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Networking through regional accents: The influence of individual differences in social network properties on regional accent processing

BY

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ABSTRACT

This thesis investigates the influence of social network size and social network "racial" diversity on regional accent processing. 122 participants listened to recorded English speech produced by 24 native English speakers. These 24 native speakers consisted of six different English speech varieties, specifically, Australia, Canada, Jamaica, Scotland, South Africa, and the United States of America. I asked participants to rate the recordings for accent strength and intelligibility on 10-point scales. Participant found the speakers to be highly intelligible, while accentedness rating ranged from mid to high. Analysing the data with ordinal Generalized Additive Mixed Models demonstrated that the Canadian accent was rated as less accented and more intelligible than the other five English speech varieties. Additionally, smaller social network sizes predicted that participants found the American accent more intelligible than other non-Canadian accents. Notably, the findings of this study do not support the hypothesis that the "racial" diversity of participants' social network modulate accent perception. The former results support previous findings that variations in social experiences influence how people process language (Lev-Ari, 2019). Further research is required to better understand the role that differences in social network "racial" and linguistic composition modulate accent perceptions (Kutlu et al., 2022).

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Chapter 1. Introduction and Background

A person's social network is a fundamental cornerstone of their daily experience, from informing their interests to shaping their views on topical discussions. The way we navigate our day is supported by the social connections with whom we regularly interact. However, it is unclear which characteristics of our social network influence our language processing and perception of regional accented speech, and the extent to which certain characteristics influence accent perception. This thesis investigates the degree to which social network size and "racial" diversity influence regional accent perception, if at all.

1.1 Language Processing and Accent Perception

During language processing, listeners are constantly predicting the speaker's next words (Porretta et al., 2020). This automatic process is essential to efficient communication, which is often a top priority within spaces like the workplace or classroom. Accent perception is also an automatic process, whereby listeners can quickly identify and categorise speakers based on their age, sex, "race", national identity, and perceived sexual orientation through their speech (Babel & Russell, 2015; Kutlu et al., 2022; McCombes, 2022; Munson & Babel, 2007).

Researchers have found that listeners' predictive processing rate and accuracy decreases when listening to foreign-accented English or an unfamiliar regional dialect of English (Arnhold et al., 2020; Floccia et al., 2006; Munro & Derwing, 1995b; Porretta et al., 2020). These findings help contextualise persistent concerns about linguistic diversity within educational settings, specifically, perceptions of professors' intelligibility, professionalism, and competency based on the degree to which the professor's accent aligns or deviates from the standard variety of English in their locale (Baratta, 2017; Donnelly et al., 2019). These perceptions impact student course enrolment and engagement, the quality of student feedback on teaching, and professor employment satisfaction (Gill, 1994; Khan & Gupta, 2020).

Previous research on accent perception predominantly focuses on foreign accent judgement (Derwing & Munro, 1997; Kutlu et al., 2022; Munro & Derwing, 1994, 1995a, 1995b; Porretta et al., 2016, 2020; Yi et al., 2013). From this research, linguists have established three related but distinct dimensions of accent perception, namely, accentedness intelligibility, and comprehensibility (Derwing & Munro, 1997; Munro & Derwing, 1995b, 2011).

Accent strength (i.e., accentedness) perception is often subjective and listeners can perceive an accent to be stronger based on their expectations for the regional dialect or the speaker's nationality (Babel, 2022; Birney et al., 2020; Grondelaers et al., 2015). It is well established that as listeners simultaneously process speech input and visual cues, the latter can modulate their accent perception (Kutlu et al., 2022; Yi et al., 2013). Notably, native and nonnative speech input is often rated as less accented and intelligible when paired with White faces; whereas the inverse is true, in that these same audio cues are rated as more accented and less intelligible when paired with Asian faces (Babel, 2022; Kutlu et al., 2022; Yi et al., 2013). These findings are evidence of the critical role individuals' stereotypes around "race" and ethnicity play in their language processing. One way these stereotypes are passed and maintained is through conversations with those in our social network. In this way, listeners' social networks could act as a tool to enforce their socio-linguistic expectations of a speaker.

Lev-Ari (2016, 2018, 2019) has previously demonstrated that individual's social network size is a modulating factor of predictive processing and semantic skills. However, there is a gap in the research on whether social network size affects accent perception. Given that social connections are an avenue through which stereotypes are circulated, there is grounds to question whether diverse social networks would expose listeners to different opinions and lived realities which could debunk certain "race"-based stereotypes they may

have. In so doing, the diversity of their social network could influence how the process language.

Further, diverse social networks with high contact frequencies and duration could be indicative of increased exposure to a variety of regional and nonnative accents. Research points towards a listener's familiarity with an accent that differs from their own resulting in a reduced impact said accent has on their language processing (Floccia et al., 2009; Munro & Derwing, 1994; Porretta et al., 2016). However, there is minimal research on the role that verify if this exposure can be attributed to heterogenous social networks.

