Communication Accommodation Theory in Conversation with Second Language Learners

By

Mahdi Rahimian

A Thesis submitted to the Faculty of Graduate Studies of

The University of Manitoba

in partial fulfilment of the requirements of the degree of

MASTER OF ARTS

Department of Linguistics

University of Manitoba

Winnipeg

Abstract

In this research, Communicative Accommodation Theory (CAT) is investigated while native speakers address nonnative peers. For the intentions of this research, three native speakers of Canadian English were asked to have conversations with native and nonnative peers. The conversations were in the form of giving directions on the map. Later on, the participants' formants and vowel durations were measured and used for comparing native-nonnative peer effect(s) on the speakers' vowel formants and duration. Based on the analyses, it is suggested that accommodation may take place based on providing stereotypical vowel durations and formants, as well as reducing inter-token variations in the nonnative peer context.

Acknowledgement

A lot of people helped, supported, and encouraged me on the process of doing this research. Doing this research would have not been made possible without the continuous support of my advisor, Dr Robert Hagiwara. He provided useful and constructive comments, as well as invaluable mentality as we went through the process of doing the research. He also supported with the funding for paying the research participants. I was also lucky to have two great committee members, Dr Sandra Kouritzin and Dr Verónica Loureiro-Rodriguez, who contributed a lot to the scholarly of the work by providing insightful comments on the thesis. People in Academic Learning Centre (ALC) at the University of Manitoba were so supportive and encouraging, especially Kathy Block: a nice, thoughtful, and supportive individual. I need to appreciate help and supports of my dear friend Jason Miles and his wonderful wife Sara Miles who have been so gracious and supportive. They are like family to me. I also need to thank my cooperative and nice participants and confederates some of whom had to change their schedules to help me with the research.

Dedicated to:

the enlightened people in Iran.

Table of Contents

Abstract ... ii

Acknowledgement ... iii

Chapter 1: Introduction ... 1

1.1 Linguistic Categorization ... 3

1.2 Communication Accommodation Theory and IDS/FDS ... 5

1.3 Accommodation and SLA ... 7

1.4 Hypotheses ... 10

Chapter 2: Literature Review ... 12

2.1 Communication Accommodation Theory ... 12

2.2 Understanding Communication Accommodation Theory ... 13

2.3 Divergence and Convergence in CAT ... 14

2.4 Automaticity of CAT ... 16

2.5 Over-accommodation and Under-accommodation ... 19

2.6 CAT and First Language Acquisition ... 19

2.7 Phoneme Categories ... 20

2.8 Infant Sound Discrimination ... 21

2.9 CAT and Second Language Acquisition ... 23

Chapter 3: Methodology and Results ... 25

3.1 Participants ... 25

3.2 Tasks ... 27

3.3 Data collection ... 29

3.4 Data Analyses ... 31

Chapter 4: Discussion ... 48

4.1 Justifications for the Accommodation Types in the two settings................. 49

4.1 Shortcomings and suggestions for further research 61

References 63

List of Tables

Table 1. The words and vowels used in this study 30

Table 2.Vowel duration and ranges, in milliseconds, in the two tasks................. 34

Table 3. Formant frequencies, in Hz, and their ranges in task 1........................... 35

Table 4. Formant frequencies, in Hz, and their ranges in task 2........................... 36

Table 5. Formants averages in the two tasks 37

Table 6. Vowel duration average in the two tasks.. 37

Table 7. Mean of vowel duration.. 38

Table 8. Vowel formants for all and each native speaker in the two tasks........... 38

Table 9. Vowel durations in the two tasks for all the speakers............................ 41

Table 10. Vowel formants in the two tasks for all the speakers 41

Table 11. Vowel duration in sets of tense-lax vowel sets in the two tasks........... 42

Table 12. ANOVA for the effects of the speaker on vowel pairs......................... 42

Table 13. The difference between tense-lax sets in different speakers................ 43

Table 14. Comparison of speakers vowel duration across the tense-lax sets 43

Table 15. The effect of task on vowel pair formants 44

Table 16. The effects of the speakers on vowel formants..................................... 45

Table 17. Repeated measures statistics for vowel duration across the two tasks . 45

