “the goal of semiotics would be to explore this meaning and the way it operates, as well as the relation it establishes with action and knowledge” (p. 22). Therefore, while each model has varying attributes, they also have the same goal. Many semiotic theorists have developed their own models, which has spawned a variety of characteristics of what constitutes a sign. For instance, Pierce believed signs to have different levels of meaning. Pierce’s work, while similar to Saussure’s, presents a slightly different system for semiotics. Pierce argues that a sign is not a sign until it has been interpreted. His theory uses these three categories for describing the relationship with a sign, object, and interpreter: icon, symbol, and index. These categories represent the level of closeness the sign and its interpreter have, icon being the strongest. According to Harris (2003), “an image is an index if it is recognizable, not because of any similarity to an object or person, but because we understand the relationship between the image and the concept that it stands for” (p.50). Images that lack this visual connection are simply referred to as symbols, and those that are highly identified with the image are said to be icons. This ranking system provides a guideline for the structure of the analysis.

Semiotic theory has been used to analyze all forms of media. Advertising is a common subject for semiotics because it provides valuable feedback as to how an audience is or will interpret a particular advertisement. Stolze (2004) argues that advertisements cannot be implemented across cultures due to translation conflicts. His study reveals the need for adaptation of advertisements based on the conflicts presented regarding cultural relevance. His study is comprised of a rhetorical analysis using German and Brazilian advertisements; the goal was to identify semiotic characteristics that would go unnoticed by an outside culture. In order for the advertising to be fully understood, "translators will have to integrate information on differences in the page layout, fonts, or in the relationship between pictures and text" (Stolze, 2004, p.6). Therefore, using semiotics as a form of market research can aid advertisers in developing ads that will receive the desired reaction from the target audience.

Applications of semiotic theory have been applied to advertisements in search of the powerful and persuasive nature of signs. Epure, Eisenstat, and Duni (2014) argue "that semiotics allows for the practical distinction of persuasion from manipulation in marketing communication" (p. 592). The article also suggests the importance of decoding signification systems to properly craft messages. Scholars like Oswald (2015) agree with the power of advertising and suggest brands to be a system of signs based on the relationship consumers make with slogans and logos. While Oswald focuses on the connection between a company's ability to successfully manage a brand using logos and slogans as seen in market research, the data provides ample support for usefulness of semiotic analysis in advertisements. For instance, semiotic analysis data showed a connection between brand loyalty and consumer behavior. Therefore, semiotic analysis enables a researcher "to investigate how cultural codes structuring culture and social organization influence the ways humans respond to messages in their

environments" (Oswald, 2015, p. 120). Furthermore, semiotics has the ability to identify cultural trends as a means to aid in producing better brand management.

Other research has been devoted to the relationship between Human-Computer Interaction (HCI) and semiotics by analyzing computer games. Scolari (2009) discusses HCI as a form of semiotic device where users can "analyze the ambiguous game between signification and interpretation played by designers and users" (p. 5). Therefore, semiotics can unveil important characteristics in the relationship and interaction between humans and computers. Studies in HCI align with IoT because computer games are a branch of human-machine interaction. Moreover, game developers are tasked with creating messages from a digital interface similar to that of connected devices where sound, video, images and interaction can be utilized.

Semiotics has a long history of application in advertising and marketing campaigns, which is one reason it will be an appropriate lens for this study. Moreover, signs are created by society and can change, so examining the current connotation of sign used in advertising is pertinent. IoT new market will need research in order to grow and successfully connect with audience; therefore, by identifying the semiotic devices in advertisements, marketers are more aware of what works in a particular culture.

RQ 1: What patterns and themes are present in the advertisements for wearable fitness trackers that suggest a healthy lifestyle?

RQ 2: What emotionally charged signs or symbols are used in advertisements for wearable fitness trackers to persuade viewers to join the smart lifestyle?

RQ 3: What signs or symbols are used in advertisements for wearable fitness trackers to create a personalized experience?