1.2 Present study

This thesis aims to further investigate the role of social network properties in accent perception, specifically on regional accent perceptions – a growing area of research in the field. This study asks participants to rate audio recordings of native English speakers of different speech varieties for accent strength and intelligibility. Afterwards, participants will complete a self-report exit questionnaire which will be used in post-tests during data analysis.

I hypothesise that social network size and diversity will significantly influence participants' accent ratings, given the findings of previous research (Lev-Ari, 2018). Notably, I hypothesise that larger and more heterogenous social networks would increase intelligibility ratings while reducing the perception of accent strength.

Chapter 2. Method

2.1 Ethics

The University of Alberta Research Ethics Board 2 reviewed the planning and operation of this research project to ensure adherence to ethical guidelines (reference number Pro00125177).

2.2 Participants

This study recruited 135 participants from the University of Alberta Linguistics students pool, i.e., SONA (https://ualbertaling.sona-systems.com), and the third-party crowd-sourcing platform, Prolific.co. Participants from SONA were compensated for their participation with 1% of their total course credit; whereas participants recruited through Prolific received £4,25 in exchange for participating. Both participant pools contained native and non-native speakers of English. However, non-native speakers were not excluded from the analysis. Additionally, both participant pools contained monolingual and bilingual speakers.

During the analysis, I did not control for bilingualism as I found that this factor did not significantly influence rating scores. 10 participants did not report the ethnic or "racial" make up of their social network, therefore preventing a social network diversity score to be generated. These 10 participants were removed from the analysis. One participant did not report the number of hours the converse with their social network in the average week, hence they were removed from the analysis. Two participants reported that they were 17 years old, hence they were also removed from the analysis to align with ethical guidelines. From the remaining 122 participants, 93 were native speakers of English and 63 were monolingual. Participant's ages ranged from 18 to 66, with a mean age of 26.55 and a median age of 21 years old.

2.3 Materials

The auditory stimuli used within this study were recordings of 24 native speakers of English from the *Speech Accent Archive* (Weinberger, 2015). This archive houses recordings of speakers from various language backgrounds reading the same passage. The passage in question is as follows:

> "Please call Stella. Ask her to bring these things with her from the store: Six spoons of fresh snow peas, five thick slabs of blue cheese, and maybe a snack for her brother Bob. We also need a small plastic snake and a big toy frog for the kids. She can scoop these things into three red bags, and we will go meet her Wednesday at the train station." (Weinberger, 2015).

I chose recordings of native speakers of the following six English speech varieties: Canada, Australia, Jamaica, Scotland, South Africa, and the United States of America. The Canadian accent was the control. These recordings were selected based on their accent strength ratings. The ratings were sourced from Schnoor and colleagues' (2021) study with a separate group of listeners. By selecting recordings from a pre-rated collection, I ensured that the various native speakers were of comparable accent strength. The recordings in question were rated for accent strength on a 9-point scale (1 being no accent, 9 being very strong accent.

Each accent had a strong accentedness and weak accentedness condition, which corresponded to a 7 to 5 mean rating and a 3 to 4 mean rating, respectively. The Canadian accent also had a strong and weak accentedness condition, which translated to a 3 and 1 average rating, respectively. Each accentedness condition had one male speaker and one female speaker, hence each accent group contained four speakers. On average, each recording was 23 seconds in duration. Each recording was split in half, i.e., the first two sentences of the passage were made into a separate recording from the latter two sentences. Both

conditions had counterbalanced lists of the 48 recordings, hence condition A had 12 recording halves while condition B had the inverse 12 recording halves. These were counterbalanced across two experimental lists in such a way that participants rated all speakers on accentedness and intelligibility without hearing the same speaker twice. 48 recordings from 24 speakers were used as the study's auditory stimuli.

2.4 Procedure

Data was collected throughout November 2022. This online study was coded via the JsPsych library, version 7.2.1 (de Leeuw, 2015), and was administered using the Cognition server (www.cognition.run). First, participants randomly selected to complete either condition A or condition B of the study. Second, participants were asked to provide their informed consent to partake in the study. The consent form outlined risks and benefits of the study without revealing the objective of this research study. Third, consenting participants were asked to adjust their volume to their comfort before starting the rating trails.

The study had two sections. The first 12 trials asked participants to rate the speakers' accentedness on a 10-point scale (i.e., 1 being very weak, and 10 being very strong). Afterwards, participants were asked to rate the remaining 12 recordings for intelligibility on a 10-pont scale (i.e., 1 being very easy to understand, and 10 being very hard to understand). The recordings in each section played only once and were in a randomised order. Participants rated the recording after hearing them played.

2.5 Post-tests

After participants finished the rating trials, they completed an exit questionnaire containing two self-report post-tests (Appendix A.1). First, participants took a social network questionnaire (Lev-Ari, 2016) to document the characteristics of their social network. This questionnaire asked participants to report their age, the number of people they discuss with in a typical week and for how many hours, the relationship between themselves and those in

their social network, the age range and most common age cohort of their social network, the education levels present in their social network, and the degree of their social network's connectedness. Additionally, I adapted this questionnaire to also track participants' social network "racial" diversity. Social network "racial" diversity was calculated with the *Herfindahl–Hirschman index* (Hunt et al., 2015), which a 0 to 1 scale (0 being very diverse, 1 being very homogenous). Although this index was developed for economic purposes, it is comparable to other indices used within social scientifical research to measure diversity (Steele et al., 2022), such as the *Shannon entropy/Shannon-Wiener index* (Grin & Fürst, 2022) and the *Neighborhood Diversity index* (Maly, 2000).