Table 18. Repeated measures statistics for vowel formants across the two tasks 46

Table 19. Repeated measures analyses for vowel duration differences and formant differences across the two tasks 47

Table 20. Vowel duration differences with the main effect of the speaker 72

Table 21. Scheffe results for the effect of speaker.. 77

List of Figures

Figure 1. Praat spectrogram image for the word ‘take’ 33

Figure 2. Vowel durations in task 1 and task 2... 39

Figure 3. Vowel formants in task 1 and task 2 39

Figure 4. Standard deviation of vowel duration across the two tasks................... 51

Figure 5. Standard deviation of vowel formants across the two tasks.................. 52

Chapter 1: Introduction

In this research, communication accommodation theory as applicable to native speakers addressing nonnative interlocutors has been investigated. Specifically, the cues used by native interlocutors and available to Second Language (L2) learners are explored. In second language acquisition, several factors can be influential on the second language (L2) speaker's perception, including speech rate (Derwing, 1990) and input and interaction (Fang, 2010). It has been argued that native speakers tend to modify their speech while addressing L2 speakers to assist the L2 speakers with their speech understanding (Dings, 2012). According to communication accommodation theory, speakers adjust their speech in accord with their communication interlocutors (West & Turner, 2010). Native speakers' tendency to modify their speech to assist L2 speakers can be viewed as an accommodation strategy employed by the native speakers while interacting with non-native speakers. Similarly, some of the accommodation techniques, realized through exaggerations in certain aspects of the speech, have been reported in both foreign directed speech (FDS) (Scarborough, Brenier, Zhao, Hall-Lew, and Dmitrieva, 2007), and infant directed speech (IDS) (Werker, Pons, Dietrich, Kajikawa, Fais, and Amano, 2007). Therefore, the investigation of communication accommodation techniques in L1 acquisition will provide insights into L2 acquisition, and vice versa. Furthermore, exploring techniques used in L2 accommodation may also contribute to our understanding of L2 processing in specific and linguistic categorization in general. In communication accommodation theory, an important role for interaction has been assumed in the sense that accommodation occurs in the on-going process of interaction between communication interlocutors.

One of the theories of first language acquisition that can be related to both communication accommodation theory and mental categorization of the linguistic sounds is social interaction theory (Bruner, 1983). Followers of the social interaction theory of language development emphasize the role of both biology as well as social interaction in language development/acquisition (for example Bruner, 1983). Among the assumptions/suggestions of the social interaction model of language development is that children have access to a variety of resources that will assist them in their language learning. As Bruner (1983) mentioned "...it is the interaction between LAD [Language Acquisition Device] and LASS [Language Acquisition Support System] that makes it possible for the infant to enter the linguistic community" (p. 19). So it is possible to assume an interactive role being played between LAD and LASS. One of the main sources of interaction for children, and thus LASS, are parental talks. The enormous interaction that goes on in parent-child conversations, along with its role in language acquisition, would justify the huge amount of child-parent and child-adult interaction research studies (for example Phillips, 1973; Newport, 1977, to name a few). Moreover, it has been shown that Infant-directed Speech (IDS or Child-directed Speech, baby talk, or care-taker speech) has specific characteristics that distinguish it from normal adult-directed speech (Werker, Pegg, & McLeod, 1994). Regarding the characteristics of IDS, it is higher in pitch (Andruski & Kuhl, 1997), and it provides cues to assist the child with his/her linguistic development (Werker et al. 2007). It has been proposed that some of these cues, such as exaggerated vowel duration (Werker et al., 2007) and higher pitch (Trainor and Desjardins, 2002) are effective in assisting the infant to categorize speech sounds in his/her mind by assigning distributional cues to the appropriate linguistic categories (Werker et al. 2007). It has also been suggested that in L2 acquisition by adults, they have access to the same cues as infants with IDS (Scarborough, Brenier, Zhao, Hall-Lew, and Dmitrieva, 2007), and these cues might assist them in language acquisition.