Method

According to Berg (2001), "Researchers employing the social anthropological approach usually are interested in the behavioral regularities of everyday life" (p.239). Studying advertisements can reveal consumer behaviors. However, a social anthropological approach normally involves using multiple platforms. While this particular style uses other facets not related to this study specifically, the steps for any content analysis follow a "standard set of analytic activities" such as: data collection, code development, categorization, material sorting, material examination, and identification (Berg, p.240). The content analysis highlighted the patterns and themes found in the wearable fitness tracker advertisements. Using the lens of semiotic theory provided additional information as to why these patterns or themes exist. I used various elements from the models of both Saussure and Peirce. These models provided the means for coding and categorizing the findings in each advertisement. The combination of elements is typical in content analysis. Therefore, the specific elements of content for this study were the symbols, text, and sounds used in the advertisements as well as the behavior or interaction of the characters in the advertisements.

I viewed advertisements of various wearable fitness devices. To select the fitness trackers that are most popular or highly rated, I conducted initial research using reputable websites in the fields of technology, sales, or consumer opinion.

Once I identified companies and websites that are known for being valued in the technology market, I searched for articles on their website that listed their top picks for current wearable fitness trackers. Of the search, the following websites shared their picks for the top wearable fitness trackers of 2015: PC Mag, Cnet, Techradar, Time, TheVerge, ZDNet, Pocket-lint, Computer World, Engadget, and Gizmodo. After selecting the websites that had posted

articles rating their top picks in wearable fitness trackers, I chose to use every device featured on the lists. To expand the study to include more advertisements, I chose to group devices developed by the same company. For instance, FitBit has multiple styles for one of their wearable fitness trackers. While these particular items offer some individual advertisements, focusing on the brands will provide a more extensive look into the specific choices in advertisements, as one would assume each brand would try to stand out among its competitors. Therefore, I dismissed any duplicates such as this in the selection process. In this light, the object of the study was the brand versus one singular product. Based on this research method, the results revealed the device brands in Figure 1.0 to be rated the top wearable fitness trackers for 2015.

Figure 1.0 Initial Data Collection Results for Top Wearable Fitness Brands

Brand	Mentions	Brand	Mentions	Brand	Mentions
Withings	5	Huawei	2	Mio	1
MisFit	7	Samsung	2	Pivotal	1
Jawbone	8	Motorola	4	Runtastic	1
FitBit	8	Acer	2	Xiaomi	1
Garmin	8	LG	2	Razer	1
Basis	6	Apple	2	Moov	1
Polar	4	Life Trak USA	1	Lark	1
Sony	3	Body Media	1	Mondaine	1
Nike	2	Pebble	1	Sync Active	1
Microsoft	3	Striiv	1		

Data Collection

All of the brands listed above will be used in the study. Each company provided a link to their company's YouTube channel; therefore, it was used as the primary platform for viewing the advertisements. I selected and viewed the two most recent wearable fitness tracker advertisements available on the brand's YouTube channel. While my intended target was two advertisements per brand, only 28 brands had published advertisements. Of those 28 brands, four had only one advertisement available. This produced 48 advertisements to analyze. I observed the advertisements and documented the data using Coding Sheet A.

Coding Procedure

The units of analysis are the advertisements. Using a coding scheme that incorporated elements of the Saussure's semiotic model. Saussure's model includes the signified and the signifier. Like most content analysis, the categories will develop before and during research. Therefore, I begin by using common categories. According to Berg (2001), "These classes are used by virtually anyone in society to distinguish between and among person, things, and events (for example, age, gender, mother, father, teacher, and so on)" (p.250). The codes in this study fell into the categories relating to symbols and signs. For instance, the gender of the actor(s) and the emotions of love and happiness were the initial categories for analysis. See figure 2.0 for reference. Other categories were allowed to emerge from the advertisements.

