CO-CREATING AN ALTERNATIVE FUTURE:

USING SPECULATIVE DESIGN AS A TOOL FOR GAUGING USERS' ETHICAL

EXPECTATIONS

A THESIS

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Chapter One: Introduction

According to a recent report, the household penetration of Smart Homes should reach about 53.9% of U.S. homes by 2023 (Smart Home Report, 2019). Voice-Activated Personal Assistants (VAPAs) – such as Amazon's Alexa, Apple's Siri and Google Home—are also becoming commonplace in an "ideal" Smart Home. At the same rate, concern about user privacy – both within the Smart Home space and generally in the tech industry—has kept pace (Shields, 2018). For example, data has been misconstrued and used by law enforcement (Zwerdling, 2018), and reports have surfaced that these devices have been eavesdropping on users (Newman, 2018). Although there are positive benefits – answering questions promptly, checking in on loved ones and controlling other "smart" devices – from the advancement of these technologies, recent developments in Artificial Intelligence (AI), specifically Machine Learning (ML) may also have significant drawbacks. A potential drawback is how the data generated by users is stored (Bhavani, 2016). As the pervasiveness of technology continues to increase, VAPAs could be placed in morally and ethically challenging circumstances. To address this issue, this thesis addresses the following research question: What are the expectations of users regarding the behaviors of VAPAs in morally challenging circumstances?

According to a Pew Research report published in 2019, millennials continue to lead other generations in technology usage (Vogels, 2019). In fact, according to the report, "more than nine-in-ten Millennials (93% of those who turn ages 23 to 38 this year) own smartphones, compared with 90% of Gen Xers (those ages 39 to 54 this year), 68% of Baby Boomers (ages 55 to 73) and 40% of the Silent Generation (74 to 91), according to a new analysis of a Pew Research Center survey of U.S. adults conducted in early 2019 (ibid p. 1)." In another study

conducted by PricewaterhouseCoopers, millennials are also seen to be adopting voice technology faster than any other generation (PricewaterhouseCoopers, 2018). However, both of these surveys report a trend that's worth paying attention to. The Pew survey noted that "Americans were also less positive about the societal impact of the internet last year than four years earlier. Gen Xers' views of the internet's impact on society declined the most in that time. In 2014, 80% of Gen X internet users believed the internet had been mostly a positive thing for society, a number that dropped to 69% in 2018. Millennial and Silent internet users were also somewhat less optimistic last year than in 2014" (Vogels, 2019 p. 1). While the survey conducted by PricewaterhouseCoopers found that 38% of the respondents agreed with the sentiment that "I don't want something 'listening in' on my life all the time" and 28% signified concern about their data and security (PricewaterhouseCoopers, 2018). Furthermore, Americans have also expressed "broad concerns" about the role of computer algorithms in "making important decisions in people's lives" (Smith, 2018). When asked specifically about the role of algorithms in "criminal risk assessments to estimate the likelihood that someone convicted of a crime will reoffend," 56% deemed it unacceptable accompanied with several reasons, from a potential for privacy violation and bias in profiling (ibid.). It is evident from these concerns that a larger discursive space needs to open and we, as a society, must probe the present in order to come to an agreement about the role VAPAs should play in our daily lives in the future. This paper seeks to open that discursive space by gauging the perceptions of millennials using speculative design about the potential moral decisions that Voice-Activated Virtual Assistants could be making in the future.

Speculative design, popularized by Dunne and Raby (2013), promotes "what-if" questions to envision the use of design and "probing" an expected future. With a combination of design fiction, stories and scenarios, we can essentially ask deeper and pointed questions about the potential role of the technologies we currently use. In 2018, researchers at the Massachusetts Institute of Technology (MIT) asked questions about the potential ethical dilemmas that will face autonomous vehicles. Using an online experimental platform called the *Moral Machine*, they were able to capture "societal expectations about the ethical principles that should guide machine behaviors" (Awad et al., 2018 p. 59). With millions of respondents from more than 233 countries, they concluded that it might be impossible to create a set of guidelines that informs our understanding of machine ethics due to strong cultural variations in the result. However, they found that there was consensus along certain themes like the "preference for sparing young lives and more lives" (Awad et al., 2018 p. 63).

The scenarios explored in this pilot study seek to understand human expectations as they relate to pervasive technology like VAPAs. The first scenario tries to extract the expectations around a rather heated conversation between a man and a woman in a house. The scenario is open to interpretation, as it would be when an actual VAPA is in a real world situation making a decision about what to do based on what the device can hear. Specifically, this first scenario with hints at family tension, culture and/or violence, it is important to understand how people imagine the roles of technologies like VAPA in such complicated situations. Understanding users' apprehension, indifference and/or acceptance of a specific role or action can help guide discussions about regulations. Importantly, regulations that aim to govern the information flow around VAPAs must take into consideration the end user and their context. This might entail

more than offering choice and more about how the device operates when in the wild. Expectations about what VAPA should do and not do and a strict adherence to a common set of rules helps inspire consumer confidence and trust.

The second scenario surrounds an imaginary usage of the VAPA device. The purpose of this scenario, specifically, is to understand users' attitudes around the use of VAPA as a smell detector. This totally imaginary ability allows us to gain some insight into users' level of comfort with the device playing such a role. Usually as technology improves so do the capabilities of end user devices. It is crucial to understand attitudes about this potential change even before it materializes. A probable scenario can serve as a fuel to jump start a pertinent conversation about data as it relates to technologies like VAPAs.

The third scenario seeks to examine the role of VAPA as a potential tool for parental oversight. In this case, how comfortable are users with VAPAs potentially reaching out to a "third party." As connectedness becomes a mainstay for technological products in our society, uncovering insights, now, about the thinking of users as it relates to data sharing between devices and the outside world.

 As the world continues to pay attention to the overall effect of technology on society, studies like the moral machine and this one must look to bridge the gap between users' expectations, policy and regulation, and the actual functioning of a product. This thesis aims to start and potentially guide a similar conversation around VAPAs, specifically Amazon's Alexa. Using an experiment delivered through an online survey, participants were asked to select an action from four separate scenarios centering on the theme of law enforcement. These scenarios will require participants to suspend current attitudes and make determinations about what the

device should do in these instances. They will then be asked to provide basic demographic data like age and preferred gender. Demographic data will be analyzed alongside their responses to gauge for variations and trends. The results from this study will give policymakers and tech companies a peek into society's ethical expectations as it relates to the moral decisions of Voice-Activated Personal Assistants.

Chapter Two: Literature Review

As VAPA technology continues to proliferate so does the academic research into it. In order to explore possible ethical and moral concerns, this chapter explores available scholarship about the privacy concerns that surround VAPA, the merits of speculative design, and documented controversial uses of VAPA.

Privacy Concerns of Voice-Activated Personal Assistant

Studies have documented privacy and security concerns surrounding voice-activated personal assistants. Lau, Zimmerman, & Schaub (2018) conducted a diary and interview study with 17 participants that sought to understand privacy concerns surrounding smart speakers. They reported a disparity between the attitudes of users and non-users of smart speakers, with the former enumerating a few privacy concerns and justifications for trade-offs and the latter expressing serious distrust for both the utility of the smart speakers and the companies that make the devices. Users of smart speakers, according to the authors, seemed to base their justifications on "an incomplete understanding of privacy risks, a complicated trust relationship with speaker companies, and a reliance on the socio-technical context in which smart speakers reside" (Lau, Zimmerman, & Schaub 2018). The authors note that "[u]sers trade privacy for convenience with different levels of deliberation and privacy resignation" (Lau, Zimmerman, & Schaub 2018 p. 102:1).

