Adolescents Voice Preference in Auditory Advertisements: A Study in Gender Stereotypes and Multi-Media Marketing

Sydney Lynch[1] and Marianne Campbell[1]

[1]Milton High School, Milton, GA, USA

ABSTRACT

This study aimed to gauge if adolescents' bias or prejudice towards a particular gender could be observed through narrator preference in auditory advertisements to ascertain if the perception of gender and its stereotypes has changed among younger generations. Prior research shows that when adult subjects are presented with multiple advertisements that they demonstrate a preference towards male narrated advertisements; however, these previous studies were performed on adults; therefore, narrator preference remains unknown for most teenagers. For this study, research data were collected through a mixed media survey in which a descriptive research process was completed. Participants in this study included 135 high school juniors and seniors both male and female. Initial results showed that statistically there was no preference for either male or female narration. From this data, one can conclude that today's teenagers do not show an overt bias for a narrator of a specific gender. Therefore, the conclusion can be drawn that the perception of gender and gender stereotypes have changed towards more egalitarian views in today's younger generations. However, this study was limited to high school-aged teenagers and did not encompass youth of all age groups. Future research should compare perceived gender stereotypes among various age groups to identify a more precise pattern of generational change of gender perception.

Introduction

In an ever-changing digital world where technology is synonymous with innovation, it is quite surprising to many that in the past few years auditory marketing or, more colloquially, "Radio Marketing," has resurfaced and is gaining in popularity. This recent resurgence of auditory marketing popularity is due to the generational change in consumption, more precisely, the method of how goods are purchased. Younger generations, those aged eighteen to thirty-five, find themselves in physical stores less often than their older counterparts aged fifty-five and up. Millennials and Generation Z or the "iGeneration" are more than likely to forgo the physical shopping experience and instead view advertisements, research, and purchase a product from their smart devices (Constantin-Drugau, 2018). Smart devices such as phones, tablets, and computers are now the primary medium for shopping transactions and entertainment with eighty-one percent of all Americans owning smartphones ("Mobile Fact Sheet," 2019). With nearly sixty percent of Americans subscribing to a digital streaming service, the popularity of traditional media such as television and print have been in rapid decline (Liesman, 2018). With awareness to this decline, marketing companies have converted to a fully digital means of advertising, specifically auditory-marketing, because of the growing popularity of reinvigorated radio-shows called podcasts. With over fifty-five percent of the United States population actively listening to these new radio-shows ("Podcast Stats and Facts," 2020), it becomes clear as to why these marketing firms have dived into the digital realm. However, even with the rapid popularity of auditory advertising, researchers are still unable to agree on two questions with this methodology: what attributes of the human voice are most useful to achieve maximum engagement and is a human voice more effective than its synthetic counterpart? Therefore, this study was conducted to determine the preferred attributes of both human and synthetic voices on Generation Z to determine if the preference for a

particular voice aligns with their general demographic or if it is evident of generational change of gender perception. Not only would this determination be important to be able to significantly improve teenager's engagement with advertisements, but it would also be pertinent to the exigent topic of gender equality among adolescents.

Literature Review

Since the debut of the first radio advertisement in 1922, multitudes of in-depth research have been conducted on the qualities of voice customer engagement. Furthermore, even though some of the research had been contradictory in the past, one attribute remains steadfastly agreed upon: pitch, more specifically, low pitch. A study conducted by the Georgia Institute of Technology showed that participants perceived the product within an advertisement with the low-pitch narration as larger than those in advertisements with higher-pitch narration. Even when shown an image of the product, participants were unrelenting, in their belief that the product was larger (Lowe & Hawes, 2014). Another study with similar results, conducted at the BI Norwegian Business School in 2017, showed that when participants listened to the same advertisement twice, once with a low pitch voice and the second with a higher pitch voice, participants believed that the product being advertised with the lower pitch narration was more expensive than its higher-pitched counterpart (Foss & Lunde, 2017).