The focus data for this study was wearable fitness tracking device advertisements. Of the 29 brands originally selected for the study, data was only available for 26 of the brands. While Pivotal, Xiaomi, and Lark were listed on various websites as having a top wearable fitness tracking device, these companies did not have any accessible advertisements. In addition, Huawei, Motorola, LG, Pebble, Striiv, Mondaine, and Runtastic only offered one advertisement

each. The study was comprised of 48 advertisements, which were obtained from each company's YouTube channel. The total viewing time for all of the advertisements was one hour and three minutes. The average length of each advertisement was one minute and eighteen seconds.

Data Analysis

The data was assembled from the statistics gathered from the coding sheets, which will be reported here. First, actor characteristics, age, race, and gender, will be discussed. Next, factors relating to the setting and location of the advertisement and device appearances will be reviewed. Then, the themes of fitness and smart lifestyles will be identified. Finally, the notable symbols found in the advertisements will be categorized according to Saussure's model.

Actor Characteristics

The first measure of data identifies the ratio of male and female actors used in the advertisements. Of the 226 actors in the advertisements, 128 (57%) were male and 90 (40%) were female. The remaining 8 actors (3%) did not reveal their gender.

Of the 226 actors in the data collected, 161 (73%) were White, 30 (13%) were black, 14 (6%) were mixed race, 12 (5%) were Asian, 2 (0.6%) were Indian, and 1 (0.4%) was Hispanic. Six (3%) actors were pictured in ways that concealed information about ethnicity.

Age was coded in the advertisements using the following ranges: 10's, 20's, 30's, 40's, 50's, 60's, and 70's or higher. Of the 226 actors pictured, two (0.9%) actors in the 10's age range, 44 (19.51%) in the 20's, 123 (54.42%) in the 30's, 17 (7.5%) in the 40's, 1 (0.44%) in the 50's, 2 (0.9%) in the sixties, and 3 (1.33%) in the 70's and older. 34 (15%) actors were pictured in ways that did not provide enough evidence to conclude the age of the actors.

Setting/Location

The setting of each actor was noted in the coding process. Setting represents the type of group the actors were performing through the duration of the advertisement. Actors were listed as performing solo, in a dyad, or a group. Of the 226 actors, 123 (54%) performed unaccompanied, 56 (25%) were in pairs or dyads, and 47 (21%) appeared in a group of three or more.

In addition to the setting, the location of the actors was included in the data analysis. Primarily, either being indoors or outdoors represented the location of the actor. Of the 269 activities observed, 141 (52%) were performed in an outdoor setting while 128 (48%) were located indoors. Details regarding the type of activity were noted during observation. Subcategories were created to identify what types of activities were performed. Of the 128 indoor activities, 62 (48%) were located in the actor's home. 12 (9%) activities featured actors at work and 11 (8.5%) at the gym. Actors were featured working out in their homes in 14 scenes. Actors were also represented is a state of waking up or getting out of bed in 13 scenes.

There were 141 outdoor activities observed during the study. Fitness and sport activities took place 136 (96%) times in of the all outdoor activities shown in the advertisements. The following represents the actors who were recorded participating in the following outdoor sports related activities: 36 (26%) running, 17 (12%) biking, 10 (7%) walking, 7 (5%) swimming, 6 (4%) skateboarding, 6 (4%) doing yoga, 3 (2%) playing basketball, 2 (1%) paddle boarding, 2 (1%) rowing, 2 (1%) parkouring, 2 (1%) playing football, 2 (1%) playing ping pong, and 1 (0.7%) in the following 14 activities: dancing, surfing, rock climbing, skiing, ice skating, boxing, jumping rope, doing gymnastics, doing ballet, playing rugby, playing racquetball, playing hockey, playing volleyball, and playing laser tag. Of the 141 outdoor activities, 18 (13%) showed

non-fitness activities. Of these non-fitness activities, 10 (56%) actors were featured on a beach, and 8 (44%) were at home with family.

