FAKULTET FOR UTDANNINGSVITENSKAP OG HUMANIORA

BACHELOROPPGAVE

Studieprogram: ENG290	Vår semesteret, 2023

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Tittel på bacheloroppgaven: Stillhetsoverhopping på Moderne Apparater

Engelsk tittel: Skipping Silences on New Appliances

Emneord: Podcasts, Skip-Silence, Silence Skipping, Conversational Silence, Conversation Analysis, Matched-Guise Experiment.	Antall ord: 6044 Antall vedlegg/annet: 0 Stavanger, 14/05 2023

Skipping Silences on New Appliances

An experimental study of the Skip-Silence feature in modern podcast-player apps within a Conversation Analysis framework

Table of Contents

1 Introduction

1.1 Aims, Research Questions and Methods

This thesis is an investigation of the *skip-silence* function found in most modern podcast-player apps which aims to explore how this feature affects listener perception of both speakers and relationships by conducting an experimental study. The experiment is a matched-guise test comprising study participants listening to podcast clips of dyadic conversations with and without the effect enabled for one or both speakers, whereafter they are requested to fill out a response-sheet asking them to appraise the speakers in regard to three relevant personality attributes selected from prior research on silence within the Conversation Analysis field: intelligence, intelligibility, and amiability.

Thus, this study aims to answer the following research questions:

> How does the Skip-Silence function relate to prior research in the Conversation Analysis field on the affective properties of conversational silence in terms of:

> 1) *Intelligence,* will speakers be perceived as more intelligent with silence skipping?
> 2) *Intelligibility,* will speakers be harder to understand with silence skipping?
> 3) *Amiability*, will conversations appear more amiable with silence skipping?

1.2 Relevance of the Study
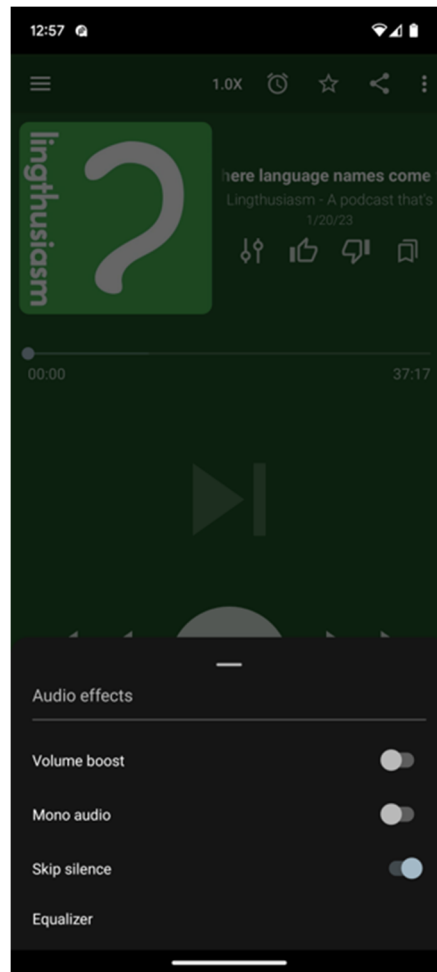
Figure 1: An example of the Skip-Silence toggle within a podcast-player app

Skip-silence does as the name implies; it is a realtime post-processing effect that automatically trims out every pause from an audio file as it is being played. The software works by analyzing an audio waveform for durations above a specified length that fall below a specified decibel threshold. It is an opt-in feature that is distinct from, but can be combined with, the pitch-adjusted playback-speed option typically included alongside it. Podcasts overall are predicted to reach half a billion listeners by 2024 (Hill, 2021), but no exact statistics are publicly available for the specific popularity of silence skipping. The only metric from which to posit is the number of players that include it, e.g. six out of the eight apps featured in a recommendation list by Bradbury, J., & Kavafian, H. (2023) contain a version of it, which suggests clear audience demand. It does not seem unreasonable to estimate that millions of people use this feature daily, yet its impact has been little studied academically.

1.3 Theoretical Framework

Silence itself does however have a long academic tradition within the linguistics subfield of Conversation Analysis (CA), which this study will draw from to understand this relatively new technological innovation. Though one point to note is that conversations taking place on podcasts do not typically fall within the CA domain. Sutherland (2021, 14:10-15:56) makes the distinction that conversations, as defined by the CA field, are strictly for participants, not an audience. He therefore views any kind of scripted drama or unscripted panel debate, which most podcasts would certainly fall under, as only pretending to be conversation. This is particularly worth noting as most podcasts are not broadcast live; before they make their way to the listener, most are already edited to varying extents. Some quite transparently so, incorporating music, narration, and sound-effects alongside dialogue between the hosts. Others may appear closer to natural conversation but might still have small mistakes cleaned up like stutters, filler words, and elongated pauses (though the excising of these within standard-editing practices is still far less aggressive than skip-silence). However, since this thesis concerns listener judgements of speakers rather than analyzing the speakers themselves, research within CA will be considered applicable to present purposes.

In her chapter on experimental methodology, Drager (2013, p. 59) advises drawing from well-established links within one's chosen field when constructing an experiment. This study will do so, focusing on three attributes whose perception CA research has demonstrated to be affected by silence duration: *Intelligence, Intelligibility,* and *Amiability*. These were also considered the most relevant to this investigation as the evaluation of them is more cumulative than strictly situational, reflecting the fact that silence skipping works indiscriminately. Literature on these three attributes will now be reviewed in turn.

2 Literature Review

2.1 Intelligence

Linguists classify speech tempo in two different ways; *articulation-rate*, which measures syllables per. second excluding pauses, and *speech-rate*, which includes pauses (Fors, 2015, p. 46). The two are of course closely intertwined, Kendall (2009, p. 165) found that pauses do naturally become shorter when articulation-rate rises. Accordingly, while silence skipping does not alter how fast someone talks in the sense that their articulation-rate remains exactly the same, it does give the impression that someone talks faster because their speech-rate increases. The playback-speed option on the other hand alters both articulation-rate *and* speech-rate.

A consistent link has been found between speech-rate and impressions of speaker intelligence. A blind listening study conducted by Braley (2011) involving clips of speakers instructed to talk at either a slow, typical, or fast pace, resulted in higher ratings of intelligence, competence, and employability being given to those instructed to talk faster. Most surprising to the author, speakers instructed to talk faster were also rated as the most physically and emotionally relaxed, though only marginally more so than those instructed to talk with typical speed.

Most relevant to this present study, Geenberg (2009) found that solely manipulating pause duration resulted in a similar effect. Their study, involving judgements of speech samples digitally manipulated to selectively include more short or long pauses, found that speakers in the former group were deemed to be more 'informed.' A follow-up experiment showed that these results became even more pronounced when the manipulated clips were aligned with their corresponding articulation-rate, i.e. high for short pauses, and low for long pauses. There is some empirical backing for these judgements, a meta-analysis of research in the field by Capella (1979, pp. 5-6) found that pause duration has repeatedly been demonstrated to increase in step with the degree of cognitive-load put on a speaker.

2.2 Intelligibility

Pause length has also been experimentally shown to affect speech intelligibility. A study conducted by Fors (2015) investigated how pauses of typical and atypical lengths affect participants' ability to recall words from a short clip. Three variants of the same clip were

employed, one with a consistent pause length of half a second deemed to be 'typical,' and two atypical variants, one with a consistent pause length of four seconds, and one with all pauses edited out. Participants were routinely able to correctly recall more words in the typical pause variant, less in the longer version, and the least in the version without pauses (p. 112).

The study simultaneously measured the extent of cognitive effort involved in listening to the various clips and discovered the longer pause variant to be the most strenuous by a significant margin. The no-pause variant was however surprisingly measured to be less taxing to listen to than the typical variant, though not to a statistically significant degree (p. 108).

2.3 Amiability

Conversational silence is regularly interpreted as disruptive, such as in the notion of an *'awkward silence.'* McLaughlin & Cody (1982), define the awkward silence as an extended response-delay following a mutually recognized invocation to exchange speaking turns whose cause cannot be pinned on a legitimate excuse (such as deliberation, preoccupation, or discretion towards a third party) (p. 301). A study conducted by them where participants were asked to rate the communicative competency of their interlocutor after a 30-minute conversation showed a clear inverse relationship between the rating received and the number of such lapses.