1.1 Linguistic Categorization

Language learners, both first language (L1) and second language (L2) learners, need to categorize the sounds of the target language (phonemes). The categorization of language sounds will pave the way to their perception and production (Escudero, 2005; also Trubetzkoy, 1969). In the case of L1 acquisition, one of the abilities enabling infants to learn language is their categorization ability, which is assigning different sounds in the target language to different categories in their minds. For example English children learn to categorize, and thus group up, the perceived /p/ sounds (e.g. [p] [p^h]) separate from the perceived /b/ sounds, [b], and so forth. According to categorization-based theories, infants learn to categorize strings of connected sounds in their language into categories of individual phonemes (for example Kuhl et al., 1992). One of the research areas of investigation providing a justification for facilitative factors in categorization is studying infants' reception of the appropriate input given by their caregivers. It is argued that infants receive input data that facilitates their target language phoneme categorization. The input provided for the infants by their care-takers is called infant-directed speech

(IDS). This input enhances features and contrasts of the language sounds, thus facilitating the distinction among, and ultimately the acquisition of, different phonemes (Werker et al., 2006). This distinction facilitative device provided in the form of IDS, along with other mechanisms, enhances those features of speech that distinguish different phonemes in the infant's target language. Thus the categorization in which infants assign different sounds to their appropriate categories in their minds is facilitated by the enhanced/modified cues in IDS (de Boer, 2005). The idea that infant-directed speech gives supportive input for categorization has been tested by several researchers. Provision of supportive input necessary for categorization has been tested using pseudo vocabulary in Japanese and English (Werker et al. 2007), and in another study in English, Russian, Swedish, and Japanese (Uther, Knoll, and Burnham, 2007). All these research studies support the above mentioned hypothesis that infants have access to a kind of input which facilitates their language phoneme categorization.

Regarding the type of input adult L2 learners receive, some researchers have suggested that speech is also modified when addressing adult nonnative learners of language (for example Schwartz, 1977; Hatch, Shapira, & Gough, 1978; Hatch & Long, 1980). These studies suggest that, as in IDS, native speakers provide similar kinds of enhanced input for nonnative speakers. In other words, it seems that the native speakers of a given language tend to modify their speech when interacting with nonnative speakers of the language. The idea that L2 acquisition might be assisted through accommodation strategies in the form of providing categorization cues, as provided in IDS, has been addressed more intensively in this research.

1.2 Communication Accommodation Theory and IDS/FDS

One of the theories providing justification for the IDS/FDS (Infant-directed Speech/Foreign-directed Speech) phenomena is communication accommodation theory. According to communication accommodation theory, speakers adjust their speech depending on their interlocutors' language capabilities in the conversation (Giles, and Coupland, 1991). As a result, linguistically speaking, an individual may minimize or maximize his/her own speech differences with his/her interlocutor while engaged in a conversation (Gallois et al., 2005). This can explain the category-enhancing aspects of IDS, in which the care-takers try to provide the infants with fine-tuned samples of speech, so the care-takers accommodate the infants in conversations. One of the outcomes of this accommodation is that care-takers attempt to provide exaggerated samples of speech sounds for the infant. The same thing could happen when a native speaker of a language is addressing a nonnative speaker interlocutor in a conversation. In this situation, the native speaker may try to accommodate their speech in such a way to either maximizing or minimizing the linguistic contrasts. In such cases, maximization or minimization of the linguistic contrasts are probably intended to help the communicability or non-communicability of the speech for the nonnative interlocutor. It has also been suggested that the minimization of speech, in the sense of producing fewer phones, in L2 communication can happen (Scarborough et al., 2007). A probable cause for such a speech accommodation and adaptation can be the intention to help the L2 speaker to understand the conversation better. In another research, Uther, Knoll, and Burnham (2007) found that, like in IDS, FDS vowels are hyper-articulated. Accommodation of speech in consideration of the communication interlocutor(s) might also be used for instructional purposes in L2. That means L2 teachers/instructors, intentionally or unintentionally, may use this technique for language instruction purposes. Yet having awareness of this technique may motivate the instructor/teacher to use it more deliberately. This may result in an enhancement of the learners' L2 experience. Knoll, Scharrer, and Costall (2011) found that acoustic measures of speech features are context and speaker dependent. In other words, the speakers tend to tune their speech regarding the phonological context of conversation. This is in support of speech accommodation in conversations.