The number of multiple settings displayed in the advertisements was recorded. To be recorded as having multiple settings, the setting could change entirely or the advertisements could have shuffled multiple settings throughout the advertisement. Meaning, an advertisement could show an actor or actors at home, in the car, and at work and be credited a three in the multiple settings category. The same advertisement could also be credited six multiple settings if it showed an actor or actors at home, in the car, and at work twice in the advertisement. The only stipulation is that the screenshot changes. The 48 advertisements showcased 535 multiple settings. Each advertisement averaged 11 setting changes per advertisement.

Device Appearances

Of the 48 advertisements viewed, the wearable fitness trackers appeared 689 times. These appearances include any screenshot where the device was easily visible and the appearance was only recounted once the device was out of frame or the screenshot had changed. On average, each advertisement showcased its featured device at least 14 times.

Other device data includes the actual application or use of the device. The advertisements showed 245 different uses of the devices. The type of activity being conducted during the advertisement was used to tally this data. For instance, actors who were running and sleeping in one advertisement would denote two applications for the device. The advertisements averaged five different device applications per advertisement.

Themes

The themes observed during this study were the portrayals of fitness, representations of other smart devices, emotional response to the device, economic status of device owners, and the interactions portrayed in the advertisements.

Fitness. To be coded with the fitness theme, an advertisement had to include actors participating in sport related activity. Of the 48 total advertisements being observed, 41 (85%) featured an actor engaging in fitness or sport related activity; 7 (15%) of the advertisements did not showcase a fitness or sport related activity.

Smart Lifestyle. To be coded as having the smart lifestyle theme, advertisements had to feature other smart devices. For instance, the Microsoft Band advertisement showed actors using smartphones to viewed data received from their wearable fitness tracker. 34 (71%) advertisements introduced other smart devices 67 times while 14 (29%) of the advertisements did not. Of these 67 appearances, smartphones were used 51 (76%) times and computers, laptops, and tablets 11 (15%). In the advertisements, there were two (3%) smart camera appearances, one (2%) smart payment method, one smart car (2%), and one (2%) mp3 player.

Emotional response. Themes of emotional responses were recorded in the advertisements. Actors were listed as having six different emotional responses during the span of the advertisements. Actors displayed feelings of happiness, determination, satisfaction, pensiveness, relief, and confidence. Of the 48 advertisements, 37 (77%) had observable emotions, and 12 (25%) advertisements displayed more than one of the emotions. There were a total of 51 instances where emotion could be observed. Actors responded with happiness 32 (62.5%) times in the advertisements. Actors were perceived as having determination in 9 (17.5%) of the advertisements. Actors were perceived as having feelings of satisfaction 4 (8%) times.

Actors revealed feelings of pensiveness three (6%) times, relief two (4%), and confidence once (2%).

Interactions. The interactions shown in the advertisements were categorized by being person to person, person to machine, and machine to machine. There were 410 interactions observed. Person-to-person interactions represent any interaction the actors have with other people. There were 36 (75%) advertisements that featured person-to-person interactions. Of the 410 observed interactions, person-to-person was noted 162 (40%) times. Each advertisement's actor or actors averaged at least four interactions with other individuals per advertisement.

Person-to-machine interactions were noted whenever the actor or actors interacted with the wearable fitness tracker. There were 40 (83%) advertisements that featured this type of contact. Of the 410 observed interactions, there were 181 (44%) person-to-machine interactions. On average, actors communicated with the wearable fitness trackers at least four times per advertisement. Machine-to-machine interactions are those where the wearable fitness tracker was shown communicating with another smart device. 28 (58%) of the advertisements showed this type of interaction. Of the 410 observed interactions, 67 (16%) were machine to machine.