For marketing, there is a consensus that low-pitched masculine voices are the most effective to achieve a positive perception of a product. However, the theory of low pitch equals positive response does not apply to artificial voices. Refined in 1968 by a Japanese, lab synthetic voice has only been in commercial use for a few decades ("Speech Synthesis,"2007). However, some studies have shown that most people have positive interactions with the artificial voice of a high pitch. Artificial voices' current primary purpose is assistance in Global Positioning Systems and automated warning statements. A study conducted by Lisbon University illustrated that most individuals prefer a high-pitched female voice when used for these purposes (MacHado et al., 2012). This preference for female voice characteristics for means of assistance and warning starkly contrasts with the masculine traits preferred in scenarios of consumption; this seems odd until the stereotypical roles and traits of each gender are analyzed. Past research concerning psychology and gender shows that women often possess traits of being warm, gentle, cooperative, and helpful. At the same time, men possess traits of being assertive, competitive, and independent (Koenig, 2018). These traits, when analyzed separately, provide the past justification for the separation of sexes in vocational fields. However, when scrutinized under the lens of marketing and technology, the subconscious preference of individual voices for specific scenarios becomes clear. When faced with a decision such as purchasing a product or service, people are more inclined to look to voices of authority and confidence traits generally associated with men, while when needing help or assistance, look for a comforting and cooperative voice or the traits generally associated with women.

These preferences for voice qualities (agree with) past research about the binary roles of men and women. However recently these norms have been disbanded, and these gender stereotypes are seen as dated. Present day society has achieved the most gender equality to date. When considering these conclusions and the structure of this new relatively egalitarian society, it is perplexing that, while conscious efforts to disavow gender stereotypes grow, the subconscious seemingly adherences to these norms. This apparent contradiction was the purpose of this study, more specifically, to attempt to validate if the subconscious adherence to gender stereotypes changed among generations via voice preference in advertisements. Teenagers were chosen not only because they are a lucrative market, being responsible for over $1 billion in e-commerce revenue, (Montgomery, 2001) but they also account for ninety-four percent of mobile device use and seventy-one percent of social media participation.

This young generation has grown up connected to the internet and therefore new ways of thinking. Another reason that teenagers were the sole participants of this study was that they are often not subject to the research of this manner, so it remains unclear the preferred qualities of voice in teenagers. And, even though a comparison was made between the teenage participants of this study and other studies that do not disclose the ages of their participants, it can be inferred that only adults are studied due to the legality of working with a protected group. Aside from a lack of information surrounding adolescents and gender bias, they were also studied due to the fact that from 2004 to 2014

over 2.9 million bachelor's degrees in science and engineering were awarded to women. This figure surpasses the number of degrees awarded to men by over one-hundred thousand (Perry, 2018). This statistic demonstrates that the number of female STEM majors in college is increasing and today's high school junior and seniors are about to become the next classes of college freshmen so it is important to ascertain if certain aspects, like their interactions with advertisements and media, can provide insight to their views on gender and the stereotypical roles of females and males. Therefore, the hypothesis that was developed for this study was that, despite the new perceptions of gender with which these adolescents were raised with, they would most prefer advertisements with a narration voice possessing a low-pitch and masculine traits. Before participating in the study, it was assumed that participants had access to smart devices and the internet, are not hard of hearing and have not suffered any acoustic trauma. Therefore, the final statement regarding this research is that this study was conducted in order to analyze the generational change in perception of gender through voice preference in auditory advertisements with the ultimate purpose of determining the most appealing advertisements for teenagers.

Methodology

The design of this study followed the "explore" format because new phenomena could be discovered due to a new concept about the generational changes in gender perception that was being explored. Also, like many marketing studies that conduct descriptive research by having participants listen or view an advertisement without manipulating variables, new trends and characteristics can be identified. This study followed the Georgia Institute of Technology study's methodology by having participants listen to multiple versions of the same advertisements and then measuring their responses with a mixed media survey. For this particular experiment, the independent variable was the voice of the narrator used in the advertisement and the dependent variable was the participants' responses. No control group was needed because there was no need for a comparison between participants, just their reaction to the advertisement would suffice. The null hypothesis curated for this study was the teenagers will not have a significant preference for the female or male narration.