Silence is also widely recognized to shade the meaning of surrounding talk. Listener perception of trouble in interaction was found to increase with the duration of pauses in a study by Roberts et al. (2006). Study participants were asked to listen to a telephone conversation over the course of which an interlocutor both agreed to an assessment and complied with a request, both answers were short and to the point, "yeah" for the former and "sure" for the latter. The control group listened to the unadulterated recording and received both answers at face value. However, for the experimental group, the response-time for both was digitally increased, which consistently led to the agreement to be perceived as weaker and the complying as less willing. Both effect sizes also increased in step with the amount of silence added (p. 1085).

Another similar silence manipulation study was conducted by Koudenburg et al. (2010), though rather than listen to a conversation, participants here read through one in text form. The experimental variable was whether the sentence "briefly, it remains silent." was added following the potentially controversial statement "obese people should pay for two seats on

the bus." The study found that this potentially controversial statement was more often regarded as such in the added-silence condition. The authors argue from this that the avoidance of silence maintains perceived consensus and social validation within a group (p. 514).

Conversely, a study by Trimboli & Walker (1984) found shorter pause durations to be more characteristic of arguments than friendly conversations. They explain the cause of this as relating to how interlocutors negotiate the conversational floor; in cooperative conversations, the turn to speak is traded, while in adversarial conversations, it is competed for (p. 304). Shorter silences were also shown to be associated with negative emotions and elevated stress levels in a study by Jaffe & Feldstein (1970) where participants were interviewed about topics intentionally designed to elicit embarrassment.

2.4 Hypotheses

From this research, the following three hypotheses were developed regarding how enabling silence skipping could affect listener perception of speakers: 1) The Intelligence Hypothesis: speakers will be regarded as more intelligent, 2) The Intelligibility Hypothesis: speakers and conversations will be deemed less intelligible, and 3) The Amiability Hypothesis: conversations will be regarded as more amiable.

3 Methodology

3.1 Experimental Research

To test these hypotheses, this study attempted to isolate the effect of silence skipping by conducting a matched-guise experiment[1]. Arunachalam (2013, p. 222) defines the goal of an experiment as investigating how one or more stimuli, *the independent variable*, affect some behavior or outcome, *the dependent variable*. In this test, the stimuli were auditory tokens of podcast clips with what Drager (2013, p. 63) calls a *variable of interest*, which was whether silence skipping was enabled. The affected outcome was the ratings participants would give of the speakers in regard to the three aforementioned attributes, which was measured by a response-sheet following the listening section. The test was a matched-guise experiment in the sense that the same speakers could enact both variables of interest, though as opposed to other experiments of this kind, it was here achieved through digital manipulation. Drager (2013, pp. 62-63) advocates for this methodology to best control for other speech characteristics that fall outside of the target variable.

The test was self-administered by participants online through Nettskjema.no and took approximately five minutes to complete. The test collected no personal information, which participants were made explicitly aware of. Due to this, no governing board of research ethics, like SISK, was consulted.

3.2 Pilot Study & Subject Pool

The experiment was first trialed in a pilot study of two people. The main feedback received was to make some wording clearer, which was subsequently done. Since these participants only submitted their answer after these changes had been made, the results of the pilot study were folded into the main respondent data. Further participants were thereafter solicited personally or recruited online through Reddit.com, via the /r/SurveyExchange subreddit, and the dedicated website Surveyswap.io. The only qualifier for subjects was to be sufficiently proficient in English to understand the clips. To ensure this, the test instructions were not provided in any other language.

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[1] See Appendix 8.3 for the full survey.

3.3 Listening Materials

The experiment itself consisted of two parts. In the first part, participants were asked to listen to a single clip from a podcast containing a dyadic conversation, then answer questions comparing the speakers against each other. The primary focus of this part was to study intelligence, which is an individual attribute. The second part followed the structure of the first, differing only in that it asked participants to listen to *two clips* from podcasts containing dyadic conversations, then answer questions comparing *the pairs* against each other. The primary focus of this part was to study amiability, which is a relational attribute. Intelligibility was considered equally relevant in both parts.

For the first part, the clip was taken from 1:01:58 to 1:03:08 in the 30/12/21 episode of *The Big Picture* (henceforth Clip 1); for the second part the clips were taken from 3:04 to 4:27 in the 29/03/23 episode of *The Bill Simmons Podcast* (henceforth Clip 2A), and from 0:22 to 2:04 in the 26/10/22 episode of *Two Psychologists Four Beers* (henceforth Clip 2B). Each of these episodes originally totaled around an hour, the limited length of the clips was decided upon solely for practical concerns regarding participant recruitment. An ideal length would have been about four minutes for each clip to provide ample time for the listener to familiarize themselves with the hosts.

The specific clips were selected to be as indistinct from one another as possible in order to best control for *confounds*, which Arunachalam (2013, pp. 223-224) describes as occurring when other factors vary along with the independent variable that are not of interest to the hypothesis but nevertheless have an impact on the dependent variable. All the selected clips were between a man and a woman, speaking General American accents, discussing topics of no real importance.

3.4 Experiment Test Conditions

To conduct the experiment, these clips were developed into three *across-subject test conditions.* For matched-guise experiments, Drager (2013, p. 64) defines an across-subject methodology as one where each participant only hears a voice in one of its guises. A condition is defined by Drager (2013, p. 62) as a distinct grouping of experimental tokens. These three conditions comprised one control condition where no silences were shortened, and two experimental conditions where they selectively were. For the experimental conditions, one speaker at a time had all their silences shortened in the first part, and one pair

at a time had their silences shortened in the second. For the first part, this included both pauses within their own speech and any gaps before replying to the other person. Which party in either part was manipulated was flipped between the experimental conditions. The purpose of including two experimental conditions with mirrored content was to measure if any effect size would hold true in both directions, Arunachalam (2013, p. 224) refers to this strategy as *counterbalancing*. From the three original clips, there were thus developed a total of seven auditory tokens, three for the first part, and four for the second. Tokens originating from the same clip will be referred to as variants.

A third experimental condition could have been created where the manipulated parties between parts were also flipped. Drager (2013, p. 62) recommends alternating token order between participants to control against sequencing effects. This was however not viable within the constraints of the study.

It should be noted that the experimental conditions in Part One do not reflect how the skip-silence feature works in real life, but it was viewed as the best option for contrasting individual speakers. Comparing two monologues would have been possible and more in line with actual use (many podcasts feature only a single speaker), but then the goal of studying *conversational* silence would have been lost.

3.5 Editing of the Clips

The editing of the clips was done in Adobe Audition. The actual spoken content of the clips was unaltered, except for a snippet of 29 seconds in Clip 2B, which was excised to allow for more turn changes. Before any silences were shortened, the decision was made to first slightly lengthen them. This was to afford participants more points of contrast between the clips, had it been feasible to have them listen for longer, this would not have been deemed necessary. Clip 1 was lengthened from 1:12 to 1:19, Clip 2A from 1:22 to 1:24, and Clip 2B from 1:14 to 1:22. The silence shortening itself was done automatically by a preset in the software called *Deleting Silence*. Silence was defined as any period where the volume level was consecutively lower than -50db for 125ms or more. These periods were then all reduced to exactly 125ms. For Clip 1, this amounted to 23 silences being removed from the Male shortened token, and 20 silences being removed from the Female shortened token, condensing the clips to 1:10 and 1:12, respectively. For clip 2A, 48 silences were removed, condensing the clip to 1:17. For Clip 2B, 49 silences were removed, condensing the clip to 1:10.

3.6 Test Condition Selection

The clips were presented to participants in the form of three different colored folders within a Google Drive container embedded into the survey itself. Each color corresponded to one test condition. They were asked to arbitrarily pick one folder and ignore the others until they had finished the survey. This self-selection ensured a *randomized assignment* of conditions, which Arunachalam (2013, p. 224) notes as imperative for avoiding group bias in the data. The participants were thereby made explicitly aware of the fact that multiple conditions of the same test existed, which could only have been avoided by administering the experiment in person or sending every person a unique link. However, in all other respects, the salient details of the experiment were obscured. All they knew going in was that they were participating in a listening study about podcasts. This might seem counterintuitive as silence skipping is an opt-in feature. However, revealing the manipulation being done would risk making participants too cognizant of the effect, which would not reflect its use in the real world. Additionally, asking participants to evaluate clips they knew for a fact had been manipulated would likely have been confusing.