Second, participants completed a language background questionnaire (Appendix A.2). In this second questionnaire, participants reported their first language and other languages they may use, whether they identify as bilingual/multilingual, which accents they think they heard in the study and their exposure to these self-reported accents. Lastly, participants were provided with the six speech varieties used in the study, then they were asked to report their level of exposure to the six accents on a 10-point scale (i.e., 1 being no experience/exposure, and 10 being high experience/frequent exposure). Due to a typographical error, the drop-down menu for participants to indicate accent exposure listed accents from a previous study. Hence, exposure data was not used in the analysis.

Chapter 3. Results

3.1 Statistical Analysis

The data was analysed through R statistical software (R Core Team, 2022, version 4.2.1) using Ordinal Generalized Additive Mixed-Models (Baayen & Divjak, 2017). Models were created using the mgcv package (mgcv, version 1.8-42, Wood, 2023) and effects were visualised and compared using the itsadug package (itsadug, version 2.4.1, van Rij et al., 2022). The model's dependent variables were accent strength and intelligibility ratings, scored from 1 to 10. Additionally, I compared each model's AIC score using the compareML() function in R from the itsadug package (van Rij et al., 2022) to forward fit the model's independent variables. The final model contained accent strength and intelligibility ratings as dependent variables, the interaction between rating type (accentedness or intelligibility) and accent origin (Canada, Australia, Jamaica, Scotland, South Africa, or the United States of America) as fixed predictors, in addition to random intercepts for participants, items, and social network diversity index (scored 0 to 1) as a control. The output of the final model is listed in Table 3.1.

Parametric Coefficients	Estimate	Std. Error	z value	Pr(>|z|)	
Intercept	-0.8766	0.1607	-5.453	4.95e-08	***
rating_typeIntelligibility	-0.2953	0.2150	-1.373	0.16967	
accentAU	2.6510	0.1645	16.114	< 2e-16	***
accentJA	2.7620	0.1655	16.692	< 2e-16	***
accentSA	3.0147	0.1627	18.525	< 2e-16	***
accentSC	3.3249	0.1734	19.171	< 2e-16	***
accentUS	2.5938	0.1662	15.606	< 2e-16	***
rating_typeIntelligibility:accentAU	-1.1781	0.2413	-4.883	1.04e-06	***
rating_typeIntelligibility:accentJA	-0.4909	0.2407	-2.039	0.04143	*
rating_typeIntelligibility:accentSA	-1.2931	0.2405	-5.377	7.57e-08	***
rating_typeIntelligibility:accentSC	-1.1157	0.2451	-4.551	5.33e-06	***
rating_typeIntelligibility:accentUS	-0.7796	0.2399	-3.250	0.00115	**
Significance of smooth terms	edf	Ref.df	Chi.sq	p-value	
s(Diversity)	1.002	1.002	0.842	0.3596	
s(trial_index)	1.002	1.003	6.362	0.0117	*

s(subject_id.x)	104.371	120.000	762.661	<2e-16	***

Table 3.1: Approximate significance of parametric effects, smooth terms and random effects for the final model. Note: intercept is set to Canadian accent, accentedness rating type, native speaker, monolingual.

3.2 Influence of Main Predictors

Based on the statistical analysis (Table 3.1), the interaction between rating type and accent were significant. Participants found the other five accents to be more accented than the Canadian control accent, as evident by the positive "Estimate" figures. Notably, the Scottish accent was rated as the most accented, while the American accent was rated as the second least accented of the six accents. The negative "Estimate" figures associated with accent intelligibility demonstrate that participants found the accents to be more intelligible than accented. To better understand accent intelligibility ratings, I releveled the model so that intelligibility would be the reference level rating type (see Appendix B.1). The control accent had the highest intelligibility. The Jamaican accent was found to be the least intelligible, while the Australian accent was the second most intelligible of the six accents.

To account for individual differences in participants, items, and participants' social network "racial" diversity, these three variables were fitted as random smooths. Notably, the latter smooth revealed that participants' social network "racial" diversity has a non-linear regression line, given that its effective degrees from freedom (edf) is greater than zero. However, the smooth's p-value indicates that the regression line does not significantly differ from zero.

To better understand the differences in the main predictors, I visualised key aspects of the final model. Results showed that participants rated the recordings to have medium accent strength (i.e., 3 to 7), but these recordings were still highly intelligible (i.e., 1 to 4) (Figure 3.1).