In order to conduct the study, the entire Advanced Placement Psychology program at a south-eastern high school were selected to be the population. This population was two-hundred high school seniors and juniors. Of those two-hundred students, one hundred and thirty-five participated in the survey giving the study a confidence level of ninety-five percent. Psychology students were selected to participate in the study because of their experience and interest in this particular research discipline. Many aspects of gender studies and marketing are rooted in psychology, so the belief was held that these students would be more interested in participating than high schoolers with different academic interests.

To complete this study, a mixed media survey was needed for participants and was chosen because both qualitative and quantitative data were desired for analysis. Four auditory advertisements with a duration of thirty seconds were needed: human male narration, human female narration, synthetic male narration, and synthetic female narration. To make these advertisements, a script was developed and was written following the common format for a thirty second television advertisement. The fictious product being advertised was a portable WIFI router. A WIFI router was chosen to be the advertised product because it would not arouse any strongly negative or positive feelings among participants and, by making the advertisement about technology, bias towards a male or females' authority could be easily detected and explained due to the attribute that often males are sources of authority for technology. By having a female narrator for a technology related advertisement, the gender stereotype can be contradicted, and participant's responses can be analyzed through a lens of social and cultural norms to see if any outstanding patterns can be identified. Once the script was written, two adults were selected to record the advertisements and their voices recorded via an iPhone for clear audio quality. The two artificial voice ads were made with free text to speech software. Finally, to analyze the data, Microsoft Excel was used as it performs basic data-analysis well and is a widely available software.

To conduct the study once the students returned their signed informed-consent forms, all participants were seated in their respective Psychology classrooms. Once the participants were settled, surveys were distributed. A few minutes was then given for them to fill out general demographic information about themselves (i.e., name, age, race). After participants were finished, the first advertisement was played over a wireless speaker in the classroom. Throughout all the trials the volume of the speaker was not manipulated. Participants were asked if they needed to listen to the advertisement again and, if they did not need to, they filled out the questions on the survey that corresponded with that particular advertisement. For the students, the advertisements were played in the order of synthetic female, synthetic male, human male, and a human female. The order was chosen so that the artificial voice advertisements and the real voice advertisements could be played successively. The process of listening to the advertisement and completing the survey questions was repeated three additional times for all versions of the advertisements. Once all the students completed the survey, any questions that the participants had were answered. Finally, the surveys were handed into the proctor and the participants were dismissed.

Results

As previously mentioned in the methodology section, the sample of the first survey section in appendix A shows the questions that participants were asked about their general demographic. Figure one shows the gender distribution of the survey participants. Of the one hundred and thirty-six participants, eighty-one were female, fifty-four were male, and one individual did not disclose their identified gender, leaving the sample size as being sixty-percent female and forty-percent male.
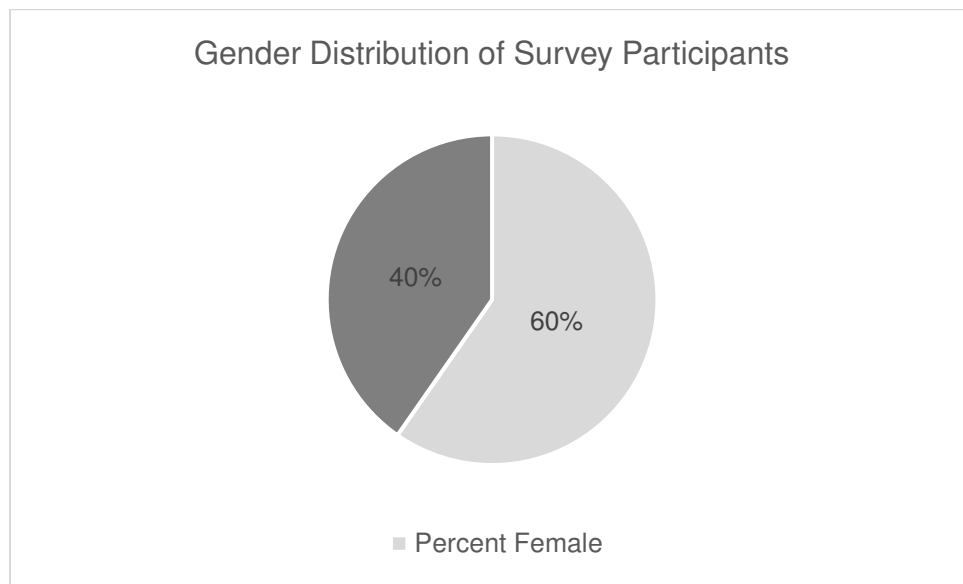