To understand more about the context in which these privacy concerns tend to arise, Malkin et al. (2019), conducted a survey that examined randomly selected conversations of the participants' and their devices. They found that, of 116 device owners who participated in the survey, "almost half did not know that their recordings were being permanently stored and that

they could review them" (Malkin et al., 2019 p. 250). Furthermore, they reported that most participants were more concerned about recording of others, especially children and guests, compared to their own personal recordings. Perhaps, most important, participants "also considered permanent retention, the status quo, unsatisfactory" (Malkin et al., 2019 p. 250).

Ammari, Kaye, Tsai, & Bentley (2019) interviewed 19 users and analysed over 80 log files for both the Amazon Alexa and Google Home devices. They report that most of the usage of voice assistants were for music, search and IoT. Privacy concerns uncovered, according to the authors, can be grouped into three categories: "(1) Amazon Alexa/Google Home listening to conversations even when not triggered with a wake word; (2) conversational records that are processed and stored on external machines; and (3) access to private information by third party services (e.g., Amazon Alexa weather skill)" (Ammari, Kaye, Tsai, & Bentley, 2019 p. 17:17). Participants whose privacy concerns link directly to the first categories were inclined to turn off or mute the device when not in use because of fear that the device might pick up on private conversations and activities. The authors report that one participant made it clear that "'if we're having sex we mute Alexa. Just in case [because] sometimes she'll start blinking' without a wake word" (Ammari, Kaye, Tsai & Bentley, 2019 p. 17:18).

Abdi, Ramokapane, and Such (2019) have also documented that users' tend to have an incomplete mental model of these devices. The authors argue that this gap can lead to "different perceptions of where data is being stored, processed, and shared" (Abdi, Ramokapane, & Such, 2019 p. 451). Using a grounded theory approach and semi-structured interview, they explored four use case scenarios with users of VAPAs: using built-in skills, third-party skills, managing other devices, and shopping. The infer that the lack of a complete mental model leads to

"incomplete threat models (few threat agents and types of attacks) and non-technical coping strategies they may implement to protect themselves" (Abdi, Ramokapane, & Such, 2019 p. 451).

Research efforts have also looked at the use of VAPAs among a specific demographic. Abdolrahmani, Kuber, & Branham, (2018) investigated the use of VAPAs by blind individuals and found that privacy concerns around the use of voice-activated personal assistants were not paramount. The authors report that "participants were generally willing to accept the threat of theft or misuse of data as a reasonable compromise for gaining access to perform tasks which may otherwise be challenging or cumbersome" (Abdolrahmani, Kuber, & Branham, 2018 p. 255). Participants were more worried about the rise in VAPA devices that have an accompanying visual display. They believed that the development of such devices will move time and resources away from developing devices that rely on voice-based interactions.

State-of-the-Art in VAPA technology

There are currently several consumer VAPAs available in the market today. These assistants using artificial intelligence, specifically natural language processing can integrate with speakers, smartphones and household devices. Most popular are Samsung Bixby, Amazon Alexa, Google Assistant, Apple Siri and Microsoft Cortana. In the paragraphs that follow, I will give a description that will cover the features and uses of each of the consumer VAPAs.

Samsung Bixby: Bixby is Samsung's voice assistant, currently available on a wide array on Samsung devices (Samsung, 2019). Bixby can currently recognise only seven languages including American and British English. Similar to other VAPAs, Samsung claims that "Bixby is constantly learning from the apps and services you use, requests you make and choices you

select. Then it applies what it's learned to make your experience more personalized, so you get what you need faster" (ibid.). Bixby claims to understand natural language and allows for integration with third-party applications and other applications to improve its user experience.

Amazon Alexa: Amazon Alexa is Amazon's voice assistant. Alexa is currently available through a growing number of products including the Amazon Echo and Amazon Echo Dot. Alexa allows "customers to use Alexa to control your smart home devices with their voices or automatically, using Alexa Routines, Groups, Hunches, and more" (Amazon, 2019). In late 2018, Amazon launched a feature called Alexa Hunches. This feature allows the assistant to guess about a customer's future behavior and requests based on past requests (Liao, 2018). In addition, Amazon has improved the presence of the assistant in the kitchen with the announcement of the new Amazon Smart Oven. This oven operates with another smart device connected to it which enables the Smart Oven to be controlled with voice commands (Gartenberg, 2019). Alexa is commonly used by customers to ask quick questions. In order to engage Alexa, the call phrase "Hey Alexa" must be uttered by the user. In certain cases when the phrase had not been uttered, Alexa has been reported to record background conversations happening in the room where it is placed (Fowler, 2019). This possibility dredges up serious privacy concerns for the users who are wary about the presence of a device eavesdropping on them.

Google Assistant: Google Assistant is Google's virtual assistant present on their Google Home Smart Speaker and other devices. The assistant is capable of carrying out various commands like increasing the volume of the smart speaker and playing a different track of music.

Apple Siri: Apple Siri, similar to all the other devices listed, can also take in and execute voice commands upon request. Apple Siri is present on all Apple devices including the Apple Home, a smart speaker that also serves as a smart home device.

Microsoft Cortana: Cortana is available in English and operational on Microsoft's personal computers. According to Microsoft, Cortana can add items to a to-do list, control the temperature of a living space and give directions. Cortana is also operational on the Harman Kardon Invoke speakers.

Speculative Design

This study heavily relies on possible/potential scenarios that might not be realistic at the moment. These scenarios are created by combining realistic elements and fictional imagination. Speculative Design is concerned with design imagination. Speculative design allows us to imagine possibilities. An effect of which is a newly formed ability to enumerate potential outcomes and importantly, "think ethically." Speculative design, according to the researchers forces one to move beyond now and into "fictional Worlds" for the purpose of "evaluation, reflection, and critique." According to Dunne and Ruby (2013), "rather than thinking about architecture, products, and the environment, we start with laws, ethics, political systems, social beliefs, values, fears, and hopes, and how these can be translated into material expressions, embodied in material culture, becoming little bits of another world that function as synecdoches" (p. 70). Game Design uses a good amount of world building. The authors give an example of game players who would rather explore the world of games rather than play the game to win points or unlock a higher challenge level (Dunne & Ruby, 2013). The authors suggest that "we find the most thought-provoking and entertaining stories extrapolate today's free market

capitalist system to an extreme, weaving the narrative around hyper-commodified human relations, interactions, dreams, and aspirations" (ibid. p. 73). It is possible that the reason why these are more thought-provoking is the feeling of "nearness" that accompanies these worlds. These worlds contain strands of what we currently experience, making it believable. At the same time, the authors advocate for creating worlds that weave the philosophical, social, and technological together into one. Practically, this can add an additional layer of believability.

With examples of this as recent as *WALL-E* (a 2008 Pixar film) and *Black Mirror* (a 2012 Netflix program), the authors suggest that the medium, film, requires a level of "a degree of passivity in the viewer reinforced by easily recognized and understood visual cues." The alternative, the authors suggest, lies somewhere between the role of "visual cues" and the inescapable need for imagination on the part of the viewer when it comes to consuming fictional literary content. This combination helps the viewer contextualize the "world the designs belong to and its politics, social relations, and ideology" (ibid. p. 75). Authors give examples of projects that fit the "ideas as stories" narrative crucial to a speculative undertaking (ibid. p. 76). *Oryx and Crake,* a novel by Marget Atwood comes close to the idea of "idea as stories". Concerning how the book manifests itself has an exercise in speculative design, Dunne & Raby write: "*Oryx and Crake* is very close to how a speculative design project might be constructed. All her inventions are based on actual research that she then extrapolates into imaginary but not too far-fetched commercial products. The world she creates serves as a cautionary tale based on the fusion of biotechnology and a free-market system driven by human desire and novelty, where only human needs count. Unlike many sci-fi writers, Atwood is far more interested in the social, cultural, and ethical implications of science and technology than in the technology itself" (ibid. p. 78).