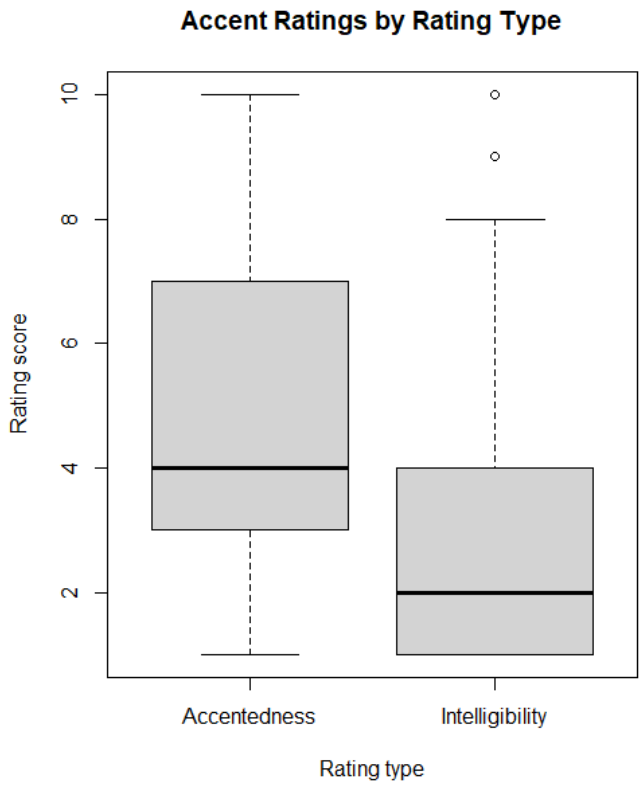

Figure 3.1: Effect of rating type on ratings of all speakers. 1 = weak accent and high intelligibility, 10 = strong accent and low intelligibility, respectively.

Participants rated the control accent as the least accented and the most intelligible, which was not surprising. Additionally, participants found the Jamaican accent and Australian accent to be equal in strength, but the latter was more intelligible (Figure 3.2). In terms of rating score range, the Jamaican accent had the lowest intelligibility score, yet the Scottish accent had the highest accentedness maximum (i.e., 8) while the South African accent had the highest accentedness minimum (i.e., 4). Additionally, the analysis demonstrated that participants' age and whether they are native English speakers or monolinguals did not predict their responses. For this reason, these variables were removed from future analysis.

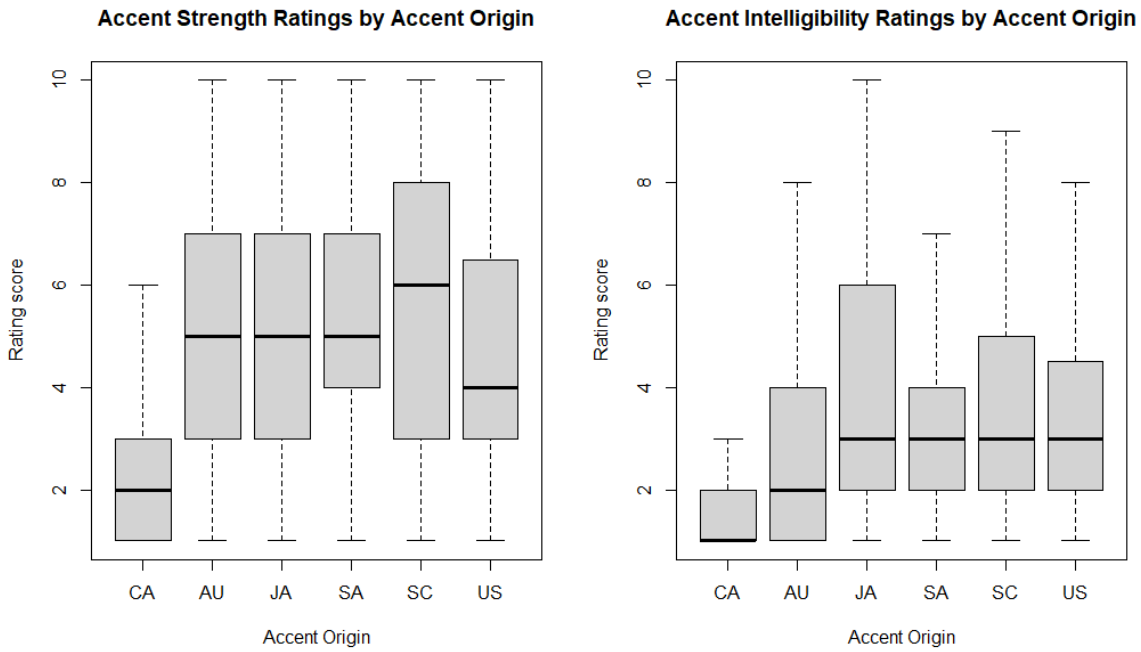

Figure 3.2: Effect of accent origin on accent strength (left) and intelligibility ratings. Acronyms represent the following English speech varieties: CA = Canadian, AU = Australian, JA = Jamaican, SA = South African, SC = Scottish, US = American.