3.7 Response-sheet Design

For both parts, three multiple-choice questions were posed after participants had listened to the clips, each of which corresponded to one of the hypotheses. An optional text box for providing additional commentary about the speakers was also appended at the end of each part. The questions themselves were direct and to the point, asking participants to rate the speakers and pairs against each other in terms of perceived intelligence, intelligibility, and amiability. There was some initial confusion in the pilot study regarding how to interpret these questions, so examples were added in parentheses for each of them. For instance, the first question of the test, asking which speaker in Part One appeared more intelligent, provided 'Who do you think would win more money on a gameshow like *Who wants to be a Millionaire*?' as an illustrative example.

Each question had four responses to choose from in a Linkert style sheet. All of them asked participants to select one speaker/pair and whether they simply leaned towards this choice or did so strongly. The possibility of neutral answers was deliberately eschewed in keeping with the finding of Schleef (2013, p. 46) that participants often use these to avoid making a decision at all.

Finally, at the end of the survey, two more optional text boxes were appended. The first invited participants to share any last thoughts they had about the survey overall, and the second gave them a chance to guess at what the focus of the study had been.

3.8 Requisites for confirming the Hypotheses

The hypotheses will be evaluated not by how much the ratings of the experimental conditions diverge from each other, but by how much each diverges from the baseline results established by the control condition. Confounds are to some degree inevitable when contrasting six different speakers, therefore this was determined to be the clearest way of isolating the impact of silence skipping. For the hypotheses to be considered at all substantiated, a minimum of 10% absolute or categorical divergence from the control condition in both predicted directions would have to be observed.

4 Survey Response

4.1 Respondents

The survey ultimately received 46 responses. 15 in the control condition, with 18 and 13 for the two experimental conditions, ensuring a mostly even distribution. 17 respondents expounded on their answers by leaving comments in the optional text boxes.

4.2 Demographics

Since the study collected no personal information, an exact demographic analysis of the respondents cannot be done. It can still be estimated from the timing of the answers that about half the participants were Norwegians, recruited through personal relation, and half were foreigners, recruited through the aforementioned channels. The ages of known Norwegian respondents spanned 19 to 60. The ages of foreign respondents are not known, but as most of them were performing their own surveys, it is likely they were of college age.

4.3 Validity and Reliability of Response Data

4.3.1 Experimental Obscuration

No single participant explicitly marked out the clips for sounding manipulated, which had been a concern. The closest was one comment mentioning the non-shortened clip in their test condition 'sounded more natural'[2]. Though, as they did not further elaborate, they could simply have meant the speakers sounded more down to earth. Neither did any participant recognize any of the podcasts themselves and wonder why the hosts spoke with a different cadence than usual.

Multiple participants did however point out the difference in pauses between speakers[3]. Though this was predominantly brought up alongside other speech characteristics that were not manipulated, like filler words, vocal tone, and speaking volume. Many participants also took note of the fact that every clip was between a man and a woman[4]; the most common speculation regarding the purpose of the study was gender prejudices. As will be seen, it does

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[2] Participant Nr. 26811694
[3] Participant Nr. 26807257, 26863395, 26813528
[4] Participant Nr. 26813528, 26806544, 26806189, 26834549, 26813335, 26807257

however not seem that participants therefore adjusted their answer to systematically favor female speakers.
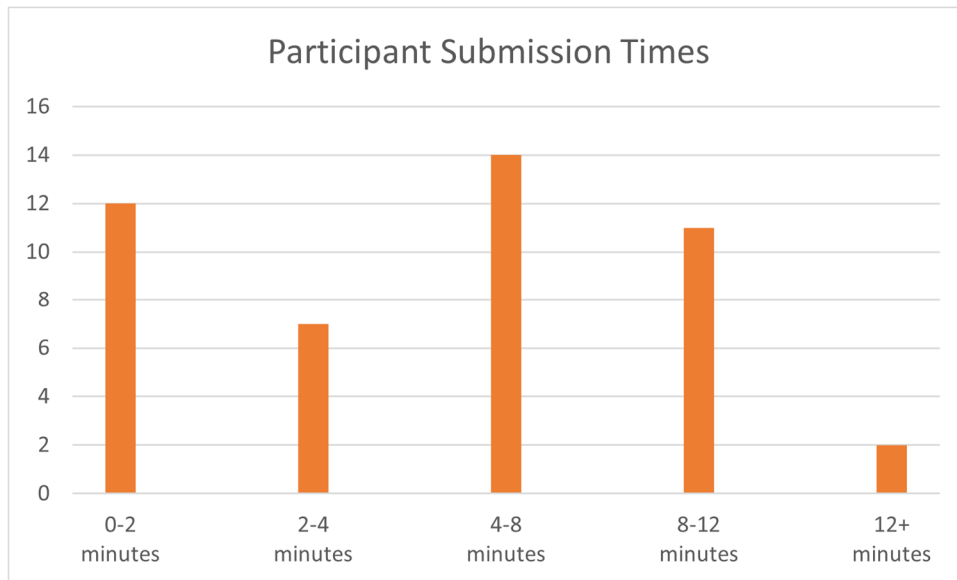
4.3.2 Submission Times

Figure 2: Chart of participant submission times

Submission times ranged from 22 seconds to 16 minutes. The total listening time for the three clips hovered around four minutes depending on the test condition; therefore, a question arose as to how to interpret submissions handed in earlier than this. In normal circumstances, it would be very clear that these participants did not properly follow the provided instructions. However, given that Nettskjema.no does not support embedded audio playback, subjects would always be redirected to the external Google Drive. This opens the possibility of participants closing the original window while listening and afterwards opening a new instance, which would reset the timer. This is especially likely on a smartphone. Even the shortest submission time of 22 seconds is then still plausible provided the participant had also read through every question the first time they opened the window.

There is also a question as to why someone would voluntarily spend their time filling out a survey in bad faith. The one possible answer to this would be survey trading, which was how a significant number of participants were recruited. Reddit.com would be an unlikely source for bad faith answers as it relies entirely on an honor system. However, Surveyswap.io users are rewarded actual points for filling out surveys, which they can then use to promote their own. If there were any participants who filled out the survey without listening to the clips, users from this website would seem the most likely culprit. It is known that nine answers

came from there, though it is not possible to isolate which ones or whether the shortest completion times did in fact predominantly originate from there.

Excluding every response with a submission time below two minutes was considered. This length would at the very least imply participants sampled the clips to inform their response. Additionally, even if it is assumed that every participant collaborated in good faith, the responses submitted before two minutes do at the very least unmistakably show a failure to follow the instruction about only listening to the clips in the second part after finishing the first. However, when the charts were redone with the culled size, it was found that no statistical patterns became meaningfully different. Therefore, the decision was made to include every submitted answer and maintain a larger sample size.

4.4 Charting the Response Data

The responses to each item were tallied in Microsoft Excel and will be presented in terms of percentages in stacked bar charts. Along with this, the decision was made to exclude two items from the main analysis. The response-sheet asked about all three attributes across both parts. Thus, there had been a question regarding perceived intelligence between pairs in Part Two, and a question regarding perceived amiability between speakers in Part One. While these two items had always been intended as supplemental, the insight provided by them proved to be limited[5].

The results will now be considered in turn. The analysis of each attribute will start with an examination of the raw data, followed by a summation of participant comments. Then it will be assessed how these findings relate to the earlier reviewed literature. Finally, an evaluation will be made on whether the relevant hypothesis can be supported or not.

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[5] The charts for these items can still be found in Appendix 8.5.