In this research, availability of fine-tuned phonetic elements for second language acquisition is investigated. For this study, native speakers of English who are experienced in working with nonnative peers have been chosen as the participants. The language tokens used for data collection were chosen from real English words. In the data collection, native speaker participants interacted in two tasks: in one with native peers and in another with nonnative peers.

The first motivation behind the present study was exploring the availability of contrast enhancement(s), in the forms of exaggerated vowel duration and hyperarticulated vowel formant frequencies, for adult second language learners as they are for first language learners. For doing this, the communication between native speakers and L2 learners were studied in conversational settings. Additionally, it was intended to investigate if such facilitative type of input is provided in more peer conversational situations. Another intention motivating this study was to investigate the provision of accommodative techniques in native-nonnative peer interactions by experienced native peers, realized through exaggerated vowel duration and enhanced formants and/or enhanced first-second-third formant spaces. It is argued that experienced native speakers employ such strategies justifiably. In other words, in the context of this study, if native speakers who had experience working with nonnative speakers used longer vowel duration and raised and/or enhanced formants (contrasts) in the produced vowels when they are conversing with nonnative peers than with native peers, it can be inferred that such accommodation strategies as applied to L2 acquisition are, in fact, effective in the language acquisition by providing facilitative devices. On the other hand, if the native speaker participants had found using these strategies counterproductive by the means of experience, they were less likely to use them in this experiment as well. Another important consideration in this study is the comparison of a native speaker's phonological characteristics with his own speech while engaged in conversations with native and L2 peers. Regarding the second point, native speakers' speech is compared in two contexts of peer native and peer nonnative interlocutors. Use of natural language tokens is another promoting point of the present study. These data collection situations made the entire study utilizing the type of language closer to the natural language situations, and thus more plausible in L2 contexts pinpointing the effects of peer collaboration in L2 development.

1.3 Accommodation and SLA

In second language acquisition literature, it is believed that native speakers change their way of talking when addressing foreigners (Rivers, 1981). According to Uther, Knoll, and Burnham (2007), like IDS in first language acquisition, FDS linguistic modifications can be found. This means in both cases the speech of the adult/adult native speaker is modified. They conclude that while addressing an L2 learner, native speakers hyper-articulate their vowels. In a study related to L2 acquisition, Uther, Knoll, and Burnham (2011) found that production of some acoustic measures such as those indicating hyperarticulation are context and speaker dependent. For instance, sometimes to enhance the distinction between “sheep” and “ship”, the native speaker may lengthen the “i” sound in “sheep” to emphasize the difference in vowel quality (IPA [i] vs. [ɪ]). Also, the speakers may shorten the vowel in ship and lengthen the vowel in sheep so the difference between them would be noticeable for the listener.

Many factors may be influential when vowel duration is investigated (Erickson, 2000), including speech rate (e.g. Lindblom, 1963). Generally speaking, research done can be used to show that vowel duration in IDS is more enhanced compared to adult-directed speech (for example Kuhl et al., 1997). This reflects an overall slower rate of speech in IDS than adult-directed speech. The existence of enhanced vowel duration, higher pitch of voice, and production of different formant frequencies in IDS can increase the availability of distributional cues, and help the infant to better store and distinguish the language sounds in L1 acquisition (Werker et al, 2007). These distributional cues may facilitate the language learners’ categorization of the phonemes in their target language. In other words, in L1 acquisition, the existence of these changes in IDS lead to the provision of more/better cues for the infant to use when he/she is assigning each sound to its already existing category stored in his/her mind for the target language. Research findings can be used to suggest that distinguishing characteristics of vowels in infant-directed speech are exaggerated, e.g. tense vowels (such as [i]) are lengthened (Andruski &Kuhl, 1996) and hyper-articulated, making the tense vowels more distinct from their lax counterparts (e. g. [ɪ]). Further, Werker et al. (2007) compared infant-directed speech between Japanese and Canadian English speakers. They found that some language-specific distinguishing cues which lead to appropriate storage of the data in the child's mind are available in mothers' speech.