One of the methods put forward by Dunne and Ruby, 2013 is the use of what-ifs scenarios. Using What-if scenarios allows the "author to strip narrative and plot right down to basics in order to explore and idea" (Dunne & Ruby, 2013, p. 86). This fictional approach toward design "communicates possibility through the stories it evokes and the conversations it starts" (Bleecker, 2010). Speculative Design also enables us to take a more critical look at the present (Auger, 2013). Through the use of alternative presents, Auger (2013) also posits that we can analyse and criticise present technology with the hope of opening spaces for discussion that allow for rethinking such technology.

Operationalizing speculative design in a way that lends itself to actionable procedures and experiments can be challenging (Bleecker, 2010). Most scholarly research often relies heavily on examples and seems to posit that the methodology be deduced from each example (Dunne & Raby 2013). However, Johannessen, Keitsch, & Pettersen (2019) have put forward a procedure to consider when engaging in any speculative and critical design:

Step 1 – Define a context for debate: Most endeavours that use speculative design revolve around a topic. "Typically topics are contemporary, ethical issues created by commercial industry, emerging technology, or social norms" (Johannessen et al., 2019 p. 1627).

Step 2 – Ideate, find problems, and create a scenario: The use of "what-if" questions is popular when ideating and figuring problems that serves as the main idea of a scenario. Auger (2013) emphasizes the need for a "perceptual bridge" when crafting scenarios. This bridge can serve as a portal between what we know now and fictional elements of the experiment. The practical role of the perceptual bridge can be nuanced, as it depends heavily on the kind of

speculation the project puts forward. Crafting the speculation with the perceptual bridge in mind can happen in different forms.

Step 3 – Materialize the scenario to provoke an audience: Materializing the narrative involves transforming the scenario into narratives, objects or a combination of both (Johannessen et al., 2019). There is a need to craft the materialization with details in order to achieve some sort of realness. Since the role of Speculative Design is to help people think and reconsider norms, Johannessen et al. (2019) posit that the "scenarios remain open-ended, unclear, and complicated, and strive to provoke using dark humour and satire" (p. 1628).

Controversial uses of VAPA technology

The use of technology for day-to-day police and law enforcement activities is on the rise (Schuppe, 2019). Local police departments across the country are deploying facial recognition technology to help in conducting investigations, and to help identify suspects (ibid. 2019). With the amount of data generated by license readers and police sensors, a new form of policing, predictive policing, has become a go-to method to *predict* crime (Griffith, 2019). But it is not enough for law enforcement to have access to data, they also need to make sense to the data at hand. Thus, Artificial Intelligence is another tool law enforcement is seeking to use to analyse and process the vast amount of data that they gather through various inputs (Baraniuk, 2019). It is evident that data will play a crucial role in the future of law enforcement, however, the inherent concerns about errors like misidentification due to variations in skin tones still remain unresolved (Schuppe, 2019).

Scholarly research has not focused on the potential issues that could arise when these devices are placed in morally challenging circumstances. Using fictional scenarios, this pilot study seeks to uncover insights about users' expectations.

Chapter Three: Method

Participants

The participants for this study were adults above the age of 18. Participants were

recruited to complete a speculative design survey through an email sent through the Ball State

University Communication Center. In total, 59 individuals participated in this pilot study.

Procedures

A survey was developed to elicit feedback about participants' opinions related to the role

of a voice-activated virtual assistant in questionable circumstances. In addition to demographic

questions, the survey contained three fictional scenarios conveyed through audio clips designed

to portray what a voice-activated virtual assistant (VAPA) might hear in a home. Each audio clip

featured conversations among residents within a home that could be interpreted as potentially

dangerous, illegal, or otherwise questionable. The first audio clip features an argument between a

married couple with suggestions of abuse. The second clip features a conversation between two

residents with suggestions of possession of illegal substances. The third clip features a

conversation between a mother, her son, and his friend with suggestions of potential violence.

The complete transcript for each scenario can be found in Appendix A.

In this case, the fictional VAPA was named Morli and envisioned to be similar to

Amazon Echo (Alexa) or Google Home (Google Assistant). By way of example, someone might

buy a Morli for these reasons:

- To play a song from a playlist
- To act as an additional smoke and chemical detector
- To act as a control hub in a smart home and to connect to other similar devices in a home or on a network
- To answer general and searchable questions
- To order and ship an item from Amazon or another retail site
- To place a call to uploaded contacts

- To make calls to an established emergency contact

For the sake of this study, participants were asked to imagine that Morli already exists in many homes across the country. They were told, "from Muncie, to Winston-Salem, to Seattle, Morli is able to help with daily activities like answering a question, sending an email, placing a call to a friend or creating an appointment on your calendar." Morli was also envisioned to serve as a hub for controlling all other devices and appliances in the home, as well as detect and identify different smells in a home.

The Judge mode procedure used in this experiment was adapted from Awad et al. (2018). In the Judge mode, users are presented with three different scenarios in which they have to make determination about what the VAPA must do. Users are instructed to choose out of four or five available options to the answer "What should the Morli (a Voice-Activated Virtual Assistant) Do?" (see Appendix A) after listening to each scenario. In addition, users are able to write in an explanation for their decision. The order the three scenarios were served to the participants was completely randomised. Participants were not able to go to the next scenario until they completed the first. At the end of the experiment, users were asked to provide some demographic data about age, ethnicity, income level, gender, current living situation. Non-completed sessions were not analysed in the results section. Participants were allowed to take the experiment more than once.

Scenario No. 1: The Johnson's House

In this scenario, the participant is placed in the house of Katie and Kurt. Participants are introduced into the scene by a conversation between Katie and her son, Kevin. Katie can also be heard interacting with her VAPA. Then, they hear Kurt walk in through the door. Upon seeing

Kurt, Katie begins to speak and then a tense conversation ensues between them. This back and forth abruptly ends with Katie yelling "stop!."

According to Dryden-Edwards (2019), "Domestic violence (also called intimate partner violence, domestic abuse, dating violence, spousal abuse, and intimate partner abuse) is any form of maltreatment that takes place in a heterosexual or homosexual romantic relationship between adults or adolescents." The Center for Disease Control and Prevention (CDC) says that 1 in 4 women and 1 in 10 men have experienced some form of sexual violence including stalking over their lifetimes (Centers for Disease Control and Prevention, 2019). IPV has both economic and life-threatening consequences. About 16% of homicide victims die at the hands of an intimate partner while the economic costs - which includes the cost of medical services and lost productivity time at work - can be upwards of $3 trillion over a lifespan. The pattern of violence is often predictable in IPV cases according to Dryden-Edwards, 2019:

> There tends to be a cycle of behavior, known as the cycle of violence, in abusive relationships. That cycle includes the tension-building, explosive, and tranquility/honeymoon stages. The tension-building stage is described as the phase of the abusive relationship in which the abuser tends to engage in lower-level abuse, like pushing, insulting, coercive behaviors, and escalating demands for control. Simultaneously, the victim of abuse tends to try to appease the abuser in an effort to avoid worsening of the abuse. Acts of abuse escalate to a severe level during the explosive stage of intimate partner violence, manifesting as the most overt and serious acts of abuse and control, like slapping, punching, inhibiting the movements of the victim, rape, or other sexual violence. The tranquility or honeymoon stage of the cycle of domestic violence tends to immediately follow the overt acts of aggression of the explosive stage and is usually characterized by the abuser seeming to be quite remorseful and apologetic for the abuse, making promises that it will never happen again and showering the victim with affection.