Symbols

Of the symbols noted in the 48 advertisements, 25 (52%) featured scenes including roads, streets, or paths, and 25 (52%) showcased actors running or climbing up stairs, mountains, or hills. There were 8 (17%) advertisements including actors crossing bridges. 17 (35%) actors were observed in beach and city setting settings. Additionally, 12 (25%) advertisements featured scenes emphasizing water and sky views. Scenes where the sun, a sunset, or a sunrise were featured in 14 (29%) advertisements. Eight (17%) advertisements featured a zoomed in view of

the actor's feet while walking or running. Below, figure 2.0 shows the symbols as coded using semiotic theory as it pertains to Saussure's model.

Figure 2.0: Themes based on Saussure's model of semiotics

Saussure's Model	
Signifier	***Signified***
Road/Street/Path	A journey or challenge is upon the actor; it represents life and the choice one makes.
Sun/Sunrise/Sunset	The sun represents the beginning and ending of the day.
Stairs/Mountain/Hills	Climbing mechanisms represent hurdles and challenges.
Running/Climbing up	Actors running or climbing in the upward motion represent challenges and hurdle being taken on.
Water/Beach	It represents a place of relaxation and reflection.
City	It represents a fast-paced lifestyle.
Sky	Clear skies represent happiness and freedom.
Bridge	A bridge connects things and represents a solution or achievement.
Zoom to feet/shoes	Represents movement, growth, and time

Discussion

Even though the wearable fitness tracking devices are produced by different brands, which have their own individual visions, and marketed differently, various patterns were found in the study. First, healthy lifestyle, smart lifestyle, and personalized experience were the themes observed throughout the study. Within those themes, there are symbols and interactions to support their presence in the advertisements. Here, each theme and its affiliated symbols and interactions will be discussed.

Healthy Lifestyle

In reference to the first research question, what patterns and themes are present in the advertisements for wearable fitness trackers that suggest a healthy lifestyle, the theme of fitness emerged in the study. Fitness was represented in the advertisements by the actor's behaviors and actions. For instance, brands such as FitBit and Jawbone used featured actors who were running up hills or on a treadmill; these activities as well as others are indicated of a healthy lifestyle. Consumers who value a healthy lifestyle will be more likely to forge a connection with the wearable fitness tracking devices because their functionalities are mostly fitness related. The wearable fitness tracking device advertisements also showed actors participating in fitness activities where the device is being used, which shows the enrichment capabilities of the device. By marketing the efficiency of the product and its ability to bring ease to the everyday activity, consumers are being persuaded to buy the device, which drives the forward thinking of IoT.

The study revealed images of actors on stairs, hills, and mountains. These types of images convey that the actors were being challenged. Images showcasing actors running up hills or climbing mountains are indicated of challenges being accomplished. According to Ferber (2000), "Life is a path or a journey on a path" (p.150). Using hills in the advertisements conveys to the audience that life is a journey. Brands eliciting this type of action communicate to the audience the perception that goals will be obtained using the device. Marketing a personal connection with the wearable fitness tracker will guide consumers to the IoT market.

Actors were observed expressing feelings of predominantly happiness and determination. By showing the actor using the device and expressing feelings of happiness, there is a correlation that the device brings happiness to those who use it. The repetition of this relationship increases the idea that IoT will bring happiness to consumers. Furthermore, actors displaying emotions of

determination were participating in fitness or sports related activities. For example, the Microsoft Band: Live Healthier advertisement featured a female actor displaying facial expressions of determination while running; this connects to the healthy lifestyle theme. Current literature supports the influence that symbols such as happiness can have on consumers. Florence's (2007) research found that advertisements featuring death related signs in combination with recently deceased musician were persuasive with consumers. The emotional connection that consumers had with the music artist were heightened by the reminders of his passing, and consumers found the advertisements more appealing. The literature also supports emotions as a tool for advertisers to connect their products with their audience. Just as the wearable fitness tracking devices were perceived as being able to create happiness, Dean's Guitars was perceived as a place where fans could once again support the music icon.