In the present study, vowel quality and duration in conversations between native speakers of English with native peers and with nonnative speakers of English were investigated. The overall purpose was to discover whether or not nonnative-directed speech is exaggerated in the case of vowel quality and duration. To accomplish this aim, two different measures were studied: vowel duration as a function of rate expecting learner-directed speech to be slower overall, and vowel quality expecting vowels to be hyper-articulated in the FDS case. Specifically, in this research native speaker participants' vowel formants and durations were calculated during conversations while they were engaged in a communicative task with their native and nonnative peers. In addition to the investigation of providing linguistic categorization cues for adult L2 speakers of English, it was intended to explore the effectiveness of such an effect. That purpose made the study design and participants unique. To achieve that goal, the participants needed to have enough mentorship experience working with nonnative speakers of English, which is at least 1 year. After requesting some potential participants for their willingness to participate in the research, a few of them contacted the researcher and expressed their willingness to participate. They performed one task giving directions to a native peer, and the same task giving similar directions to a nonnative peer. Recordings in the two settings, native versus nonnative peer, were compared together to find out whether and what contrast enhancement(s) in the native speaker vowels duration and quality exist while they were speaking with nonnative speaker peers. The research had the University of Manitoba Research Ethics Board's approval.

1.4 Hypotheses

This research is concerned with the features of FDS. Specifically, the idea that slower rate and exaggerated vowel qualities occur in FDS, as they do in IDS, and probably to assist the learner in discriminating and identifying vowel contrasts in the target language was investigated. Consequently, two hypotheses were to be tested: the first hypothesis is that speech is slower in FDS than in speech directed to peer native speakers. The measurement of the speaking rate was realized through comparing vowel durations. The second hypothesis is that FDS speech will lead to hyper-articulated vowels, like IDS. For testing this hypothesis, we need to compare vowel duration; vowel duration differences, in the paired lax-dense vowels; and vowel quality, by measuring and analysing formant frequencies; in the two contexts of: native-directed speech and nonnative-directed speech.

Based on communication accommodation theory, inspired by social interaction theory and linguistic categorization hypothesis, this research was intended to explore the availability of FDS for nonnative speakers of English. The results of this study suggest that there is a significant difference both at the vowel duration and formants cases in the two performed tasks. However, it does not support the idea that there is higher formant frequency and enhanced vowel duration in the FDS. Based on the analyses of the differences between vowel duration and frequency in each set of lax-tense vowels, it is also argued that the cues of interpretation for the nonnative speakers may be realized through the exaggerations in the duration differences between the two pairs of lax-tense vowels, or through providing more fine-tuned and stereotypical patterns of the vowels.

Chapter 2: Literature Review

2.1 Communication Accommodation Theory

In this chapter, the related literature and some applications of the communication accommodation theory are presented. As noted by West and Turner (2010) the “core of communication accommodation theory” is that “in an interpersonal relationship, in a small group, or across cultures, people adjust their communication to others” (p. 466). After communication accommodation theory’s proposal in the 1970s, it has received a lot of attention by scholars in different fields for both explanation and application purposes. It was used to explain different interactive behaviours in various areas of science, such as linguistics and computer sciences, as well as to propose new potentialities in diverse areas. In this chapter, after a quick review of the related literature in its early days of 1970s and 1980s, follow-up explorations of the theory are discussed. Additionally, possible effects of communication accommodation in first and second language acquisition are discussed in brief. Specifically, in the case of first language acquisition, discussions of speech sound categorization by infants are provided. This section is followed by explaining different functions of applying accommodation strategies by adults for infants. Further possible effects of accommodation, from two perspectives of social and language acquisition, on second language acquisition have also been briefly discussed.