3.3 Influence of Social Network Size

Social network size was left skewed, with participants reporting a minimum of one person in their social network and a maximum of 88 people (Figure 3.3). The mean social network size was 12.16. Whereas social network "racial" diversity was right skewed, with a minimum diversity index of 0.2285 and a maximum of 1 (Figure 3.4). The mean Diversity index score was 0.7618. Additionally, participants reported that their social networks were highly interconnected in that on average 65.74% of the people in their social network knew one another.

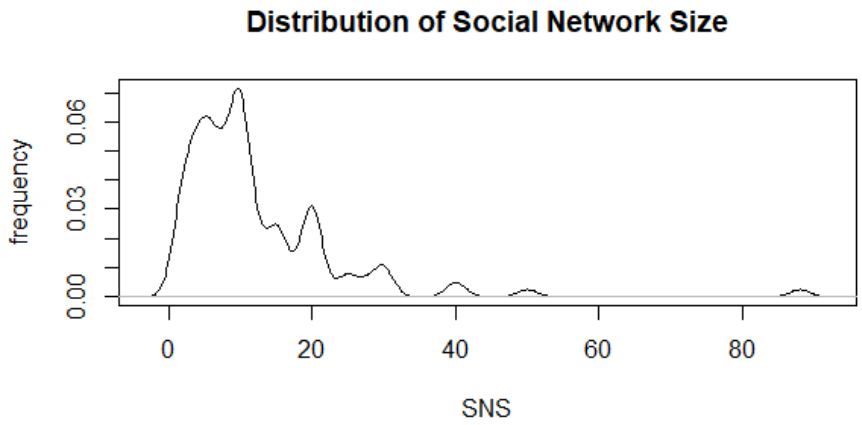

Figure 3.3: Distribution of Social Network Size of participants.

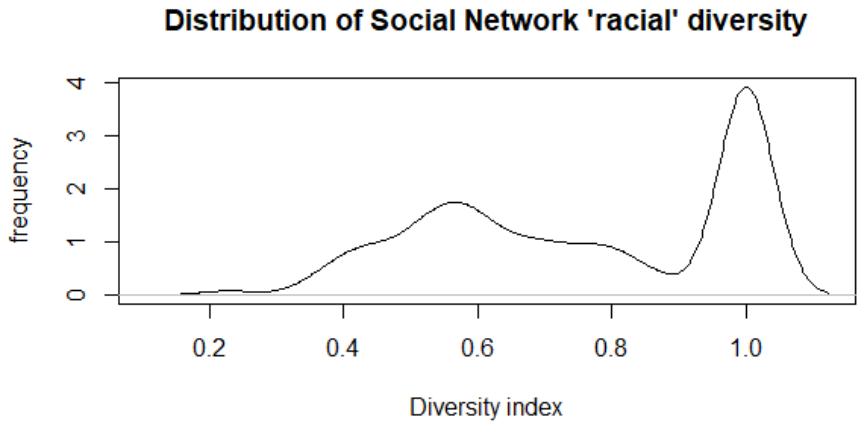

Figure 3.4: Distribution of Social Network "racial" diversity of participants. 0 being very racially diverse, 1 being very homogenous.

To further explore the influence of social network size on each regional accent, I ran an additional model which combined the interaction between rating type (accentedness or intelligibility) and accent origin (Canada, Australia, Jamaica, Scotland, South Africa, or the United States of America) into a single fixed predictor. This model did not include the social network diversity index as it did not have a significant effect in the first model, nor did it have a significant interaction with the combined variable. Nevertheless, the other dependent and independent variables remained the same. The output of the final model is listed in Table 3.2.

Parametric Coefficients	Estimate	Std. Error	z value	Pr(>|z|)	
Intercept	-0.8754	0.1611	-5.433	5.55e-08	***
combinedAccentedness AU	2.6828	0.1645	16.311	< 2e-16	***
combinedAccentedness JA	2.7821	0.1656	16.804	< 2e-16	***
combinedAccentedness SA	3.0293	0.1626	18.636	< 2e-16	***
combinedAccentedness SC	3.3393	0.1736	19.237	< 2e-16	***
combinedAccentedness US	2.6132	20.1662	15.720	< 2e-16	***
combinedIntelligibility AU	1.1840	0.2062	5.743	9.30e-09	***
combinedIntelligibility CA	-0.2962	0.2153	-1.375	0.169	
combinedIntelligibility JA	1.9821	0.2080	9.531	< 2e-16	***
combinedIntelligibility SA	1.4266	0.2063	6.914	4.70e-12	***
combinedIntelligibility SC	1.9206	0.2055	9.345	< 2e-16	***
combinedIntelligibility US	1.5174	0.2053	7.392	1.44e-13	***
Significance of smooth terms	edf	Ref.df	Chi.sq	p-value	
te(SNS):combinedAccentedness CA	2.365	2.811	7.393	0.1103	
te(SNS):combinedAccentedness AU	1.000	1.000	1.049	0.3059	
te(SNS):combinedAccentedness JA	1.001	1.002	0.037	0.8488	
te(SNS):combinedAccentedness SA	1.001	1.001	1.132	0.2878	
te(SNS):combinedAccentedness SC	1.000	1.000	1.397	0.2373	
te(SNS):combinedAccentedness US	1.001	1.001	0.516	0.4724	
te(SNS):combinedIntelligibility AU	1.000	1.001	0.781	0.3772	
te(SNS):combinedIntelligibility CA	1.000	1.000	0.000	0.9994	
te(SNS):combinedIntelligibility JA	1.000	1.001	0.841	0.3595	
te(SNS):combinedIntelligibility SA	1.008	1.016	0.271	0.6157	
te(SNS):combinedIntelligibility SC	1.000	1.001	0.121	0.7283	
te(SNS):combinedIntelligibility US	1.001	1.001	4.373	0.0366	*
s(trial_index)	1.001	1.002	5.995	0.0144	*
s(subject_id.x)	104.545	120.000	775.060	<2e-16	***