5 Analysis of Survey Response Data
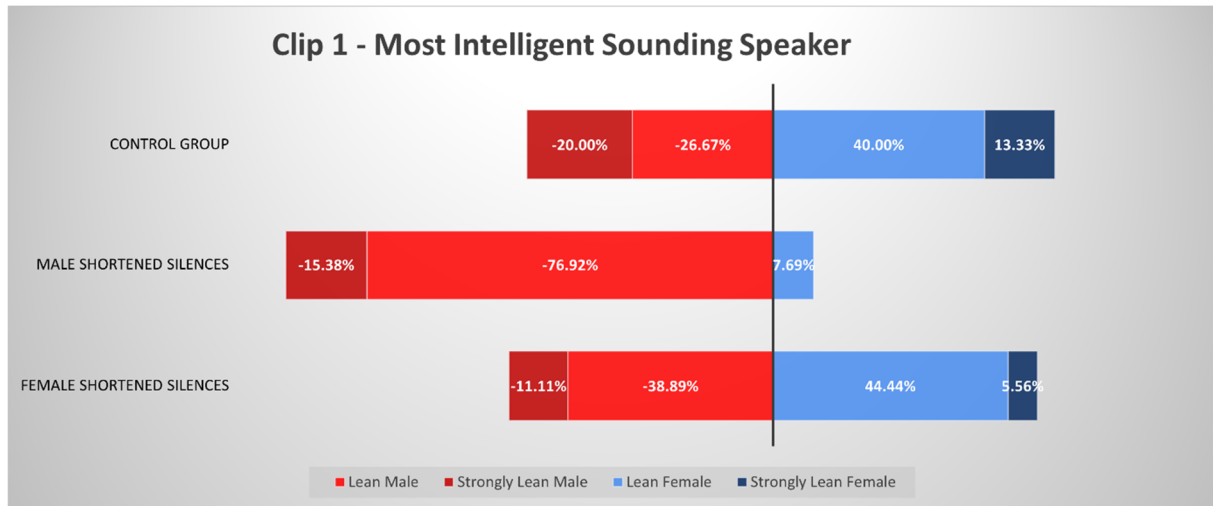
5.1 The Intelligence Hypothesis

Figure 3 Chart of Intelligence ratings for Clip 1

The results for this test were stable except for a strong divergence for the male speaker experimental variant, where the speaker transitions from being the less favored option in the control condition to taking 92% of the vote. Two participants from this condition, elaborating on why they leaned toward the male speaker, both cited the female speaker's number of pauses (along with filler words) as the determining factor in their choice. However, neither maintained a strong predilection; one commented that both came across as rather intelligent, but that the female speaker's cadence made her seem less confident in her words[6]. The other said the clip itself was too short to give a fully informed response, but that there was a lack of fluency on the part of the female speaker[7].

The results for the male speaker experimental condition can thus be seen to be strongly in keeping with Braley (2011) and Geenberg (2009), but this correlation is less clear for its inverse. For the female speaker experimental variant, favoring is overall marginally down, resulting in an exact 50/50 split, with the proportion of these strongly favoring the speaker also down. However, the percentage of participants strongly favoring the male speaker is nearly halved from the control condition, which implies some, albeit markedly less, influence in the hypothesized direction for this condition as well.

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[6] Participant Nr. 26807257
[7] Participant Nr. 26863395

There are unfortunately not any comments to help explicate why this discrepancy exists. Sexism could be a factor, women often have a harder time being considered intelligent (Storage, Charlesworth, & Banaji, 2020), though appraising this falls outside the scope of this study. What could be relevant, as will be seen in the next section, is that while the male speaker was perceived as more intelligible in their experimental condition, the female speaker was perceived as less. This suggests there could be a link between these judgements. Another possibility comes from Geenberg (2009) who had noted that the increase in perceived intelligence for speakers with shortened pauses was magnified when combined with a higher articulation rate. The male speaker was measured to have an articulation rate of approximately 6 syllables per. second, while the female speaker averaged out to 4, indicating there could be a link here as well. More research would have to be done to bear out whether these links are incidental or causative.

5.1.1 Hypothesis Review

If the results for the male speaker had been mirrored for the female speaker, it would have been easy to confirm the intelligence hypothesis. However, because of this large effect size for the male speaker, the hypothesis cannot be entirely dismissed either. The evidence suggests skip-silence increases perceived intelligence in some cases, as was explicitly confirmed by participant comments, but not in every case. Isolating what factors govern this would require more research.

5.2 The Intelligibility Hypothesis
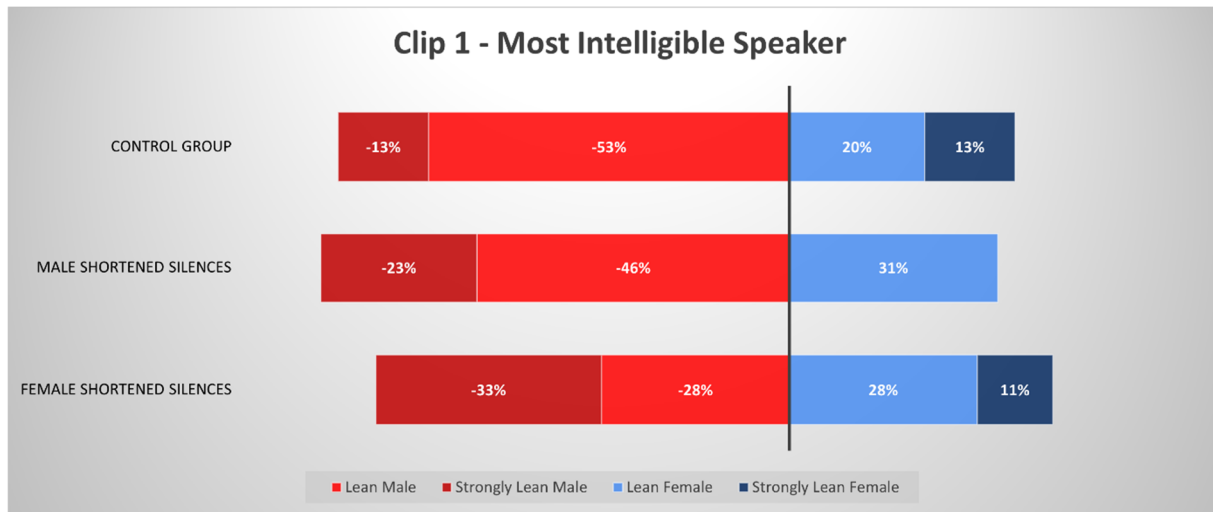
Figure 4 Chart of Intelligibility ratings for Clip 1
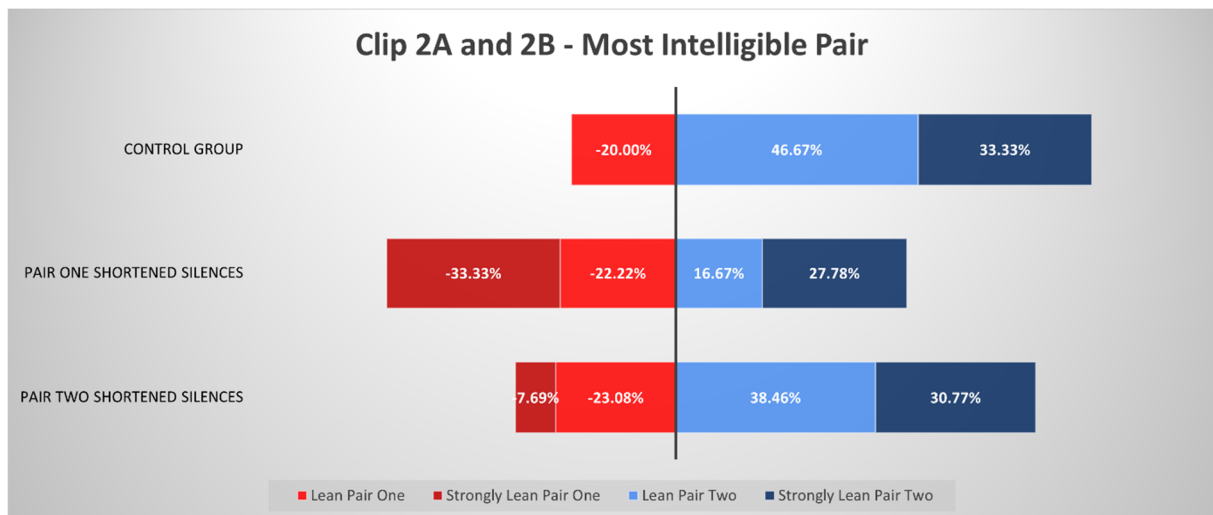
Figure 5 Chart of Intelligibility ratings for clip 2A & 2B

The scores for Clip 1 were relatively stable across all three conditions, with the value most in flux being how many participants strongly leaned towards the male speaker. There seems to be a clear, though marginal, increase to the male speaker's intelligibility with his silences shortened. While total preference is only up 3%, strong preference increased by 10%, and any strong preference for the female speaker is gone. Interpreting the results for the female speaker is harder, total preference is up 6%, but how many participants strongly prefer the male speaker is up 20%, which does seem to indicate an overall decrease to intelligibility.