2.2 Understanding Communication Accommodation Theory

Communication accommodation theory was proposed in 1970s. In communication accommodation theory (CAT), or in its original form ‘speech accommodation theory’ (West and Turner, 2010), it is argued that interlocutors in a conversation adjust their speech according to their conversational partners (West and Turner, 2010; Giles and Gasiorek, in press). For instance according to Giles, Coupland, and Coupland (1991), CAT has been used to explain patterns of accommodation between conversational partners/peers (Burleson, 1986), health care personnel and patient/health-care interactions (Kline and Ceropski 1984), and improvements on children’s sharing behaviours (Burleson and Fennelly, 1981). To this list, one can tentatively add language teaching (Thanasoulas, 1999), human robot interaction, and computer programming (Bickmore and Schulman, 2012). Additionally, as some scholars have mentioned, communication accommodation theory interlinks areas of human interaction (Bradac, Hoper, and Wiemann, 1989). Among the reasons for adapting communication accommodation theory to different disciplines; as noted by Giles, Coupland, and Coupland (1991); is its explanatory power covering “micro and macro contextual communicative concerns within a single theoretical and interpretive frame” (p. 2). However, to this day, there is still a vast explanatory power within the framework of CAT to be investigated and/or applied to other areas.

According to Giles, Coupland, and Coupland (1991), there are five possible contributory effects of the communication accommodation theory. These five effects are: to “(1) social consequences (attitudinal, attributional, behavioral, and communicative),

(2) ideological and macro-societal factors, (3) intergroup variables and processes, (4) discursive practices in naturalistic settings, and (5) individual life span and group-language shifts" (p. 4). It was also proposed that accommodation happens both at verbal and non-verbal levels of behaviour (Giles, Coupland, and Coupland, 1991). There are two main possible accommodative attributes of CAT: divergence, and convergence. In other words, communication accommodation can occur in two different directions, which were mentioned above. Each of these two attributes, or conversational usages, will be discussed in the following section.

2.3 Divergence and Convergence in CAT

Divergence and convergence are two main potentially possible outcomes of conversation accommodation. In divergence, the interlocutor(s) in the conversation emphasize(s) the conversational, linguistic and non-linguistic, differences. Bourhis and Giles (1977) conducted a study to investigate the possible divergence effects. The research participants were a group of Welsh people learning Welsh in that time. They found that their participants, when faced with an exaggerated English accent speaker questioning their wisdom of learning Welsh language, extended the differences between their speech and English accent as it is spoken in England. In other words, in a variety of ways they diverged from the English accent. This diverging, or diverting, activity happened after a sarcastic question about their wisdom for trying to learn Welsh had been asked. This divergence had not happened, at this salient level, prior to the challenging topic. The divergence that this group of participants employed happened in different linguistic aspects including vocabulary, through using more Welsh vocabulary by some participants, and accent, through emphasizing/enhancing Welsh accent.

On the other side of conversation accommodation continuum, as explained in CAT, is convergence. Convergence occurs when the interlocutor(s) convert their communication behaviour to be more similar to their interlocutor in the conversation (Giles, 1973). For example if a conversation counterpart adapts the same dialect as his/her interlocutor, he/she is using convergence. Giles (1973) proposed that accent convergence is "a strategy, consciously or unconsciously conceived [or executed]," causing reduction in "linguistic dissimilarities", and the converter/accommodator is placed within a more welcoming situation (p. 101). Divergence and convergence could be deployed through a variety of communicative behavioural practices, both linguistic and non-linguistic.

Convergence and divergence include a whole range of communicative behaviours, and thus are complex communicative behaviours. Convergence and divergence may work differently in different situations, even with similar conversational counterparts. For example, Bilous and Krauss (1998) found that female participants converged on some attributes to their male interlocutors, while diverged on some other attributes. Additionally, power relationship factors may be influential on convergence and divergence states in communication. For example, studies suggest that from a power relationship perspective, subordinates tend to accommodate, that is convert, more to their superordinates than vice versa (Taylor, Simard, and Papineau 1978). However, to have a positive social face/experience, interlocutors tend to adjust/modify the communication strategies they use while engaged in communication with another person (Gallois et al. 2005). Like many other communication strategies, convergence and divergence serve communicative purposes. While speech convergence is a communication strategy that helps the individual to associate with the other members of the group; speech divergence is a communication strategy that helps the individual to dissociate himself/herself from the group (Giles and Powesland, 1975). One possible explanation for the complexity of the convergence and divergence strategies lies in the range of the factors effective in their behavioural deployment as well as the range of communication situations to which they could apply.