Figure 1: Gender distribution amongst survey participants

After the gender distribution was determined, a chi-square analysis was performed on the participants' most preferred advertisement to see if males or females had an overwhelming preference for either voice method. At the end of the survey, participants were asked to select their overall favorite advertisement, the results of which can be found in the **Appendix.** The preferences for advertisements were separated by gender, specifically, the male preference for an advertisement and the female preference for an advertisement were counted separately. This sum represents the observed values for the chi-square table. To arrive at the expected values for the chi-squared table, the total of the rows was multiplied by the total of the columns then dividing that number by the sample size. In figure two, the observed values for the table are calculated.

Gender	Artificial Female Preference	Artificial Male Preference	Human Male Preference	Human Female Preference
Female	5	1	43	31
Male	7	2	20	25

Figure 2: Observed values for advertisement preference.

Next, in figure three the calculated expected values can be seen for each gender's advertisement preference. These expected values are very similar to the observed values and, when Chi-Square analysis is completed, these numbers will yield an extremely high P-Value.

Gender	Artificial Female Preference	Artificial Male Preference	Human Male Preference	Human Female Preference
Female	4.835820896	1.208955224	37.6119403	33.43283582
Male	7.164179104	1.791044776	25.3880597	22.56716418

Figure 3: Expected values for advertisement preference.

Finally, upon chi-squared analysis, a P-Value of 0.1835 was calculated. This calculation can be seen in figure four. This P-value is significantly higher than 0.05 and demonstrates that the figures hold very little statistical significance.

P-Value
0.183588198

Figure 4: Calculated P-Value

Conclusion

After data analysis, the previously mentioned null hypothesis that teenagers will not have an implicit bias or preference for an advertisement with a like gendered narrator, can be neither definitively accepted nor rejected. After analyzing one-hundred and thirty-five adolescent responses the conclusion has been drawn that there is no significant correlation between identified gender and preferred narrator voice. Additionally, there was no significant correlation found between gender and preference for artificial voice narration. While no definite conclusion was arrived upon about gender and preferred voice in an advertisement, a conclusion can be made about the generational differences on perception of gender. As previously mentioned, this study was conducted to document the generational change in perception of gender through the identification of voice preference in auditory advertisements with the original hypothesis being that, despite being raised in a more egalitarian society, adolescents regardless of identified gender would prefer the advertisement with a low-pitch masculine voice. However, this hypothesis was disproven in this exercise because the Chi-squared analysis showed that there was not an overwhelming preference for the human male narration. The rejection of this hypothesis supports the notion that today's teenagers do not hold as much of an implicit bias towards a particular gender. A corollary conclusion can be drawn regarding the declining popularity of mainstream media and the decrease in stereotypical gender roles amongst teenagers. A study conducted by the accredited German University