Sorenson & Wiebe (2004) found in their study that firearms, especially handguns, are common in the households of battered women. They also reported the use of hands, fists, feet and

common household objects in domestic violence episodes. Participants in the aforementioned study responded favourably to the idea of "spousal notification/consultation regarding gun purchases." Dryden-Edwards, 2019, also notes that although mandatory reporting is now a legal requirement in 47 states it is not without its drawbacks: like placing victims at risk of retribution and violation of doctor-patient confidentiality.

Scenario No. 2: James and Perry's Apartment

In this scenario, the participants are introduced to a conversation about pots between Perry and James happening in their apartment. Soon after participants can then hear Morli alert Perry and James about the presence of Ammonia in the air.

The National Institute on Drug Abuse reports that about 1.7 millions people living in the US used Methamphetamine in the previous year (NIDA, 2019). Within this group, the average age of a user is 23.3 years. Although Methamphetamine is not the most used illegal drug in the US, the economic cost can be far reaching; ravaging through communities and costing local, state and federal governments a lot of money. According to a 2005 report, the societal cost of the drug comes in at about $23.4 billion (Nancy et al., 2009). Premature death and addiction are responsible for more than two-thirds of the economic costs (ibid.).

The preparatory process of making crystal methamphetamine involves the combination of several dangerous and explosive chemicals that could be found in over-the-counter drugs and household cleaning liquid (Village, 2019). The chemicals used in making crystal meth contribute to the smell that crystal meth is known to give off. Crystal Meth is known to have a sweet smell or chemical smell when used. In addition, the location where the drug is manufactured is also said to have peculiar smells that can help detect the presence of the drug. Labs tend to have

"hospital smells," give off the smell of ammonia and vinegar, paint and chemicals (Village, 2019).

Scenario No. 3: Greg's Room

In this scenario, participants are introduced to Greg arriving home after a day in school. Greg does not respond to his mom when he arrives home, but runs to his room with his friend, LaShaun, to complain about his ordeal at school. Participants then hear an agitated Greg talk with LaShaun what exactly he is concerned about and what he intends to do. Peggy, Greg's mom then interjects by reminding him about a planned hunting trip with his dad and telling him his gear is ready-to-go downstairs. The conversation with Greg yelling at LaShaun telling him he plans to end it all tomorrow.

Reports indicate that there is no one profile that most mass attackers fit into (Pappas, 2016; Carey, 2019). The same also holds when trying to decipher the motivations of killers. However, with the help of data and research, identifiable patterns common to most perpetrators of mass shootings have emerged (Peterson & Densley, 2019; Pappas, 2016). Among other reported patterns like experiencing childhood trauma and violence, studying (and sometimes imitating) past reported shooting, reaching a personal point on crises and having the means to carry out an attack is high likelihood that at least someone familiar around a potential shooter knew about the attack in advance (Gill, Horgan & Deckert, 2014). In fact, Pappas (2016) writes:

> In that sense, the Orlando shooter is very typical. Former co-workers and his ex-wife have described him as angry and violent. His father reported that the shooter had flown into a rage after seeing a gay couple kissing. He had been reported and investigated by the FBI in 2013 and 2014 because of talk about terrorism, but those investigations were closed. Though his wife apparently knew of his plans and even accompanied him to buy weaponry, authorities didn't know of the final planning phases of the attack. That's where bystanders could have mattered, Bloom said.

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Egnoto and Griffin (2016) found in their research that, using text analysis techniques with the

Linguistic Inquiry and Word Count (LIWC) tool, it was possible to distinguish between suicidal

and homicidal writing from each other and from other student writings. They conclude that their

work is just the beginning of a possible way of identifying people who are dealing with

dangerous ideation. Peterson & Densley (2019) agree writing:

> Most mass public shooters are suicidal, and their crises are often well known to others
> before the shooting occurs. The vast majority of mass shooters leak their plans ahead of
> time. People who see or sense something is wrong, however, may not always say
> something to someone owing to the absence of clear reporting protocols or fear of
> overreaction and unduly labeling a person as a potential threat. Proactive violence
> prevention starts with schools, colleges, churches and employers initiating conversations
> about mental health and establishing systems for identifying individuals in crisis,
> reporting concerns and reaching out — not with punitive measures but with resources and
> long-term intervention. Everyone should be trained to recognize the signs of a crisis.

Chapter Four: Results

Fifty-nine respondents participated in this pilot study. The following sections chronicle participants' responses to a survey designed to elicit feedback about how a VAPA should respond in certain domestic situations. Participants were asked to listen to three fictional scenarios conveyed through audio clips designed to portray what a voice-activated virtual assistant (VAPA) might hear in a home. Then they were asked to determine what Morli should do based on the content of the audio. This question served as a way to gauge their perception about the role of the VAPA device in the scenario. Participants were also asked to explain their choices for each scenario. Responses have been categorized into thematic areas (n= the number of responses).

Scenario No. 1: The Johnson's House

Participants listened to an audio clip of scenario #1, which focused on possible domestic violence, (see Appendix A for the full transcript) and then decided what action Morli should take based on what they heard. Out of 59 participants, 28 chose for "Morli to do nothing," and four participants chose for Morli to "start recording everything she hears." Figure 1 further illustrates respondents' choices.
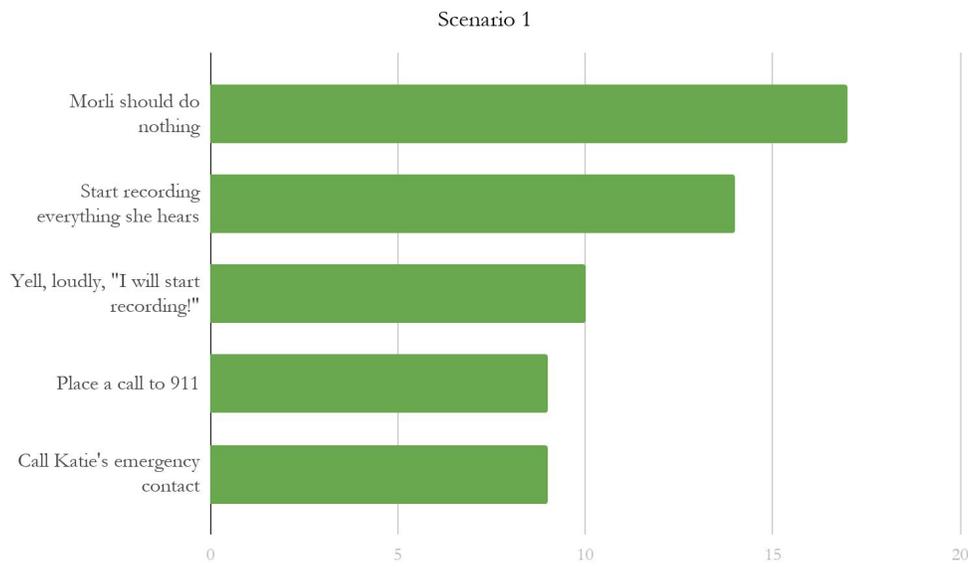
Figure 1: Most participants preferred for the VAPA device in this scenario not to interfere given the circumstances.