This interpretation of the male speaker experimental condition was supported by multiple comments. In a personal correspondence, one participant detailed their reasoning in terms that strongly echoed Fors (2015). While they largely had a negative experience listening to either

speaker, they still found it easier to follow someone who spoke too fast, than someone who spoke too slow. Though it should be noted that the elongated pauses in either non-experimental variant were still far shorter than the long pauses in Fors (2015), which totaled four seconds. Others found the absence of pauses altogether positive. One participant noted that they, perhaps because of ADHD, generally experience speech with fewer pauses as easier to understand[8]. This evokes the finding in Fors (2015) of there being ever so slightly less cognitive strain involved in processing speech without silence. As with the previous attribute, there is however a lack of comments to fully explicate why this pattern differed for the female speaker.

The results of the second part were similar to the first in that there was an increased lean towards one party in both experimental conditions here as well. Though the extent of that lean was here more pronounced for that party's experimental variant, with a stronger effect size than was seen in the first part as well. The first pair went from 20% preferred to 55% with their silences removed, of which 33% expressed a strong preference. The increase was more marginal in the second pair's experimental variant but still went up 10%. These numbers could indicate that the first pair became more clear with their silences removed, rather than the second pair becoming less clear without theirs. There is here again a lack of explicatory comments.

5.2.1 Hypothesis Review

In total, only half the experimental variants were considered less intelligible without pauses. This makes it hard to proclaim Fors (2015)'s findings strongly align with the data. The hypothesis that silence skipping always reduces intelligibility can therefore not be confirmed. More research would have to be done to elucidate why these estimations differ between speakers.

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[8] Participant Nr. 26807257

5.3 The Amiability Hypothesis
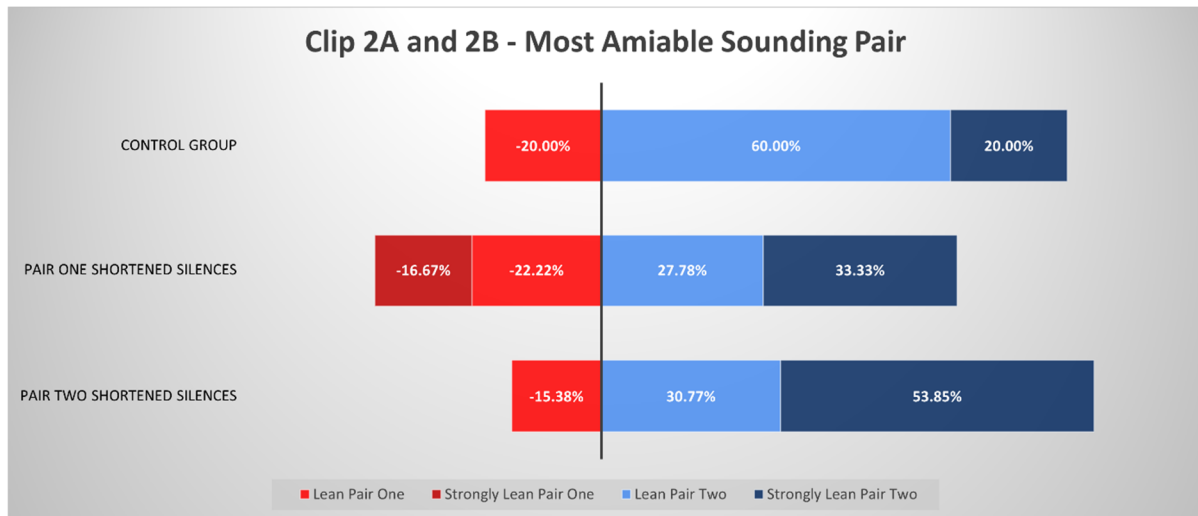
Figure 6 Chart of Amiability ratings of Clip 2A & 2B

For this attribute, although there was an overall preference for Clip 2B in every condition, the manipulation of silences nudged both results in the hypothesized direction. Selection of the first pair increased by 19% for its experimental variant, with 17% of the total now being a strong predilection. Pair Two held very stable in each condition, with overall favoring increasing marginally by 5% for its experimental variant, however strong predilections rose considerably by 34%.

Participant comments reflected the dichotomy that was seen in the theoretical chapter regarding how conversational silences can be interpreted. In the experimental condition for the first pair, one said they selected Pair One due to them sounding more excited and enthusiastic together[9], bringing to mind Koudenburg et al. (2010). While another said they chose Pair Two due to them seeming more relaxed together[10], recalling Trimboli & Walker (1984) who asserted that shorter silences are more characteristic of arguments.

Another participant also rated the second pair as more amiable due to them sounding calmer together[11], which was in this case especially notable because they were in the experimental condition for this pair. This could be interpreted as either echoing the research of Braley (2011), where participants instructed to talk faster were also rated as the most physically and

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[9] Participant Nr. 26813344
[10] Participant Nr. 26811694
[11] Participant Nr. 26863395

emotionally relaxed, or as indicating that silence length does not necessarily supersede the influence of other paralinguistic features.

One commenter in the experimental condition for Pair Two, who strongly favored this pair, explicitly singled out the disproportionate amount of pauses as informing their choice[12]. They specifically drew attention to one pause near the end of clip 2A as being particularly indicative of a fraught relationship. Presumably, they are referring to the one at exactly 1:00, which only lasts one and a half seconds, but follows a clear invocation for the other party to reply. This seems to be a clear example of what McLaughlin & Cody (1982) coded as an 'awkward silence', though it also recalls Roberts et al. (2006)'s assertion that silence can shade the meaning of otherwise inconspicuous talk and signal trouble. This is especially salient because, as was just mentioned, another commenter described this very same conversation as 'excited and enthusiastic' when these pauses were not present.

This same participant also highlighted the fact that one speaker in the second pair at one point used a swear word without a subsequent disruption to the conversational flow, which they argued strongly spoke in favor of the pair being good friends. This specifically recalls the experiment in Koudenburg et al. (2010) where a controversial statement was only interpreted as such if it was followed by a silence.

5.3.1 Hypothesis Review

Altogether the results of this response-sheet aligned more strongly with its relevant hypothesis than any other. While the intention to present participants with two equivalent clips was largely unsuccessful, as was seen by Clip 2B attaining a majority vote in every condition, there was still proportionate deviation from the control condition in both predicted directions. This was also the attribute whose relation to silence was the most irresolute in the reviewed literature, and this dichotomy was reflected by participants as well. However, as in the literature, the majority ultimately considered less silence as a strong indicator for amiability.

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[12] Participant Nr. 26807257

6 Conclusion

6.1 Limitations of the Study

Limitations surrounding this study makes it difficult to claim any of the findings as conclusive. Firstly, the sample size was small. Schleef (2013, p. 52) cites 30 as the minimum number of respondents for a questionnaire to be considered statistically significant, and while the total number of participants was above this, the fact that they were split across three conditions puts the value below 30 for each. While the analysis was done in terms of percentages, it is worth bearing in mind how few votes separate these numbers. For instance, the near halving from the control condition of participants strongly leaning towards the male speaker as the most intelligent sounding in the female shortened silence condition is in real numbers the difference between three votes and two.

Administering the survey online also obscures the degree to which every participant followed the provided instructions and collaborated in good faith. As was explicitly brought up by commenters, the short listening time for each clip also hindered participants from making fully informed choices about the speakers.

Limited feedback also made it difficult at times to understand the reasoning behind predilections, especially when these deviated from the hypotheses. Requiring participants to submit a written explanation for every choice would still have been too time-consuming, though one solution could have been to also provide participants an option to select which line of reasoning from a list most aligned with their own.

6.2 Contributions of the Study & Concluding Remarks

Through conducting a matched-guise listening experiment, this thesis has investigated three research questions, which were the effect skip-silence would have on judgements of 1) Intelligence, 2) Intelligibility, and 3) Amiability.