of Tubingen presented young children with television advertisements that showed gender stereotype conditions, such as young girls struggling with math, and when showed these advertisements young girls were reported to show more interest in stereotypical female careers than the group of young girls that were shown a counter-stereotype advertisement such as girls excelling in math (Wille et al., 2018). While this study does show the damaging influence of gender stereotypical advertisements, these advertisements were in a traditional television format which is no longer a manner in which most children and teenagers consume media. A survey by Business Insider shows that today only sixteen percent of teenagers watch traditional cable television which is a steep decrease compared to the previous twenty-nine percent in 2015 (McAlone, 2020). Currently, most teens consume alternative forms of media via their phones, laptops, and tablets. The new media platforms such as YouTube and Instagram are creator controlled and therefore utilizes a broader range of ideas and values. However, the pluralism that these social media platforms provide are not commonly found on traditional cable television because each channel is controlled by an individual corporation which itself influences all of their produced media. Another study by the European Commission of Employment, Social Affairs and Equal Opportunities stated that new forms of media have offered easier and more accessible use than traditional media for women's groups, feminist groups and female artists to communicate and work with a diverse audience ("Breaking Gender Stereotypes," 2012). Therefore, messages and advertisements defying gender stereotypes and advocating for equality are more common on these alternative platforms that teenagers are interacting with more frequently. This frequent interaction with alternative media platforms appears to be a driving force behind teenagers increasingly egalitarian views on gender.

Implications

This research's inconclusive results can imply there has been a generational change of perception of women's roles in society and technology. Past studies such as the one conducted by the Norwegian Business School have shown a correlation between a male narrator and more positive perception of an advertised product. Aside from male voices being assumed most preferable, a conclusion has also been drawn between most individuals preferring a female voice when it applies to a service such as GPS or a warning such as an Amber Alert. This research would appear to contradict the notions of the aforementioned studies among adolescents. However, these studies results do coincide with the results of a study from the Technical University of Lisbon. The Lisbon study had twenty college students listen to multiple versions of a warning message and then select their most favored version of the warning. After these results were collected, the team of researchers completed a Chi-Square analysis. The analysis revealed that there was no statistically significant difference between preference for a certain gender narrator (Machado et al.,2012). Now, while the study was conducted with an extremely small number of people making their overall conclusions statistically insignificant, this current study that had over a hundred teenagers participate can support their conclusions as correct. Among teenagers, there was no significant preference for the male narrated advertisement. This lack of preference could be tangible evidence that the norms of society are changing. With the recent push for women and girls to participate in STEM fields there has been an exponential increase of women leaders in traditionally male dominated fields including technology. With women being put in more authoritative positions within the recent past, younger generations such as Generation Z have become accustomed to the breaking of stereotypical gendered roles in society and this becomes evident within advertisements with the gender of the narrator no longer being of much importance. An additional implication of the results of this study could be to encourage the continued growth of programs that enable women to pursue fields of study or careers that are normally considered male dominated. If this study's results show the improvement of gender perception and equality among teenagers, more programs that foster women's involvement in STEM should target this group to aid in young people's abilities to defy stereotypical gender roles and reach their fullest potential. Also, this is pertinent and beneficial information for marketing companies to begin to focus less on appealing to certain stereotypes and instead begin to improve the quality and content of their advertisements for more universal appeal. Another recommendation to these marketing companies would be to focus more on alternative media platforms, such as social media, to ensure maximum engagement with adolescents.

Limitations

Within this study there is much room for improvement and one of the main ways to improve this study is by addressing its limitations. The most apparent limitation within this study is the limited participation. To conduct research, a population of two-hundred high schoolers was chosen because it would have not been possible to get an appropriate sample size if the population was larger. Another hindrance was the uneven gender distribution among the one-hundred and thirty-five participants. Of all participants, over sixty percent identified as female. A reason for this sample size skewing mostly female could be because the population was taken from Advanced Placement Psychology students. This larger number of females is in part due to the culture within the high school where this research was conducted. At this particular school, the observation made was that a class dealing with a soft science such as psychology is more suitable for females, and because of this view males maybe less inclined to participate in the class. For this research, the optimal gender distribution would have been an even split between male and female to achieve less biased results. However, the gender distribution had no apparent effect on the most preferred advertisement because an overwhelming majority did not select human male narration as their most preferred advertisement. To fix this uneven gender distribution, the population could be expanded to include both "hard" and "soft" sciences so that there could be even male representation in the study. Another limitation within this study was within the format of the survey itself. The wording of the survey itself assumes that the participant had an overall opinion. This wording disallowed participants to show indifference to the advertisements persuading them to form an opinion thereon. Finally, the last notable limitation again concerns the pool of participants. Even though this study's purpose was to document any generational changes in gender perception, adults were never surveyed and compared to the results of the teenagers. To drastically increase the credibility of the results of this study, a group of adults should be tested and be compared.