Participants also added more context to their answers by answering why they chose a particular option for each scenario. Their responses were analysed and grouped into three thematic areas: technology should not interfere, safety/deterrence, and evidence of possible altercation.

Thematic Area	N
Technology Should Not Interfere Example participant comment: "Unless programmed to do so, Morli should not act on the woman's behalf or record audio without explicit consent. Domestic violence is complicated and Morli's intervention could ultimately put the woman in more danger."	27
Safety/Deterrence Example participant comment: "Seems like a potentially dangerous situation. However, not dangerous enough to call 911 or emergency contact."	14
Evidence of Possible Altercation Example participant comment: "I chose this option because from the audio the situation sounds like an intimate partner violence situation. Having verbal evidence like this recorded could quite literally be the difference between an abuser being punished or	12

walking away. This is extremely important, especially if it is an intimate partner violence situation, because this might be the only way the person has a chance to escape. I say this, considering that 1/3 of intimate partner violence survivors are killed by their abuser after they leave them. However, if their abuser is in jail or faces restrictions in relation to contacting that individual they will be safe."	

Table 1: Participants heavily favoured for the VAPA device to do nothing, especially because of the complexity of the situation in this scenario

Scenario No 2: James and Perry's Apartment

Participants listened to an audio clip of scenario No. 2 (see Appendix B for the full transcript), which focused on possible teen violence, and then indicated what action they thought Morli should take. Out of 59 participants, 46 indicated Morli should "continue alerting until the levels subside," and six participants chose for Morli to "send notice of the presence of the chemical to the CDC."
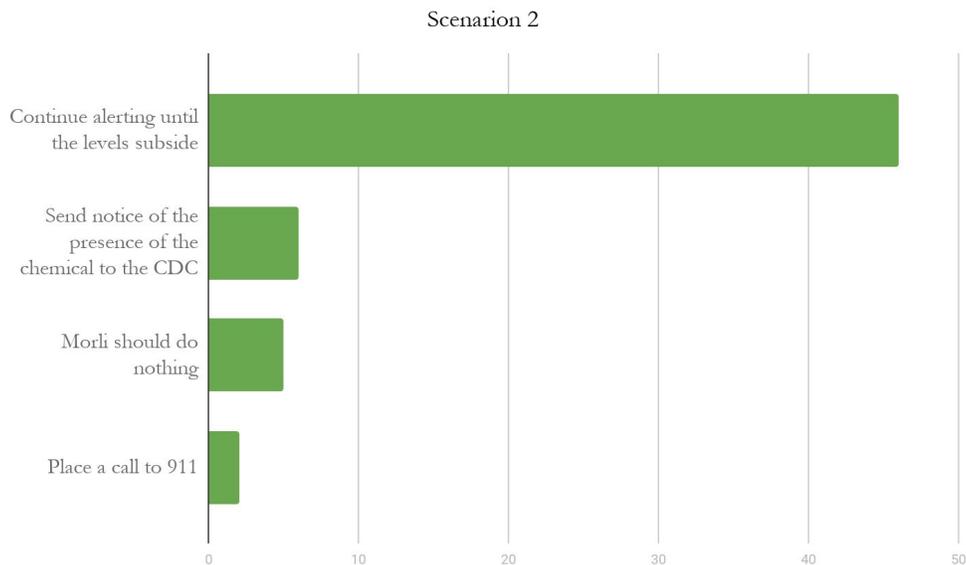

Figure 2: Participants were extremely hesitant for the device to place a call to 911 and so preferred that the VAPA continue alerting until the levels subside.

Participants also added more context to their answers by elaborating on why they chose a particular option for each scenario. Their responses were analysed and grouped into three thematic areas: technology should not interfere, privacy concerns, health concerns, and normal device function.

Thematic Area	N
Technology Should Not Interfere Example participant comment: "The guy is aware of what's going on, plus it's difficult to tell the context of the situation."	9
Privacy Concerns Example participant comment: "Notification to some authority may be necessary if levels continue to escalate or remain escalated for a sustained period of time. However, there is no evidence of a crime and at this point it would be a violation of privacy to notify authorities."	5
Health Concerns Example participant comment: "[I] am not really sure what high levels of ammonia in the air causes. So maybe if [I] knew the dangers I would choose another option. If [it's] dangerous- I would at least want it to keep alerting vs doing nothing; like a fire alarm."	31
Normal Device Function Example participant comment: "That's its job."	3

Table 2: Participants were mostly concerned for the health of the individuals in this scenario given the presence of the chemical might negatively impact them

Scenario No. 3: Greg's Room

Participants listened to an audio clip of scenario No. 3 (see Appendix C for the full transcript), which focused on the possible presence of an illegal substance, and then decided

what action Morli should take. Out of 59 participants, 28 indicated "Morli should do nothing," and 20 participants chose for Morli to "prompt Peggy to listen in."
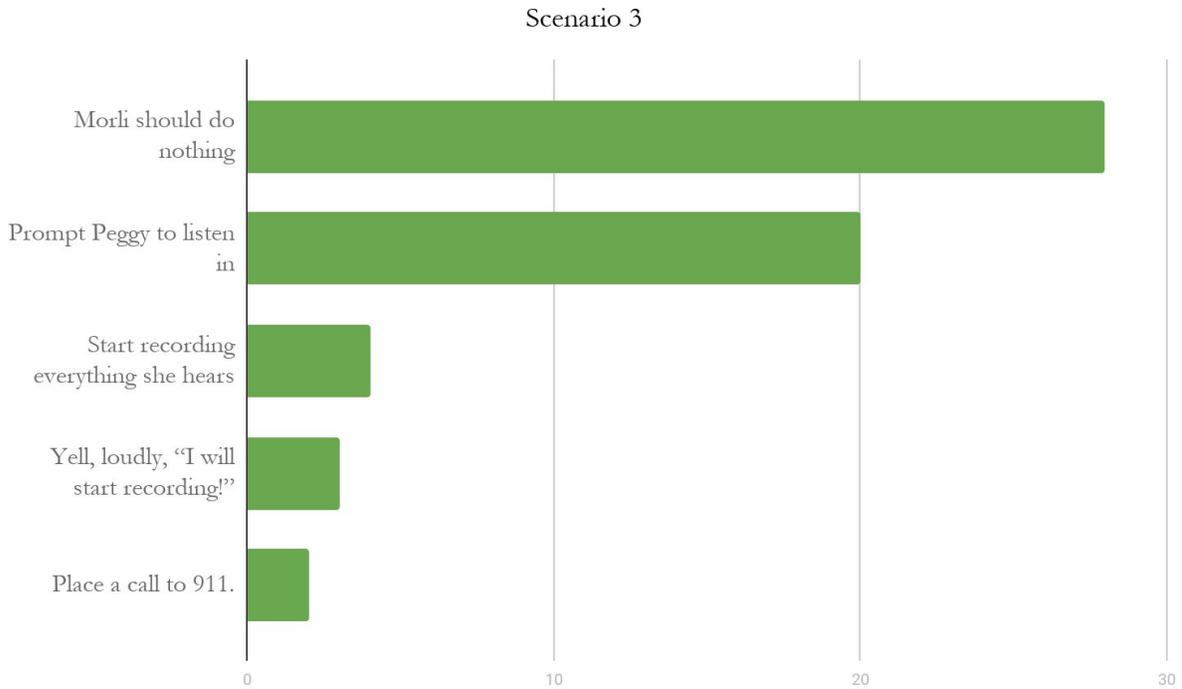
Scenario 3

Figure 2: Participants were extremely hesitant for the device to place a call to 911 and preferred that the VAPA continue alerting until the levels subside.