Consumers are health conscious; this is evident by the amount of health trends and fads that have been developed over the years. According to the Pew Research Center, "60% of U.S. adults say they track their weight, diet, or exercise routine" (Health Fact Sheet, 2013, para 25). Keeping a food journal, daily weight tracking, using a calorie counter, and wearable fitness trackers are just some of the ways more than half of U.S. population is tracking aspects of their health. The advertisements used a variety of different fitness related activities to show the device's application range for health minded consumers. Wearable fitness tracking devices are the entry point to IoT because they give consumers an efficient outlet to track their daily activities. The device advertisements show consumers that IoT enables movement tracking that other traditional methods cannot. Wearable fitness tracking devices provide feedback and tracking that no longer has to be calculated by hand and provides users with immediate data. By

tapping into the wellness market, brands are showing consumers how to customize their health routine and shed its once daunting image.

Smart Lifestyle

In reference to the second research question, what emotionally charged signs or symbols were used in advertisements for wearable fitness trackers to persuade viewers to join the smart lifestyle, there were several to appear during the study. Throughout the viewing of the advertisements, there were documented appearances of other smart devices. Not only were these devices shown in the advertisement, but also they were shown in a way that teaches consumers how they connect with the wearable fitness tracking device. In Figure 2.0, symbols like or similar to a path are noted. According to Berger (2004), symbols can "tell us what to do in various situations and what certain things 'mean'" (p.30). Throughout popular culture, roads have been used metaphorically as signs to convey choices. In literature, for example, Robert Frost's poem *The Road Not Taken* tells of a man's reflection on his life choices by describing two roads in a wooded area. Like Frost, the wearable fitness tracking device commercials have featured roads, streets, or paths to mirror the choices that are made in daily lives of the actors. Additionally, these images attempt to connect the audience with their own personal journey and the aid the device could bring to that consumer. Essentially, the use of a path in the advertisements articulates the benefit of the device for individuals in situations where decisions have to be made. It drives consumers to the IoT market because shows them an opportunity where they can bring ease to the challenges they face.

The wearable fitness tracking device advertisements featured scenes of the sun, sunrises, and sunsets. These images show users that the device should be used all day. Users should activate the device as soon as they wake up until they are resting again. Some devices even allow

users to track their sleep, which means the device would hardly ever be taken off. By wearing the tracker almost all day, users are engaging in the IoT lifestyle. Not only do the advertisements show the actors using the device throughout the day and night, ease is evident in the actor's daily interactions when using the device.

In addition, the advertisements featured scenes of bridges. Bridges in their everyday use are created to make passage from one place to another possible or easier. In the advertisements, images of bridges were use in scene shots and sometimes actors were featured crossing them. With the wearable fitness tracking device in tact, actors are seen crossing the bridge or the metaphoric hurdles of life, which are made easier by the device. For example, the Withings Activite: Motion is Life advertisement showed several screenshots of a bridge; the advertisement also showed a female actor walking across the bridge. A bridge as it is signified in Saussure's model can be interpreted as a solution. Therefore, consumers can interpret a solution to their own challenges would be to purchase a wearable fitness tracking device. Like a bridge, wearable fitness tracking devices can be seen as the bridge to a smart lifestyle.

The Smart lifestyle theme was also measured by the number of person to machine interactions and machine-to-machine interactions that appeared in the advertisements. As stated earlier, person to machine interaction was when the actors were using the wearable fitness tracking device or other smart devices such as smartphones or smart cars. Additionally, smart devices communicating with other smart devices or machine-to-machine interaction represents a smart lifestyle. For instance, several advertisements showed actors logging activity using the wearable tracking device, and in the same advertisement showed the same actor viewing their progress on a computer. Both person to machine and machine to machine are vital interactions in IoT. Therefore, by displaying how each relationship functions in regards to the wearable fitness

tracking devices, consumers are able to see a clear picture of the device's operation and the foundation of IoT. Moreover, consumers are being exposed to the idea that a wearable fitness tracker will increase quality of life beyond health. This represents a bond between humans and technology, which ultimately exposes the audience to the benefits of technology use.