Future Research

From this study many new opportunities for future research can arise. Most interestingly, the possibility to further study different age groups, to expand the participant age range from Baby Boomers to the newest Generation Alpha. Having this expansive age range would lead to clearer patterns of generational change of gender perception and stereotypes. Along with broadening the age range, future research should expand into different demographic traits such as how age and race affect narrator preference in auditory advertisements. Future researchers could also expand into different media such as visual advertisements or even advertisements on popular social media platforms such as Instagram. By expanding into the realm of visual advertisements, social media researchers can curate advertisements that directly contradict the gender binary by placing males in traditionally female roles and females in traditionally male roles. By adding this visual stimulating aspect, researchers could collect more in-depth and qualitative data about perception of gender stereotypes. Analyzing social media platforms such as Instagram, which are widely used by younger generations, researchers can study the advertisements with which they interact and determine the common characteristics that the most popular advertisements possess. Finally, by furthering this research one could possibly catalog the generational change of gender and other demographic perceptions through the utilization of auditory marketing as well as set the precedent for the future of radio and auditory marketing to discontinue stereotypes and promote a more equal society. A beneficial study that could be conducted in the future could be to analyze how various gender stereotypes, through exposure to stereotypical advertisements, have negatively impacted the academic performance of adolescents. As mentioned previously in the study, there was an uneven gender distribution with over half of the psychology students being females in the current study. This characteristic, as stated earlier, could be due to the culture surrounding soft sciences. There is a detectable bias among students that classes such as English and History are more female oriented while classes such as math and computer science are more masculine disciplines. The stigma surrounding these classes not only led to decreased male participation in this study, but, more importantly, discourages

girls and boys to expand their academic interest into these fields of study. The same study cited from the University of Tubingen explains that bias held in classrooms often negatively impacts girls' performance in math, and due to this, girls are dissuaded from continuing studies in these fields (Wille et. al, 2018). Besides strictly analyzing the negative impacts of gender stereotypes, future researchers should also analyze how race, ethnicity, religion, and economic status can impact perception of gender stereotypes as well.

Acknowledgments

References

Axelrod, V., Bar, M., Rees, G., & Yovel, G. (2015). Neural correlates of subliminal language processing. Cerebral Cortex, 25(8), 2160-2169. doi: 10.1093/cercor/ bhu022

Constantin-Drugau, A. (2018) Emotional and cognitive reactions to marketing stimuli: mechanisms underlying judgments and decision making behavioral and consumer neuroscience. *Economics, Management, and Financial Markets, 13*(4), 45-50. doi: 10.22381/EMFM13420183

Foss, C., & Lunde, S. (2017). Sounds expensive? The effect of voice pitch on price perception. Retrieved from https://biopen.bi.no/bi-xmlui/handle/11250/2484285

Gelinas-Chebat, C., & Chebat, J. (1992). Effects of two voice characteristics on the attitudes toward advertising messages. *The Journal of Social Psychology, 132*(4), 447-459. http://dx.doi.org/10.1080/00224545.1992.9924724

Hardy, Q. (2016, October 9). Looking for a choice of voices in A.I. technology. The New York Times. Retrieved from https://www.nytimes.com/

Harris, J., Salus, D., Rerecich, R., & Larsen, D. (1996). Distinguishing detection from identification in subliminal auditory perception: A review and critique of Merikle's study. *The Journal of General Psychology, 123*(1), 41-50. doi: 10.1080/00221309.1996.9921258

Koenig, A. (2018). Comparing prescriptive and descriptive gender stereotypes about children, adults, and the el-derly. *Frontiers in Psychology, 9,* doi: 10.3389/fpsyg.2018.01086

Krestar, M., & Mclennan, C. (2013). Examining the effects of variation in emotional tone of voice on spoken word recognition. *The Quarterly Journal of Experimental Psychology, 66*(9), 1793-1802. doi:10.1080/17470218.2013.766897

Large, D., & Burnett, G. (2013). Drivers' preferences and emotional responses to satellite navigation voices. *Int. J. of Vehicle Noise and Vibration, 9*, 28 - 46. doi: 10.1504/IJVNV.2013.053815.