Participants also added more context to their answers by elaborating on why they chose a particular option for each scenario. Their responses were analysed and grouped into three thematic areas: technology should not interfere, privacy concerns, parental oversight, safety, and normal machine function.

Thematic Area	N
Technology Should Not Interfere Example participant comment: "Again, I think it's dangerous and potentially intrusive to have electronic devices try to decipher human emotions and intentions."	10
Privacy Concerns Example participant comment: "A teenager becoming upset in a situation that may or may not end in violence/tragedy is not reason enough for a device to continuously infringe on my privacy."	2
Parental Oversight Example participant comment: "[I]f the child is in school- I think the parent (who I think is peggy) should know if the kid is saying concerning things. I don't find that different [from] monitoring [kids' social] media or phones. That way the parent can decide if [it's] a serious concern or something silly like venting at a video game."	20
Safety Example participant comment: "That's a threat! Might as well alert 911 to see if it is just a mere threat or something else."	3
Normal Machine Function Example participant comment: "While, as [a] human, I have context that would lead me to infer what "I'm ending it all tomorrow" means, Morli may not. It would depend on how intelligent the AI is (this person could be referring to a video game, etc.) Morli's understanding of the context would greatly impact my answer."	3

Table 3: Participants often cited the presence of an adult, in this case Peggy, as a reason for the technology not to interfere.

Chapter Five: Discussion

The fictional scenarios presented in this pilot study have elicited both structured and unstructured responses from participants that can serve as a good roadmap for future work on similar topics or research regarding the use of VAPA technologies. In each scenario, participants were allowed to explain their thought processes. The complexity of the extended responses only justifies the need to have a more nuanced discussion when it comes to using and regulating technology.

In the first scenario, 28 out of 58 participants chose for the device to not interfere in the circumstance. At first glance, this could seem highly unusual given the potential for the harm present in this scenario. However, several participants explained that the complexity of the situation presented led them to believe Morli should not interfere. Several also said that interfering could potentially put the life of the woman in danger. For example, according to one participant,: "Unless programmed to do so, Morli should not act on the woman's behalf or record audio without explicit consent. Domestic violence is complicated, and Morli's intervention could ultimately put the woman in more danger." Conversely, other participants (14 out of 58) agreed that the complexity present in the scenario made it more important that Morli step in and serve as a "purveyor of truth," i.e. record what transpired in the scenario in the event that the truth of the situation is hard to come by through other methods in the future. Supporting this premise, one participant noted:

> I chose this option because from the audio, the situation sounds like an intimate partner violence situation. Having verbal evidence like this recorded could quite literally be the difference between an abuser being punished or walking away. This is extremely important, especially if it is an intimate partner violence situation, because this might be the only way the person has a chance to escape. I say this, considering that one-third of intimate partner violence survivors are killed by their abusers after they leave them.

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However, if their abuser is in jail or faces restrictions in relation to contacting that individual, they will be safe.

This option is particularly interesting given that the home quarantine/isolation due to the COVID-19 pandemic in Spring 2020 occurred at the time of publication of this thesis. Reports suggest the possibility of increased incidents of domestic violence during that time (Lennard, 2020). A related question or line of inquiry could explore the usefulness of a device like Morli to reduce violence.

Participants also envisioned Morli serving as an active deterrent of violence in scenario no. 1. The presence of Morli could ensure that both Kurt and Katie are safe and violence does not occur or that the possibility of violence is greatly reduced. Some participants chose for Morli to say she would start recording as the less-serious option of placing a call to 911, with some participants hinting that the idea of calling 911 might overburden emergency services and might also be costly. One participant noted that "Calling 911 would overburden police. Doing nothing seems like not using technology to our advantage. Recording would be helpful, but does not actually help the [woman] in the situation; and also do we want 'everything' recorded?...maybe Morli would make an error in choosing what to record. Calling an emergency contact allows another human to [assess] the situation." This did not deter about nine participants from indicating Morli should call the police. They asserted that Katie is in danger and only a third party can save her from this impending danger. Interestingly, the same number of participants also wanted Morli to reach out to Katie's emergency contact. It is possible that these participants are keenly aware of the power dynamics at play in this scenario and are concerned that only a third party can resolve the situation, and by extension, save Katie's life. A participant who chose

this option stated that "Considering Privacy vs Emergency situation - If the emergency contact calls Katie and no response, then the individual can proceed to the next step (maybe call 911 or other actions)."

In the second scenario, participants showed overwhelming support for Morli to serve as a notification system. In this case, participants wanted Morli to continue to alert residents of the house until detected levels of the chemical subsided. Participants were reasonably concerned for the health of the residents and wanted Morli to keep alerting. Six participants chose for Morli to notify the Centers For Disease Control (CDC) about the presence of a chemical. The CDC in this instance can be substituted for any other government agency that has legal jurisdiction over receiving such information about the presence of a substance that has been deemed dangerous and possibly illegal. One participant stated that: "Notification to some authority may be necessary if levels continue to escalate or remain escalated for a sustained period of time. However, there is no evidence of a crime and at this point it would be a violation of privacy to notify authorities." Participants also noted that it is almost impossible to understand the context of what was going on in the scenario which makes it hard to make a determination about what Morli should and shouldn't do in this case. The complexity present in this scenario is a microcosm of a larger discussion about the ability of devices like Morli to understand the nuances of human communication and condition. Just like in this scenario, the chemical detected could possibly be used in the production of the illegal substance Methamphetamine. It could also be used to clean out ovens and other several household equipment. With a strong and pungent smell, it is not entirely far fetched for Morli to pick up on the smell but not the context of use. And to that point, one participant noted: "Ammonia can be used for many different reasons, and

to notify the CDC or call the cops when high levels of ammonia were detected would be ridiculous."

The inability of Morli to discern context could also have contributed to the hesitation participants' showed about Morli contacting a third party. However, participants are walking a fine line between the issue of privacy and civic responsibility. If Morli detected something illegal, would it be the expectation of users that Morli report regardless of the user settings? Proponents of personal and civil liberty often assert that this should not be the case. However, circumstances within a society at a given time could push and test the laws such that the line that once separated those divisions become invisible. A good example of this was the creation of the Patriot Act after the 9/11 attacks. Proponents of the need for civil liberties believe the act directly violates several constitutional amendments including the First and Fourth amendments. In this case, placing a call to 911 and notifying the authorities or the authorities gaining access to such personal records may become the only viable option.

In the third scenario, participants also preferred that Morli not interfere; and coming in a close second, was the option for Morli to prompt Peggy, the mom in the scenario, to listen in into her son's room and by extension the conversation happening. Ostensibly, a lot of participants were open to the idea of notifying a third party because a minor is involved. Participants often cited the need to ensure that the son remains safe as the paramount need, stating that: "[I]f the child is in school - I think the parent (who I think is peggy) should know if the kid is saying concerning things. I don't find that different [from] monitoring kids' social media or phones. That way the parent can decide if [it is] a serious concern or something silly like venting at a video game." Other participants were quick to identify a threat stating the need to call and notify 911.

To safeguard a young life, participants were willing to allow communication with third parties. This is understandable but made other participants uneasy, especially those who were concerned with privacy and the device trying to decode the subject and the situation. A participant sympathetic to the "tech should not interfere viewpoint stated: "Again, I think it's dangerous and potentially intrusive to have electronic devices try to decipher human emotions and intentions."