The relationship between man and machine has been developing for centuries. Existing literature suggested that mobile phones would be responsible for popularizing IoT. Ferris' (2007) research shows the global shift in mobile phones as a source of internet. Ferris discusses Japan's implementation of IoT in conjunction with mobile technology. This further supports the claim that mobile phones cannot solely support the IoT movement. Since consumers have been using mobile phones for quite some time now, it would be difficult to see it as a new technology. However, showing how the mobile phone and wearable fitness tracker work together to create the IoT experience will increase popularity. In the advertisements, machine to machine interaction is shown operating seamlessly in the actor's daily activities to further support this relationship as the new normal.

The advertisements showed how the wearable fitness trackers enrich the relationship between human and machine. As stated earlier, the advertisements portray flawless interactions and concealed any negative aspects associated with this relationship. For instance, monitoring user data has its privacy issues. Wearable technology is no different than other mobile devices; there is always the possibility of hacking. While this might not occur directly from the tracker itself, the devices are meant to be use with another device such as a computer or mobile phone.

Other applications are available on the devices, so information and data sharing create privacy issues. For example, before using the device, consumers are prompted to create an account, which requires an email. The data retrieved from the device is sent to the account,

which has to be accessed using the email. This process of data exchange proposes a privacy threat. Some devices enable users to sign up through Facebook to share their goals and accomplishments. Facebook, being an outside party, increases the vulnerability of the device. The advertisements purposefully eliminate any discussion surrounding privacy issues. Privacy is one of the major concerns for IoT. Tavares' (2014) research argues that data sharing on this scale is the greatest obstacle to IoT, which explains why advertisements choose not to mention data sharing in the advertisements. Even though stealing someone's fitness data does not seem appealing, it is a means to an end. Some wearable fitness trackers are being linked to medical office electronic files. Hacking into this type of information becomes more of an issue due to Health Insurance Portability and Accountability Act (HIPPA) laws and patient confidentiality. According to Wang (2014), software applications "that collect, store, or share personally identifiable health information with covered entities (such as doctors and hospitals) must be HIPAA-compliant" (para. 1). HIPPA violations are subject to serious fines and possible jail time. Advertising these potential threats could send potential consumers away. However, consumers should know of the potential privacy threats and how to avoid them.

Personalized Experience

The wearable fitness tracking device advertisements show that IoT is customizable. Wearable fitness tracker consumers have a large variety of devices to choose from. For instance, cyclist can purchase a Polar bike computer to monitor cycling activity, runners can track their mileage with the Moov Now band, and swimmers can monitor their strokes using the Garmin Vivoactive. Athletes can purchase a tracker that is made specifically for their sport. Brands like MisFit are known for their design; their stylistic band will satisfy the consumer who wants their tracker to feel more like an accessory.

Regarding the final research question, there were signs and symbols embedded in the advertisements to create a personalized experience. A personalized experience would indicate the advertisements were marketed in way where a diverse audience could relate to the message. Current literature agrees with the customization element of IoT. Kim and Sundar's (2010) study revealed the benefit to creating more customized mobile advertising. Additionally, personalized advertising that produces "higher relevance between advertised product and site context evokes more positive attitudes toward the ads" (p.348). Personalization reduces the pessimism associated with mass advertisements because they will be directly related to the consumers.

To reach a diverse group, the advertisements featured many different types of fitness activities, a range of different settings and locations, and diverse demographics in their actors. Some brands chose to feature actors participating in more than ten fitness activities in one advertisement, which included multiple setting changes. One of the FitBit advertisements, for instance, featured fitness activities like basketball, running, and ping pong being played by teenagers, young adults, and seniors. FitBit also featured multiple settings in the advertisement. Therefore, if exercising at home was not of interest to a consumer, the actor competing in the mud run could be enticing. By including such ranges, the advertisements show consumers the diversity of the wearable fitness tracking device. The advertisements push consumers to IoT by marketing diversity.