Liesman, S. (2018). Nearly 60% of Americans are streaming and most with Netflix: CNBC survey [Online article]. Retrieved from https://www.cnbc.com/2018/03/29/nearly-60- percent-of-americans-are-streaming-and-most-with-netflix-cnbc-survey.html

Lowe, M., & Haws, K. (2014). Sounds big: the cross-modal effects of auditory pitch on product perceptions. Advances in Consumer Research, 42, 172-176. Retrieved from http://www.acrwebsite.org/volumes/v42/acr_v42_17755.pdf

MacHado, S., Rebelo, F., Duarte, E., Reis, L., & Teles, J. (2012). Selection of a voice for a speech signal for personalized warnings: the effect of speaker's gender and voice pitch, Work, 41(1), 3592-3598. doi: 10.3233/WOR-2012-0670-3592

McAlone, N. (2018). Netflix and YouTube combine for over 70% of the time teens spend watching video, as cable TV slumps. Retrieved from https://www.businessinsider.com/teens-watch-more-than-twice-as-much-netflix-as-cable- tv-2018-10

Mobile Fact Sheet. (2019). Retrieved from https://www.pewresearch.org/internet/fact-sheet/mobile/

Ninness, H.A.C., Rumph, R., Mcculler, G., Bradfield, A., Saxon, J., Calliou, M., & Ninness, S.K. (2001). The effect of computer-emitted speech inflections during verbal-interactive responding. *Psychological Record, 51*(4). Retrieved from https://opensiuc.lib.siu.edu/tpr/vol51/iss4/4/

Nygaard, L., & Lunders, C. (2002). Resolution of lexical ambiguity by emotional tone of voice. Memory & Cognition, 30(4), 583-593. Retrieved from https://link.springer.com/article/10.3758%2FBF03194959

Opinion on Breaking Gender Stereotypes in the Media. (2012). Advisory committee on equal opportunities for women and men [PDF file]. Retrieved from https://eige.europa.eu/docs/3093_2010-12_Opin-ion_on_Breaking_gender_stereotypes_in_the_media_EN [1].pdf

Perry, M. (2018). Gender gap in STEM. [Online blog post]. Retrieved from https://www.aei.org/carpe-diem/gender-gap-in-stem-women-are-majority-of-stem-grad-students-and-they-earn-a-majority-of-stem-bachelors-de-grees/

Podcast Stats and Facts. (2020). Retrieved from https://www.podcastinsights.com/podcast-statistics/

Speech Synthesis. (2007). Wikipedia [Wikipedia entry]. Retrieved May 1, 2020, from https://www.cs.mcgill.ca/~rwest/wikispeedia/wpcd/wp/s/Speech_synthesis.htm

Wille, E., Gaspard, H., Trautwein, U., Oschatz, K., Scheiter, K., Nagengast, B. (2018). Gender stereotypes in a chil-dren's television program: effects on girls' and boys' stereotype endorsement, math performance, motiva-tional dispositions, and attitudes. *Frontiers in Psychology, 9,* 1-17. doi: 10.3389/fpsyg.2018.02435

Wong, K. (2018, September 4). In pursuit of the perfect AI voice. [web log comment]. Retrieved from https://www.engadget.com/2018/04/09/in-pursuit-of-the-perfect-ai voice/?guccounter=1

Zhu, L., & Beauchamp, M. (2017). Mouth and voice: a relationship between visual and auditory preference in the human superior temporal sulcus. *The Journal of Neuroscience: The Official Journal of the Society for Neuroscience, 37(10)*, 2697-2708. doi: 10.1523/JNEUROSCI.2914-16.2017