Overall, there are four through lines present in the responses to the three scenarios. In all the scenarios participants indicated a strong inclination towards ensuring that technology not interfere in daily human life. This disposition, possibly naive, also points to the reality that the ideas and thoughts of users are generally disregarded. The required change needed to usher in new technologies is often foisted upon the society. In the end, society changes without realizing it has. The choice for technology to not interfere could also be seen as a moral decision. Essentially, society wants to believe that in order to remain human and natural we must continue to be in control of decisions that affect us. Thus, it might be considered less human and natural to have a machine make a drastically complex decision. Could we essentially be ceding our human autonomy by allowing algorithms through devices like Morli to make decisions about life and death? We shall see is the best possible answer. A rejoinder could be offered by people who do necessary buy into the technology should not interfere: when it comes to saving lives and ensuring people get justice then lines must be crossed. This rejoinder is clearly seen when participants offer justification for allowing technology to step in in an emergency, to contact a loved one or call the cops or prompt a parent to listen in. In this case, participants possibly believe that the good probably outweighs the bad. This tension is very real and visible in a sizable number of responses. Balancing these two can also become a real struggle for a good

amount of people. This is evident in the hotly debated conversation about the balance between security, privacy, and civil liberties. How much privacy can people give up to in order to ensure safety and the safety of others. As is the right to do, participants brought with them years of experience trying to resolve this question in their minds and often find it hard to come to a decision about what is right or wrong for them.

Participants also hinted at an exception to the above norm: minors. In scenario three, a sizable amount of participants were willing to forgo an amount of privacy to preserve the health of the young individual in the scenario. Participants still had to battle the complexity of such a decision. The device should be able to detect "trigger" words that would prompt it to take the action of linking someone into the room. Even in this scenario, a participant wondered, "Morli can't [possibly] know the real intentions of the young man. So it might be better to get a person to confirm what's going on. However, I was torn between the 1st and 2nd option." The two options the participant is referencing are whether Morli should start recording everything she hears or Morli should prompt Peggy to listen in. In both cases, the participant is grappling with the possibility of infringing on the individual's privacy and getting immediate help for an urgent and potentially fatal situation. There is a potential for these tensions to increase as technology advances and also as talks about potential oversight and regulation of the technology industry tries to keep up pace. The framework of speculative design used in crafting the scenarios provides a method for gauging users' thinking and extracting insights that could impact current and future conversations about regulating technology. The *what-if* scenarios could serve as a good starting point for conversations about the future we are creating and the role of technology in it.

Conclusion and future research

Generally, most of the participants prefer for Morli not to interfere. In some instances, participants did elect for Morli to intervene when a young person is involved or when subjects were in clear danger. Future research should consider sampling a larger population so as to be able to tease out more concrete insights concerning the potential ethical and moral dilemmas presented by the existence of technologies like voice-activated virtual assistants. Importantly, future research could also try to gauge already held beliefs by participants about technology. This could be administered as a pre survey before the main study. A pre survey could also collect crucial data like socioeconomic level and political ideology that could be used in further analysis of the study results and offer insight as to why certain participants chose the options they did. In addition, gauging present attitudes towards the prevalence and pervasiveness of technology could potentially offer crucial insight into the internal deliberations participants often undertake when confronted with decisions about the behavior of technology. The initial data uncovered in this pilot study can be used to guide and formulate a more nuanced future study concerning VAPA and their uses. A more nuanced study could focus on creating more engaging scenarios and options for participants to choose by using a multimedia approach that is well suited to the topic of VAPA. In addition, expanding on questions asked during the study could potentially uncover insights necessary to push the conversation about the ethical use of VAPAs forward.

Appendix A

Scenario #1: Morli at the Johnson's House
KATIE: "It's time for bed, honey,"
KEVIN: "OK Mom"
KATIE: "Hey Morli, Play Night-time Chill playlist."
["Playing Night-time Chill at volume 4."]
[Stomping Feet]
KATIE: "Luke! Stop stomping around."
[A door slams]
KATIE: "Who is there?"
KATIE: "It's about time you got home."
KURT: "Don't start with me."
KATIE: "You said you will stop the drinking and partying!"
KURT: "Don't scream at me, Bitch!"
KATIE: "What did you call me?"
KURT: "You heard me, Bitch!"
KATIE: "Please STOP!"

1. What should Morli do?
    A. Start recording everything she hears.
    B. Call Katie's emergency contact.
    C. Place a call to 911.
    D. Yell, loudly, "I will start recording!"
    E. Morli should do nothing.
2. Why did you choose that option?

Appendix B

Scenario #2: Morli in James and Perry's apartment
[Morli can hear and identifies the sound of the Disney Channel playing in the background.]

JAMES: How do you plan to dispose of these containers?
PERRY: I will probably have to take them outside and clean them out. Can I get done with what I'm doing and do that after?
[Beware! Beware!! Detecting rising levels of Ammonia.]
JAMES: Oh shit!
PERRY: I told you not to do this while he is here. And cover those pots!

1. What should Morli do?
    A. Continue alerting until the levels subside.
    B. Send notice of the presence of the chemical to the CDC.
    C. Place a call to 911.
    D. Morli should do nothing.

2. Why did you choose that option?

Scenario #3: Morli in Greg's room

Morli hears the door open.

PEGGY: "How did school go today?".
[Morli hears no verbal response, only fast feet running up the stairs.]
PEGGY: "What happened again today?" (she asks with a worrying and disappointed tone.)
GREG: "Do you know what I hate the most?" (Greg screams at LaShaun.)
GREG: Those Five Bastards! I hate Toby, Steve, Marcus, Korey, and, and, and... (Greg screams and starts to sob.)
LaShaun: And Adam.
GREG: I hate Adam and everybody in the class. I cannot take this anymore.
LaShaun: A month of this is too much.
[Morli hears a knock at the door.]
PEGGY: Honey, is everything OK? Your stuff's downstairs. You and your dad are going hunting tomorrow.
GREG: I'm ending this tomorrow!

1. What should Morli do?
     A. Start recording everything she hears.
     B. Prompt Peggy to listen in.
     C. Place a call to 911.
     D. Yell, loudly, "I will start recording!"
     E. Morli should do nothing.
2. Why did you choose that option?

Works Cited

Abdi, N., Ramokapane, K., & Such, J. (2019). More than Smart Speakers: Security and Privacy Perceptions of Smart Home Personal Assistants. *USENIX Symposium on Usable Privacy and Security (SOUPS) 2019*. Retrieved from https://www.usenix.org/conference/soups2019/presentation/abdi

Abdolrahmani, A., Kuber, R., & Branham, S. M. (2018). Siri Talks at You': An Empirical Investigation of Voice-Activated Personal Assistant (VAPA) Usage by Individuals Who Are Blind. https://doi.org/10.1145/3234695.3236344

Amazon. (2019). Alexa Connected Devices. Retrieved from https://developer.amazon.com/alexa/connected-devices.

Ammari, T., Kaye, J., Tsai, J. Y., & Bentley, F. (2019). Music, Search, and IoT: How people (really) use voice assistants. ACM Trans. Comput.-Hum. Interact, 26(3), 1–28. https://doi.org/10.1145/3311956

Auger, J. (2013). Speculative Design: Crafting the Speculation. Digital Creativity, 24, 10 1080 14626268 2013 767276.

Awad, E., Dsouza, S., Kim, R., Schulz, J., Henrich, J., Shariff, A., … Rahwan, I. (2018). The Moral Machine experiment. Nature, 563(7729), 59–64. https://doi.org/10.1038/s41586-018-0637-6

Baraniuk, C. (2019). Future - The new weapon in the fight against crime. Retrieved from http://www.bbc.com/future/story/20190228-how-ai-is-helping-to-fight-crime.