The findings for the first two questions were inconclusive. While many conditions fell in line with the hypotheses and had commenters directly echoing CA research, the overall results were not consistent. This indicates silence duration is a pertinent factor for appraising these attributes though it will not always supersede other influences. The clearest result was for the third question, which had an appreciable effect size in both experimental conditions, suggesting a strong link between enabling skip-silence and perceiving the relationship

between podcast hosts as more amiable. While this finding cannot be considered authoritative, this thesis has demonstrated amiability to likely be a fruitful avenue for further research on the affective properties of skip-silence.

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8 Appendix

8.1 Link to the Google Drive containing the clips

https://drive.google.com/drive/folders/1yDy6Q5V398s5K24PT_3jZRtzqhANDldb?usp=share _link

Red = Control Condition

Blue = Experimental Condition 1 (Shortened Silence for Female Speaker & Clip 2A)

Green = Experimental Condition 2 (Shortened Silence for Male Speaker & Clip 2B)

8.2 Links to the full-length episodes from which the clips originate

Clip 1

"Year-End Mailbag! The Top 10 Performances, Trailers, and Needle Drops of 2021" Published December 30th, 2021, by *The Big Picture.*

URL: https://traffic.megaphone.fm/GLT6650749454.mp3?updated=1656706325

Clip 2A

"The Lamar Sweepstakes With Mallory Rubin. Plus, Half-Baked Ideas With Kevin Wildes." Published March 29th, 2023, by *The Bill Simmons Podcast*.

URL: https://pdst.fm/e/traffic.megaphone.fm/GLT9330100226.mp3?updated=1680049254

Clip 2B

'Episode 96: So, what do you do?' Published October 26th, 2022, by *Two Psychologists Four Beers*.

URL: https://chtbl.com/track/5195D/aphid.fireside.fm/d/1437767933/69da8ae3-a19e-41ed-a678-0e145a936a3f/f9c7350e-bd07-4cb1-977f-1e5af49d4c43.mp3

8.3 Full Copy of the Survey:

Podcast Listening Study

Mandatory fields are marked with a star *

A Podcast listening study

Introduction

Hi, thank you for participating in this study. My name is Thomas André Hebnes, the topic of my research is podcasts, as such this is a listening test where you will be asked to listen to three clips from real podcasts and share the impressions you get of the speakers. Each clip is slightly over a minute long, and the whole test should at most take five minutes to complete.

The study will be divided into two parts. In the first part, *Test One*, you will be asked to compare two speakers within a single clip. In the second part, *Test Two*, you will be asked to compare two pairs of speakers from two different clips.

You should listen to the clip in Test One and answer all the questions about it first, then listen to the clips in Test Two and answer the questions about them.

- You may listen to the clips as many times as you like, though you should not need to listen more than once.

There are three questions for each part, with an **optional** open text-box for adding any additional thoughts you may have at the end of each section.

Some of the questions might seem hard to answer as you have only listened to the speakers for a very limited time, but there are no wrong answers and just pick whatever option seems the most correct to you.

If you have any questions at all about the study, don't hesitate to contact me at Hebnes.thomas@gmail.com.

(Your responses will be treated with absolute confidentiality and will not be passed on to third parties. You will remain fully anonymous and information identifying your answers will not be disclosed under any circumstances.)

Podcast clips and picking a variant

You can find the links to the podcast clips here:

https://drive.google.com/drive/folders/1yDy6Q5V398s5K24PT_3jZRtzqhANDldb?usp=share_link

Here you will find three variants of the same test. Each variant corresponds to a folder with the name of a color. For the test, you need to select one of the three colors. Each folder contains three clips, one in *Test One*, and two in *Test Two*. Simply select your test variant by randomly picking one out of the three folders you are presented with, it does not matter which one you pick.

- One test variant can be done per person. Please **do not** listen to the clips found in the other color folders than the one you picked before you have finished this survey.

In order to listen either click the file within Google Drive, right click and select 'preview', or right click and select 'download' to get the mp3 file, which you may open in any media player.

I chose test variant... *

Please select the color of the folder you chose.

- ○ Blue
- ○ Red
- ○ Green

Figure 7 Full copy of survey Part 1/4

Test One

Please listen to the clip in Test One which contains two podcasters discussing where they prefer to sit in a movie theatre.

You may listen as many times as you like, though you should not need to listen more than once.

If I had to choose which of the two I think sounded like the more intelligent speaker, I would... *

(For instance, which one of them do you think would win more money on a quiz show like 'Who wants to be a Millionaire?', or which one of them would you pick to help you with your homework?)

○ ...Strongly lean towards Male speaker

○ ...Lean towards Male speaker

○ ...Lean towards Female speaker

○ ...Strongly lean towards Female speaker

If I had to choose which of the speakers was the most understandable to listen to, I would... *

(For example; whose dialogue did you feel was the easiest to follow? Who would you rather listen to host a lecture?)

○ ...Strongly lean towards Male speaker

○ ...Lean towards Male speaker

○ ...Lean towards Female speaker

○ ...Strongly lean towards Female speaker

If I had to describe the relationship between the speakers, I would say they sounded like they were... *

(For instance, how long do you think they have known each other? Do you think they meet up outside of hosting a podcast together?)

○ ...Very good friends.

○ ...Good friends.

○ ...Somewhat friends.

○ ...Not friends with one another at all.

If you have any other thoughts you wish to share about the first clip, please add them below.

Figure 8 Full copy of survey Part 2/4

Test Two

Please listen to **both clips** in Test Two.

Clip One contains two podcasters discussing the news of a player, Lamar Jackson, wanting to leave his team in the NFL.

Clip Two contains two podcasters discussing the news that one of them has finished remodeling their kitchen.

You may listen as many times as you like, though you should not need to listen more than once.

If I had to choose which of the pairs I think together sounded like the more intelligent speakers, I would... *

(For instance, if the groups competed against each other in a round of Pub Trivia, which pair do you think would win?)

- ○ ...Strongly lean towards the pair in Clip 1
- ○ ...Lean towards the pair in Clip 1
- ○ ...Lean towards the pair in Clip 2
- ○ ...Strongly lean towards the pair in Clip 2

If I had to choose which of the pairs were the most understandable to listen to, I would... *

(Which conversation was the easiest to follow? Which pair would you rather listen to discussing other topics?)

- ○ ...Strongly lean towards the pair in Clip 1
- ○ ...Lean towards the pair in Clip 1
- ○ ...Lean towards the pair in Clip 2
- ○ ...Strongly lean towards the pair in Clip 2

If I had to choose which of the pairs I think sounded like they were better friends, I would... *

(For instance, which pair do you think has known each other longer? Who do you think is most likely to meet in private outside of hosting a podcast together?)

- ○ ...Strongly lean towards the pair in Clip 1
- ○ ...Lean towards the pair in Clip 1
- ○ ...Lean towards the pair in Clip 2
- ○ ...Strongly lean towards the pair in Clip 2

If you have any other thoughts you wish to share about the last two clips, please add them below.

Figure 9 Full copy of survey Part 3/4

Additional comments

Do you have any other comments?

The main test is done, thank you for participating. If you have any other comments about the speakers or the test itself, you are free to add them below:

What do you think this study was about?

If you have a theory about what this study was about, please write it below.