Table 3.2: Approximate significance of parametric effects, smooth terms by social network size. Note: intercept is set to Canadian accent, accentedness rating type.

The parametric figures corroborate the results from the first model. The smooth terms highlight non-linear relationships between participant's social network sizes and most accent ratings, notably Canadian accentedness ratings. Further, the results demonstrate that social network size and intelligibility ratings of the American accent were trending. This finding indicates that the non-linear regression line for American accent intelligibility ratings somewhat differs from zero. There was no other significant interaction between social network size and accent origin across both rating types. Next, I visualised the difference

curves of the six accents' intelligibility ratings based on the model's predictions using the plot_diff() function in R from the itsadug package (van Rij et al., 2022). Social network size was the continuous variable and American accent intelligibility ratings were the baseline predictor because it was the only accent to be trending in the model (Figure 3.5).

The plotted difference curves illustrated that participants with social network sizes below 20 people found the American accent to be more intelligible than the Jamaican and Scottish accent, respectively. Participants with a social network size between 10 to 30 people found the Australian accent to be more intelligible than the American accent. The role of social network size in predicting South African accent intelligibility in comparison to American accents is unclear. Lastly, all participants found the Canadian accent to be more intelligible than the American accent.

Interestingly, participants with larger social network sizes did not show significant differences in accent intelligibility ratings. Additionally, participants with larger social network sizes demonstrated smaller variation in Canadian versus American accent intelligibility ratings, whereas those with smaller social network sizes had larger differences.