Bleeker, J. (2009). Design Fiction: A short essay on design, science, fact and fiction. Near Future Laboratory.

Carey, B. (2019). What Experts Know About People Who Commit Mass Shootings. Retrieved from https://www.nytimes.com/2019/08/05/health/mass-shootings-mental-health.html.

Centers for Disease Control and Prevention. (2019). Retrieved from https://www.cdc.gov/violenceprevention/intimatepartnerviolence/fastfact.html.

Dryden-Edwards, R. (2019). Domestic Violence Facts, Types & Effects. Retrieved from https://www.medicinenet.com/domestic_violence/article.htm#domestic_violence_facts..

Dunne, A., & Raby, F. (2013). Speculative everything: design, fiction, and social dreaming. Cambridge, MA: The MIT Press.

Egnoto, M. J., & Griffin, D. J. (2016). Analyzing Language in Suicide Notes and Legacy Tokens. Crisis, 37(2), 140–147. https://doi.org/10.1027/0227-5910/a000363

Fowler, G. A. (2019). Alexa has been eavesdropping on you this whole time. Retrieved from https://www.washingtonpost.com/technology/2019/05/06/alexa-has-been-eavesdropping-you-this-whole-time/.

Gartenberg, C. (2019). Amazon follows up its Alexa microwave with a new Alexa Smart Oven. Retrieved from https://www.theverge.com/2019/9/25/20883867/amazon-smart-oven-features-specs-price-release-date-alexa-echo-dot.

Gill, P., Horgan, J., & Deckert, P. (2014). Bombing Alone: Tracing the Motivations and Antecedent Behaviors of Lone‑Actor Terrorists. J Forensic Sci, 59, 425–435. https://doi.org/10.1111/1556-4029.12312

Griffith, D. (2019). The Latest Law Enforcement Software 2019. Retrieved from https://www.policemag.com/517016/the-latest-law-enforcement-software-2019.

Johannessen, L. K., Keitsch, M. M., & Pettersen, I. N. (2019). Speculative and Critical Design—Features, Methods, and Practices. Proceedings of the Design Society: International Conference on Engineering Design, 1(1), 1623–1632. https://doi.org/10.1017/dsi.2019.168

John Kruzel . (2018). Is your Amazon Alexa spying on you?Retrieved from https://www.politifact.com/truth-o-meter/statements/2018/may/31/ro-khanna/your-amazon-alexa-spying-you/A

Kruzel J. (2018). Is your Amazon Alexa spying on you?

Lau, J., Zimmerman, B., & Schaub, F. (2018). Alexa, Are You Listening?: Privacy Perceptions, Concerns and Privacy-seeking Behaviors with Smart Speakers. Proc. ACM Hum.-Comput. Interact. 2, CSCW, Article 102, 31. https://doi.org/10.1145/3274371

Lennard, N. (2020, April 13). Domestic Violence Is on the Rise With Coronavirus Lockdown. The Responses Are Missing the Point. Retrieved April 19, 2020, from The Intercept website: https://theintercept.com/2020/04/13/coronavirus-lockdown-domestic-violence/

Liao, S. (2018). Alexa Hunches can now suggest actions based on daily behavior. Retrieved from https://www.theverge.com/2018/9/20/17883396/amazon-alexa-hunches-prediction-smart-home-ai.

Malkin, N., Deatrick, J., Tong, A., Wijesekera, P., Egelman, S., & Wagner, D. (2019). Privacy Attitudes of Smart Speaker Users, 2019(4), 250–271. https://doi.org/10.2478/popets-2019-0068

Moralizing technology(Vol. 34, p. 14). (2011). Verbeek: University of Chicago Press.

Nancy, P., Liccardo, R., Kilmer, B., & Lundberg, J. (2009). Methamphetamine Use Estimated to
Cost the U.S. About $23 Billion in 2005. Retrieved from
https://www.rand.org/pubs/monographs/MG829.html.

Newman, L. H. (2018). Don't Freak Out About That Amazon Alexa Eavesdropping Situation.
Retrieved from https://www.wired.com/story/the-alexa-amazon-eavesdropping-situation/

N.I.D.A. (2019). Methamphetamine. Retrieved from
https://www.drugabuse.gov/publications/research-reports/methamphetamine

Pappas, S. (2016). The Science of Mass Shooters: What Drives a Person to Kill?Retrieved from
https://www.scientificamerican.com/article/the-science-of-mass-shooters-what-drives-a-p
erson-to-kill/.

Peterson, J., & Densley, J. (2019). Op-Ed: We have studied every mass shooting since 1966.
Here's what we've learned about the shooters. Retrieved from
https://www.latimes.com/opinion/story/2019-08-04/el-paso-dayton-gilroy-mass-shooters-
data.

PricewaterhouseCoopers. (2018). Consumer Intelligence Series: Prepare for the voice revolution.
Retrieved from
https://www.pwc.com/us/en/services/consulting/library/consumer-intelligence-series/voic
e-assistants.html

Samsung. (2019). Samsung Bixby: Your Personal Voice Assistant: Samsung US. Retrieved from
https://www.samsung.com/us/explore/bixby/.

Schuppe, J. (2019). How facial recognition became a routine policing tool in America. Retrieved
from
https://www.nbcnews.com/news/us-news/how-facial-recognition-became-routine-policin
g-tool-america-n1004251.

Shields, N. (2018). New survey shows consumers are wary of smart home devices invading their
privacy. Retrieved from
https://www.businessinsider.com/survey-says-consumers-have-privacy-concerns-with-sm
art-home-devices-2018-4

Shilton, K., & Anderson, S. (2016). Blended, not bossy: Ethics roles, responsibilities, and
expertise in design. Interacting With Design.

Smith, A. (2018). Public Attitudes Toward Computer Algorithms. Retrieved from
https://www.pewinternet.org/2018/11/16/public-attitudes-toward-computer-algorithms/

Sorenson, S. B., & Wiebe, D. J. (2004). Weapons in the lives of battered women. American Journal of Public Health, 94(8), 1412–1417. https://doi.org/10.2105/ajph.94.8.1412

Thuraisingham, B. (2015). Big Data Security and Privacy. Proceedings of the 5th ACM Conference on Data and Application Security and Privacy (CODASPY '15, 279–280. https://doi.org/10.1145/2699026.2699136

Village, T. R. (2019). What Does Meth Smell Like?Retrieved from https://www.therecoveryvillage.com/meth-addiction/meth-smell/#gref.

Vogels, E. (2019). Millennials stand out for their technology use, but older generations also embrace digital life. Retrieved from https://www.pewresearch.org/fact-tank/2019/09/09/us-generations-technology-use/

Wamsley, L. (2018). Amazon Echo Recorded And Sent Couple's Conversation — All Without Their Knowledge. Retrieved from https://www.npr.org/sections/thetwo-way/2018/05/25/614470096/amazon-echo-recorded-and-sent-couples-conversation-all-without-their-knowledge

What Things Do (Vol. 33, p. 13). (2010). Verbeek: Penn State Press.

Zwerdling, D. (2018). Can Your Smart Home Appliances Snitch on You?Retrieved from https://www.themarshallproject.org/2018/05/24/your-home-is-your-snitch

(n.d.). Smart Home Report 2019 - United States | Statista Market Forecast. Retrieved from https://www.statista.com/outlook/279/109/smart-home/united-states