Figure 10 Full copy of survey Part 4/4

8.4 Full Copy of Every Survey Response

8.4.1 Control Condition

NR	Color1	Smart1	Understand1	Amicable1	Thoughts1	Smart2	Understand2	Amicable2	Thoughts2	ExtraThoughts1	ExtraThoughts2	Elapsed time
26809037	2Red	2LeanMale	2LeanMale	3SomewhatFriends		2LeanPair1	2LeanPair1	3LeanPair1				31 seconds
26376802	2Red	3LeanFemale	3LeanFemale	2GoodFriends		2LeanPair1	2LeanPair1	3LeanPair1				2 minutes 18 seconds
26806705	2Red	4StronglyLeanFemale	4StronglyLeanFemale	2GoodFriends		3LeanPair2	2LeanPair2	2LeanPair1				40 seconds
26806683	2Red	3LeanFemale	3LeanFemale	3SomewhatFriends		2LeanPair1	3LeanPair1	3LeanPair2				35 seconds
26806965	2Red	2LeanMale	1StronglyLeanMale	3SomewhatFriends		3LeanPair2	2LeanPair1	2LeanPair2				7 minutes 22 seconds
26810582	2Red	2LeanMale	2LeanMale	3SomewhatFriends		3LeanPair2	3LeanPair2	3LeanPair2				43 seconds
26801689	2Red	2LeanMale	2LeanMale	2GoodFriends		4StronglyLeanPair2	3LeanPair2	3LeanPair2				11 minutes 9 seconds
26805595	2Red	1StronglyLeanMale	2LeanMale	2GoodFriends		4StronglyLeanPair2	3LeanPair2	3LeanPair2		sometimes the volume the podcasters speak at might make it seem like they aren't smarter or that they are better friends	no idea tbh	7 minutes 29 seconds
26857388	2Red	3LeanFemale	1StronglyLeanMale	3SomewhatFriends		2LeanPair1	4StronglyLeanPair2	3LeanPair2				22 seconds
26813444	2Red	4StronglyLeanFemale	4StronglyLeanFemale	2GoodFriends		3LeanPair2	4StronglyLeanPair2	3LeanPair2		The flow between two individuals,	how one plays off of the other for a easier listen	2 minutes 27 seconds
26806946	2Red	1StronglyLeanMale	2LeanMale	3SomewhatFriends		3LeanPair2	4StronglyLeanPair2	3LeanPair2		I think the volume of the speakers might affect how people view them (smart-good friends) because for me loud speakers might not seem confident what they are speaking so they shout and talking in whispers also sometimes might make people bored or people who have English as their second language frustrated so both have points to work on	how people perceive different speakers and how to improve as a speaker based on feedback	3 minutes 9 seconds
26806604	2Red	1StronglyLeanMale	2LeanMale	2GoodFriends		4StronglyLeanPair2	4StronglyLeanPair2	3LeanPair2				33 seconds
26816460	2Red	3LeanFemale	3LeanFemale	3SomewhatFriends		2LeanPair1	3LeanPair2	4StronglyLeanPair2		I liked the way the second pair from test 2 sounded. Tones of voice and friendliness towards each other.	How the voices and personalities are perceived.	10 minutes 59 seconds
26813335	2Red	3LeanFemale	2LeanMale	2GoodFriends		3LeanPair2	3LeanPair2	4StronglyLeanPair2				7 minutes 4 seconds
26815582	2Red	3LeanFemale	2LeanMale	2GoodFriends		4StronglyLeanPair2	4StronglyLeanPair2	4StronglyLeanPair2			Male-female podcasts and ability to engage both sexes to content that is neutral, male leaning and female leaning?	13 minutes 4 seconds

Figure 11 Copy of every participant response in the control condition

8.4.2 Experimental Condition 1

NR	Color	Smart1	Understand1	Amicable1	Thoughts1	Smart2	Understand2	Amicable2	Thoughts2	ExtraThoughts1	ExtraThoughts2	Elapsed time
28806256	1Blue	2LeanMale	2LeanMale	2GoodFriends		2LeanPair1	2LeanPair1	2LeanPair1				1 minute 5 seconds
28813528	1Blue	2LeanMale	4StronglyLeanFemale	3SomewhatFriends		3LeanPair2	2LeanPair1	2LeanPair1			People's perception of male and female voices, whether or not male or females sound more intelligent, sound more friendly	10 minutes
28813343	1Blue	2LeanMale	1StronglyLeanMale	1VeryGoodFriends	I thought maybe it was a couple because they clearly know something about each others' moviegoing habits.	3LeanPair2	4StronglyLeanPair2	4StronglyLeanPair2			maybe about the type of language used, the pauses between sentences and the vocal tones (rises and falls in tone) that suggest friendliness / closeness / awkwardness	10 minutes 13 seconds
28806544	1Blue	2LeanMale	1StronglyLeanMale	1VeryGoodFriends		3LeanPair2	4StronglyLeanPair2	4StronglyLeanPair2			Got the feeling the study might be about prejudice between males and females about intelligence for part 1. While in part 2 its about people who enjoy sports is seen as less intelligent.	10 minutes 54 seconds
28813344	1Blue	2LeanMale	3LeanFemale	2GoodFriends	The people in clip seemed like they could express themselves to one another.	1StronglyLeanPair1	1StronglyLeanPair1	1StronglyLeanPair1	The people in the first clip sounded more excited and enthusiastic.		Who you are going to chose as your speakers for a podcast.	2 minutes 13 seconds
28806638	1Blue	3LeanFemale	3LeanFemale	3SomewhatFriends		2LeanPair1	3LeanPair2	3LeanPair2		Nice test. Very interesting. I never completely a test I like this one.	connecting with a podcast to grab the listeners attention	2 minutes 27 seconds
26787355	1Blue	3LeanFemale	3LeanFemale	3SomewhatFriends		3LeanPair2	3LeanPair2	3LeanPair2			What factors makes someone sound intelligent or trustworthy?	2 minutes 7 seconds
28822715	1Blue	4StronglyLeanFemale	4StronglyLeanFemale	3SomewhatFriends		4StronglyLeanPair2	4StronglyLeanPair2	2LeanPair1				26 seconds
28806555	1Blue	3LeanFemale	1StronglyLeanMale	1VeryGoodFriends		3LeanPair2	3LeanPair2	4StronglyLeanPair2				33 seconds
28811128	1Blue	2LeanMale	3LeanFemale	3SomewhatFriends		2LeanPair1	1StronglyLeanPair1	3LeanPair2				4 minutes 21 seconds
28813410	1Blue	2LeanMale	1StronglyLeanMale	3SomewhatFriends		3LeanPair2	3LeanPair2	2LeanPair1			What are the stereotypes behind Podcaster voices and how they affect the listeners.	4 minutes 30 seconds
28813353	1Blue	3LeanFemale	2LeanMale	2GoodFriends		1StronglyLeanPair1	1StronglyLeanPair1	1StronglyLeanPair1				5 minutes 44 seconds
26789745	1Blue	1StronglyLeanMale	1StronglyLeanMale	4NotFriends		3LeanPair2	4StronglyLeanPair2	4StronglyLeanPair2				6 minutes 37 seconds
28806189	1Blue	3LeanFemale	3LeanFemale	2GoodFriends	no toughts	3LeanPair2	2LeanPair1	3LeanPair2	no comments		female and male presence	56 seconds
28811694	1Blue	3LeanFemale	1StronglyLeanMale	3SomewhatFriends		4StronglyLeanPair2	4StronglyLeanPair2	4StronglyLeanPair2	Second clip just sounded a lot more natural.		Maybe something like vocal tone and retention of listeners	6 minutes 4 seconds
28803912	1Blue	1StronglyLeanMale	3StronglyLeanMale	3SomewhatFriends		3LeanPair2	4StronglyLeanPair2	3LeanPair2				7 minutes 31 seconds
28813398	1Blue	3LeanFemale	3LeanFemale	1VeryGoodFriends		4StronglyLeanPair2	2LeanPair1	4StronglyLeanPair2			I assume this is a survey about observing and analyzing what works best for podcasts.	8 minutes 2 seconds
26834549	1Blue	2LeanMale	2LeanMale	2GoodFriends		3LeanPair2	1StronglyLeanPair1	1StronglyLeanPair1			I think this is about the reception of male vs. female podcasters, and/or how podcasters can convey their intelligence and conversation skill through different topics	8 minutes 43 seconds