In accordance with the diversity among the applications of the wearable fitness tracking devices, majority of the actors were noted smiling or expressing happiness. To support all of the activities presented in the advertisements, brands emphasized the happiness of each actor. The actor's emotional response also provided signs of personalization. The advertisements attempt to positively increase the perception of the device by emphasizing the actor's happiness with

images of smiling. Moreover, consumers can make the connection between creating their own happiness with the ability to track daily fitness activity. The devices are not free from error and can miss data. Users will then have to input their activity by hand on the computer or mobile phone, which takes away from the customizable experience. Therefore, it may come as no surprise that the brands chose not to feature glitches in the devices.

Limitations

The study revealed some limitations. The primary limitation in this study is the lack of data available for the selected brands. Several brands did not have any published advertisements for their wearable fitness tracking device. Consequently, the amount of data available for the study was constrained.

The sole focus of the study was to uncover themes and patterns in wearable fitness tracking device advertisements, which would inevitably reveal certain things about IoT. Only observing top wearable fitness tracking device brands from 2015 limited the study to the current state of marketing. The study would need to use older advertisements to obtain any data regarding the past and current themes in the marketing of IoT devices.

One additional limitation is that the advertisements place the product in its best possible light. Any glitches or issues regarding the devices were eliminated from the advertisements. The advertisements did not reveal any critiques or user reviews of the devices. Further research is needed in unveiling the pitfalls relating to wearable fitness trackers.

Future Research

Future research would benefit from the following suggestions. As explained in the limitations sections, the sample size for the advertisements was smaller than planned. Therefore, a larger group of brands and advertisements could offer more data. For instance, this study

selected its studied brands by researching several lists created by well-known technology websites. Expanding the prerequisites to include twenty websites featuring top wearable fitness tracking device list would allow for more advertisements.

Based on the research results, there are implications present for the future researchers of IoT. The variety of wearable tracking device styles alone is evidence that IoT will be a large market. This market will be so large that consumers will have to choose products based on the connection they have with the brand. For instance, while majority of the brands chose to use actors in their advertisements, some brands chose to only focus on the features of the device and not include actors to represent the real life experience. By not focusing on the real life experience the wearable fitness tracker has on daily routine, brands are stifling the forward integration of IoT. By not showing the audience how the device will enhance their current routine, will consumers want to purchase this type of device, and how does only marketing the device features engage the newly health conscious consumer? The findings of this study would indicate that market research on IoT products is low, and these types of questions will require more research.

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Appendix A

Coding Sheet A

Brand: _____

Device Name:_____

Advertisement location: _____

Duration of advertisement: _____

Actor #	**Sex** (Male/Female)	**Age** (10's, 20's, 30's, 40's, 50's, 60's, 70's+)	**Race** (White, Black, Hispanic, Asian, Mixed, Other)	**Setting** (Dyad or Group)	**Location** (Home, Work, Gym, Outdoors, other)	**Activity**

	Number of Appearances	**Details Of Persuasive Language**
Device		
Multiple Settings		
Multiple Applications		
Persuasive Language (Hash tags, website links, and other thematic language)		

Themes	Evidence
Fitness (All actions, attire, and settings relating to the actors or any words or objects presented in the advertisement that depict fitness)	
Smart Lifestyle (Any representations of connectivity using the wearable fitness tracker and other Smart devices and the devices being used in multiple aspects of daily life)	
Emotional State (Any emotional reaction displayed by the actor(s) while using the device during the advertisement)	
Economic status (Aspects of the advertisements that convey economic status can be the setting of the advertisement and the attire worn by the actor)	
Interactions (Any interaction being shown in the advertisement; this could include person to person, person to machine, and machine to machine)	

Notable Symbols