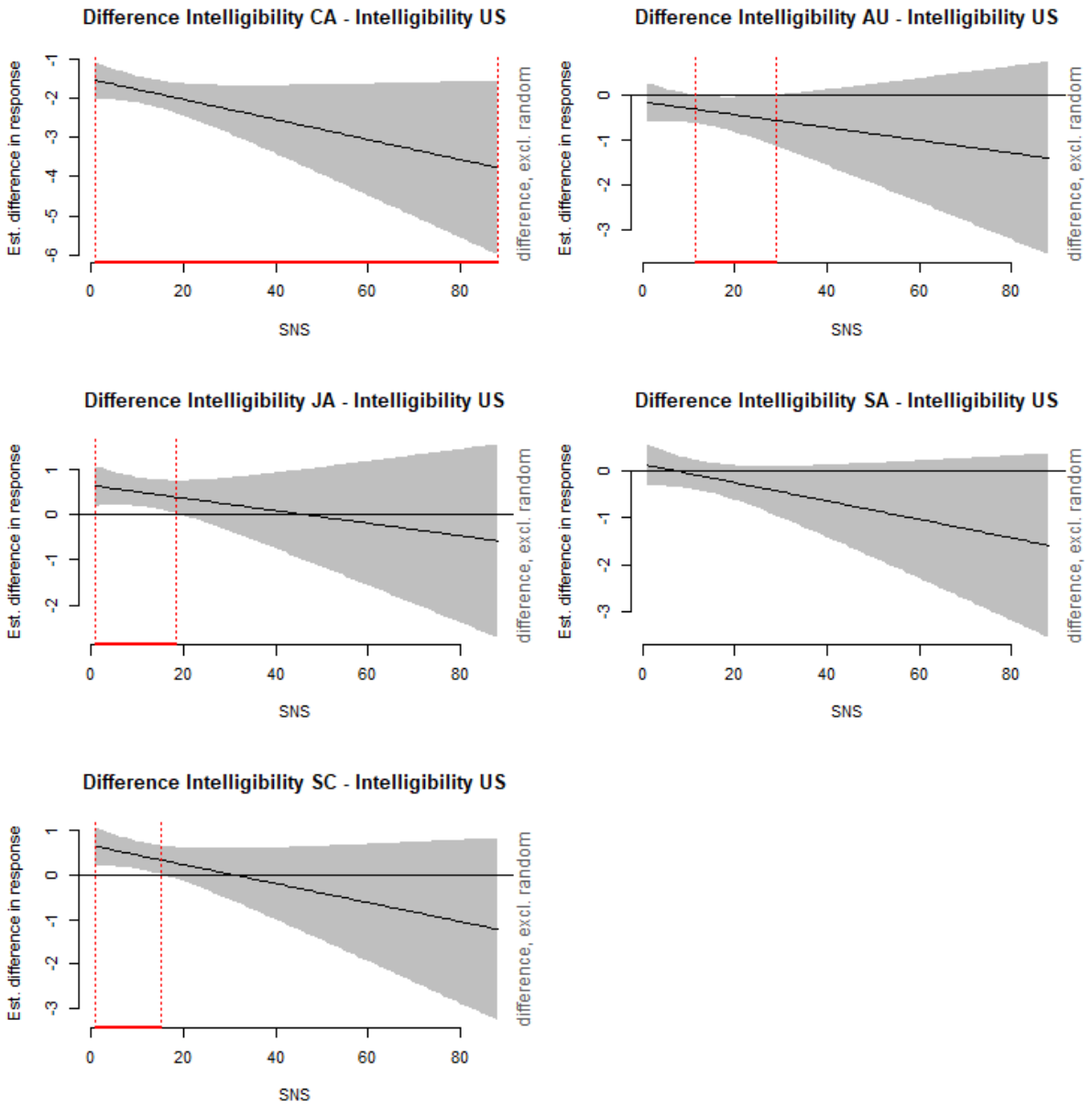

Figure 3.5: Difference curve based on model predictions of each accent's intelligibility. The American accent is the zero line. The red demarcation indicates the area of significant difference.

Chapter 4: Discussion

The current study sought to further investigate the way social network characteristics, such as size and "racial" diversity influence regional accent processing. Results highlight that social network "racial" diversity does not predict accentedness or intelligibility ratings. However, the study did find that social network size did predict accent intelligibility, this was specifically true for participants with social network sizes of 40 people or less.

The present study illustrates that participants rated regional accented speakers with strong accentedness yet high intelligibility; this finding corroborates previous research on foreign accent perception (Derwing & Munro, 1997; Munro & Derwing, 1995a). Unsurprisingly, the American accent was considered to have minimal accentedness in comparison to the Canadian accent. This perception could be attributed to the high exposure participants have to the American accent, either through media (for non-Canadians and Canadians alike) or personal interactions from the ease at which many Canadians can visit the US. However, I was surprised that the Australian accent was more intelligible than the American accent when both are respectively compared to the Canadian accent. Though, the Australian accent intelligibility ratings had more variation than the American accent.

Importantly, social network size did influence accent ratings. Most differences can be observed amongst participants with smaller social network sizes, especially amongst participants with social network sizes below 40 people. Notably, social network size predicted participants' accent intelligibility ratings for the American accent. Additionally, participants with smaller social network sizes tend to find the American accent more intelligible than the other non-Canadian accents. This finding could be evidence that smaller social networks are more homogenous, which could lead to reduced familiarity with different accents which in turn hinders the degree of ease at which participants understand accents that different from the control i.e., Canadian. There is reason to further investigate this theory on

the effects of familiarity (Floccia et al., 2009; Munro & Derwing, 1994; Porretta et al., 2016) given that all non-Canadian accents have comparable accentedness ratings, but differing intelligibility scores from participants with smaller social network sizes. Further research into modulators of these individual differences is needed.

Surprisingly, larger social network sizes did not demonstrate significant intelligibility differences. This is contrary to the literature that demonstrates larger social network sizes as a crucial modulator of language processing proficiency (Lev-Ari, 2016, 2018, 2019). This absence of variation could be attributed to the skewed participant pool used in the current study. In that most participants had a social network size below 40 and very "racially" homogenous social networks. These biases could explain the minor role that social network size and diversity had in predicating accent perception ratings. In that the presence of more data points along the social network size and diversity continuum would have allowed for any significant influences to be observed. It is unclear whether the high interconnectedness of the participants' social networks also mediated results. It would be interesting if the present study incorporated ways to explore the role that social network interconnectedness has on the way participants encode the speaker's social identity during accent processing. Perhaps loosely related social networks may encourage a diversity of opinions associated with "race" which could influence participants' accent perception. For this reason, a post-hoc test on "race"-based stereotypes could have allowed for more avenues to explore the influence of social network interconnectedness and "racial" diversity.

A second limitation of this study is the experiment design, in that the inclusion of a supplementary experiment could have allowed for a better exploration of the role of social network "racial" diversity. Most studies investigating the influence of "race" on accent perception often rely on visual stimuli to prime participant response, i.e., a photo of a "racial" minority's face displayed when an audio recording is played versus a photo of a "racial"

majority's face displayed when the same audio recording is played. The absence of said stimuli means that the way participants categorise speakers "racially" is not controlled, rather the study assumes that participants will recognise all accents and categorise them based on the country's proximity to their prototypical representation of a Canadian. Additionally, this assumption does not account for the diverse ethnic composition of the six countries represented in the audio stimuli, in that even if the participant accurately identifies the speaker's origin, the "racial" background the participant may categorise them into is unclear. Therefore, including photos and running the same recording various times could have been useful in observing the influence of an individual's interactions with a diverse community on their accent perception. It should be noted that such a study would need to look at fewer accents to be mindful of the study duration and participant attention span.