Figure 12 Copy of every participant response in the first experimental condition

8.4.3 Experimental Condition 2

NR	Color1	Smart1	Understand1	Amicable1	Thoughts1	Smart2	Understand2	Amicable2	Thoughts2	ExtraThoughts1	ExtraThoughts2	Elapsed time
26802050	3Green	2LeanMale	3LeanFemale	2GoodFriends		1StronglyLeanPair1	2LeanPair1	2LeanPair1				8 minutes 37 seconds
26793100	3Green	1StronglyLeanMale	1StronglyLeanMale	1VeryGoodFriends		2LeanPair1	2LeanPair1	3LeanPair2				1 minute 59 seconds
26875510	3Green	1StronglyLeanMale	2LeanMale	2GoodFriends		2LeanPair1	2LeanPair1	3LeanPair2				2 minutes 16 seconds
26818592	3Green	2LeanMale	1StronglyLeanMale	2GoodFriends	The male talked clearer with less filler words.	2LeanPair1	3LeanPair2	3LeanPair2		This seems very interesting! Can't wait to see the results.		10 minutes 26 seconds
26807257	3Green	2LeanMale	2LeanMale	3SomewhatFriends	It's likely that they're both fairly intelligent, but the female speaker is less confident than the male one, leading her to insert more filler words and pauses. As a person with A/DHD, it's usually easier for me to listen to someone who has fewer pauses and speaks more quickly, even though that isn't a direct sign of intelligence. Also, the male speaker was given more time to consider his answer whereas she had to think on the spot. This should definitely be accounted for if we're comparing their intelligence and ability to speak on their feet in a performance scenario.	2LeanPair1	3LeanPair2	3LeanPair2	The pair in Clip 1 were definitely colleagues, and by the pause before the male speaker started talking near the end, it's pretty clear that they aren't friends outside of the recording booth (or that there's a strain in their relationship). In comparison, the pair in Clip 2 had a better rapport and felt comfortable with one another, even though they hadn't seen each other in some time (this is solidified by the fact that they knew personal facts about one another). They even felt comfortable enough to swear openly.		Hmmm... my theory is that this test has to do with the male and female speakers' relationships, particularly comparing rapport, expectations, and tonality; I could be wrong, though!	9 minutes 54 seconds
26863395	3Green	2LeanMale	1StronglyLeanMale	2GoodFriends	It seems a little odd to try to judge speakers' "intelligence" based on such a short excerpt. I think the pauses, false starts, all those "ah", "um" in female speaker's part made slightly put me off (if that's the word to use) and made me choose male speaker as "more intelligent" since his speech was more fluent.	3LeanPair2	4StronglyLeanPair2	3LeanPair2	At first I thought that I liked Clip2 better. Just because it sounded more calm. But then I decided to come back and re-listen to Clip1. I must say, if not that overly-enthusiastic voice of the woman in Clip1, I would have chosen Clip 1 (after comparing two clips I thought that maybe Clip2 was too calm. And yet, I chose Clip2 as more appealing because it wasn't really pleasant to hear woman in Clip1).		What impression/influence can people's voices have (on audience/people in general). How much does the voice matter (in determining our relationships, connections, likeability).	16 minutes 48 seconds
26844440	3Green	2LeanMale	2LeanMale	2GoodFriends	I think they have good rapport and are good communicators.	1StronglyLeanPair1	1StronglyLeanPair1	4StronglyLeanPair2	I liked them all. All were easy to understand and seemed friendly with each other and inviting.		Effective communication and different speaking styles to engage audiences and establish confidence.	7 minutes 34 seconds
26806626	3Green	3LeanFemale	3LeanFemale	2GoodFriends		2LeanPair1	2LeanPair1	4StronglyLeanPair2			Podcast/listening study	7 minutes 8 seconds
26827256	3Green	2LeanMale	2LeanMale	2GoodFriends		2LeanPair1	3LeanPair2	4StronglyLeanPair2				5 minutes 57 seconds
26788759	3Green	2LeanMale	3LeanFemale	2GoodFriends		3LeanPair2	3LeanPair2	3LeanPair2				8 minutes 26 seconds
26807022	3Green	2LeanMale	2LeanMale	2GoodFriends		4StronglyLeanPair2	4StronglyLeanPair2	4StronglyLeanPair2				5 minutes 26 seconds
26785528	3Green	2LeanMale	2LeanMale	3SomewhatFriends		4StronglyLeanPair2	4StronglyLeanPair2	4StronglyLeanPair2				55 seconds
26807011	3Green	2LeanMale	3LeanFemale	2GoodFriends		4StronglyLeanPair2	4StronglyLeanPair2	4StronglyLeanPair2				7 minutes 57 seconds

Figure 13 Copy of every participant response in the second experimental condition

8.5 Charts for Excluded Response-sheet Items

8.5.1 Clip 1 - Perceived level of Amiability between the Speakers
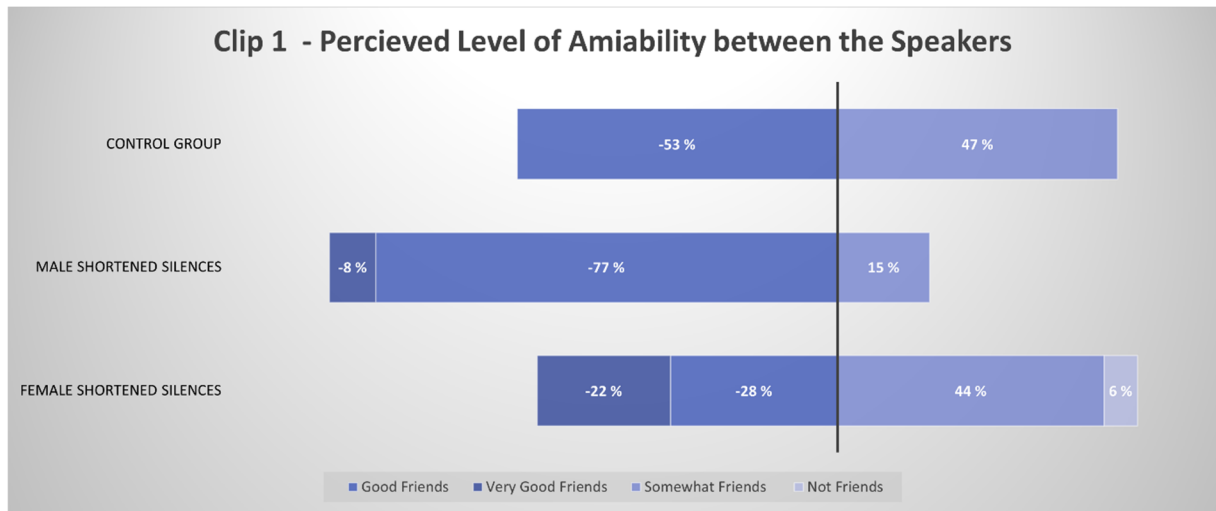

Figure 14 Chart of amiability ratings for Clip 1
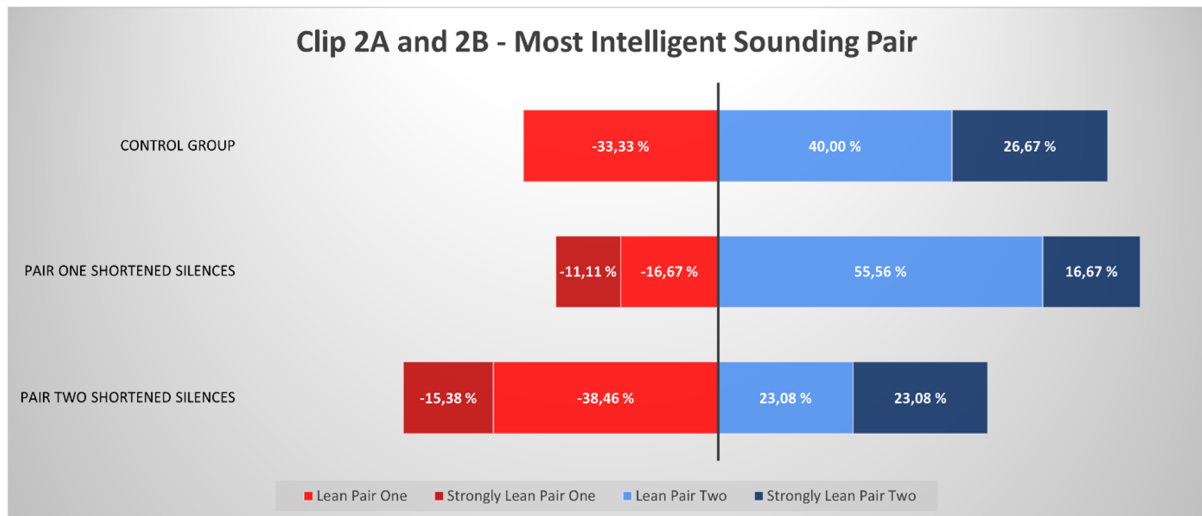
8.5.2 Clip 2A & 2B - Most Intelligent Sounding Pair

Figure 15 Chart of Intelligence ratings of Clip 2A & 2B