In conclusion, the present study expands our understanding on the relationship between regional accent perception and social network size. Notably, smaller social network sizes predict accent intelligibility. Further research is necessary to better understand the extent to which larger social network sizes and more "racially" diverse social networks modulate regional accent perception.

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Appendix A: Post-Tests

A.1 Social Network Questionnaire

In this questionnaire we would like to gather information about your linguistic interactions. We realize that some of the estimates are difficult to make. Please do your best and be as accurate as possible. Feel free to share as much or as little as you are comfortable sharing.

Important: When providing estimates for your exposure in a week, keep in mind that your habits may vary considerably depending on the day of the week (e.g., weekday vs. weekend). Please be as accurate as possible and do not simply multiply your estimate for one day by 7.

1) How old are you?

2) With how many people do you converse orally in a typical week (Please only include people with whom you regularly talk for longer than 5 minutes)?

3) How many hours do you usually spend on conversing orally with people in a typical week?

4) How are the people you converse with in a typical week related to you (e.g. friend, colleague, family, service person, neighbor, etc.)? Please indicate the relations with an estimate of how many people fall there (e.g., 3 relatives, 10 colleagues, etc.).

5) Please state the age range of the people with whom you regularly converse in a typical week from the youngest person to the oldest person (e.g. 21-60 years). Only include those above the age of 12.

6) What is the main age group with which you interact in a typical week? (e.g. if you mainly interact with your friends who are between 18-20 years old (20 people) and you also interact with your parents/guardians who are 50 years old (2 people), the most common age group would be 18-20 years.

(continued)

7) Please indicate what are the highest and lowest levels of education completed by the people you interact with in a typical week? (e.g., high school diploma, PhD). Only include the level of education of people above the age of 18. [only select 2 options]
    - 'no certificate or diploma',
    - 'secondary/high school diploma',
    - 'Apprenticeship or trades certificate or diploma',
    - 'College, CEGEP or other non-university certificate or diploma',
    - 'University certificate or diploma below bachelor level',
    - 'Undergraduate/bachelor degree',
    - 'Masters degree',
    - 'Doctoral degree',
    - 'PhD'

8) What is the most common education level among those people? (e.g. if you mainly interact with college graduates, but you also occasionally converse with people who did not go to college, the most common education level would be 'Bachelor degree'. If there is not one dominant educational level, select 'varied'.

9) How would the people you converse with in a typical week describe themselves (e.g. African-American, Asian-Canadian, Cree, Brazilian, Irish, etc.)? Please indicate how they identify with an estimate of how many people fall there. e.g., Finnish - 3 friends, Cuban - 5 classmates, Nigerian - 2 relatives, Asian-Canadian - 1 colleague, etc

10) What percentage of the people you converse with in a typical week know one another?

A.2 Language Background Questionnaire

1) What is your first language?

2) Which other language(s) do you speak? (Indicate 'N/A' if you do not speak another language).

3) Do you consider yourself to be bilingual or multilngual (Yes or No)?

4) Which accent(s) did you hear in the experiment?

5) Please indicate which, if any, accents mentioned in the previous question you have experience with? e.g. studied its associated language, or have immediate family who speak with this accent. (Type 'N/A' if you have no experience with any of the aforementioned accents).

6) On a scale from 1 to 10, rate your experience/exposure to the following English dialects: Canadian, Australian, Jamaican, Scottish, South African, and American. '1' being no experience/exposure and '10' being high experience/frequent exposure.

Appendix B: Model Outputs

B.1 Relevelled Model 1 whereby Reference Level is Intelligibility Rating Type

Parametric Coefficients	Estimate	Std. Error	z value	Pr(>|z|)	
Intercept	-1.1719	0.1683	-6.962	3.35e-12	***
rating_typeAccentedness	0.2953	0.2150	1.373	0.16967	
accentAU	1.4729	0.1748	8.425	< 2e-16	***
accentJA	2.2712	0.1748	12.992	< 2e-16	***
accentSA	1.7216	0.1755	9.809	< 2e-16	***
accentSC	2.2092	0.1735	12.732	< 2e-16	***
accentUS	1.8141	0.1732	10.475	< 2e-16	***
rating_typeAccentedness:accentAU	1.1781	0.2413	4.883	1.04e-06	***
rating_typeAccentedness:accentJA	0.4909	0.2407	2.039	0.04143	*
rating_typeAccentedness:accentSA	1.2931	0.2405	5.377	7.57e-08	***
rating_typeAccentedness:accentSC	1.1157	0.2451	4.551	5.33e-06	***
rating_typeAccentedness:accentUS	0.7796	0.2399	3.250	0.00115	**
Significance of smooth terms	**edf**	**Ref.df**	**Chi.sq**	**p-value**	
s(Diversity)	1.002	1.002	0.842	0.3596	
s(trial_index)	1.002	1.003	6.362	0.0117	*
s(subject_id.x)	104.371	120.000	762.661	<2e-16	***

Formula: response ~ rating_type * accent + s(Diversity) + s(trial_index) + s(subject_id.x, bs = "re")