2.4 Automaticity of CAT

There has also been research on the voluntariness or involuntariness of using convergence and divergence communication strategies. In other words, exploring whether or not conversational interlocutors employ convergence/divergence strategies consciously or unconsciously, while engaged in conversations, has been the focus of research in some studies. For example Babel (2009) researched the automaticity of phonetic imitation of vowels. It was found that the convergence is not automatic, but after occurrence, it is not at the conscious level anymore (Babel, 2009). Yet another important fact about convergence is that, as it is argued, intentional and unintentional convergences are distinguishable by the interlocutor(s) (Gilbert, Pelham, and Krull, 1988). In other words, it is suggested that interlocutors can differentiate between intentional and unintentional convergence. Probably, non-conscious nature of convergence gives enough clues to the interlocutor to tell the difference between intentional and unintentional convergence. It may be argued that as a matter of experience, that is frequent interaction with nonnative peers for a long time, chances are good that the native speakers avoid intentional convergence and tend to do the convergence more unintentionally.

Accordingly, research suggests that at least at some language switching situations, interlocutors can recognize convergence and divergence and possible intentions behind them (Bourhis, 1983). In that study, it was found that French Canadians are more inclined to switch into English, while English Canadians are more likely to sustain their language in conversing with each other. In other words, the French Canadians that Bourhis used in that study were more frequently found code switching into English, but English Canadians tended to sustain English more and they were less likely to code switch into French.

Related to these findings is the fact that researchers have suggested the interlocutors' tendency to evaluate the conversation as they enter an interaction. According to Giles and Gasoirek (in press), speakers initiate a communication with "an initial orientation". The "initial orientation" is formed or "informed" by some "relevant personal and interpersonal and intergroup histories" as well as "sociohistorical context" (p. 4), to name a few communicative strategies deployed by the interlocutors. Considering the fact that speakers start a conversation with some starting point considerations, it seems plausible to expect the possibility of accommodation in speech adjustments as executed by the engaged speakers in a conversation, realized in the form of convergence or divergence. An explanation for such an expectation is rooted in a possible attempt made by a speaker to accommodate the nonnative speaker by providing a clearer and more distinguishable speech samples.

Recalling Gallois et al. (2005), on speakers intention to adapt/modify/adjust their communication strategies while engaged in a communication with another person, one can expect changes in a native speaker's speech adjustments as he/she continues an interaction with (a) nonnative speaker(s). To elaborate on that, one can expect that after a conversation between a native speaker and a nonnative speaker initiates and goes on, the native speaker can have a better measurement of his/her interlocutor and thus adjust his/her own speech to the nonnative speaker.

In a communication in general, and specifically in conversation, depending on the communication participants' perception of the adjustments made, there may be accommodation or non-accommodation. If the adjustments are successful and thus perceived as "appropriate", then one can say that accommodation has happened, and if not, then non-accommodation has happened (Giles and Gasoirek, in press, p. 6). It has not been clearly stated in Giles and Gasoirek (in press) whether or not accommodation and non-accommodations include convergence, divergence, or both. However, it is possible to consider that accommodation and non-accommodation can occur in both convergence and divergence. It is logical to assign more accommodative and non-accommodative roles to convergence because accommodation and non-accommodation gain more significance/importance, specifically when confused in convergence. To put it other way, it is in convergence that one tries to portray a positive face of him/herself to the interlocutor in the conversation, and thus achieve better communicative purposes. On the contrary, in divergence, one tries to dissociate him/herself from the interlocutor in the conversation, and if non-accommodation occurs, and the interlocutor misunderstands the strategy as convergence, the sender can rely on other communicative resources to get the divergence across, for example through ignoring the interlocutor.

2.5 Over-accommodation and Under-accommodation

Over-accommodation refers to the situation in which the receiver of accommodation takes it to mean that the sender is extending the required accommodation in conversation (Coupland, Coupland, Giles, & Henwood, 1988; Giles & Gasoirek, in press). An example of over-accommodation is when a native speaker tries to explain something more clearly while the linguistic message is clear enough for the nonnative speaker.

However, as noted by Giles and Gasiorek (in press), although over-accommodation may be perceived as "unpleasant" by the receiver of the message, it is analysed, and maybe interpreted, by the receiver as an unsuccessful attempt, yet with good intentions (p. 21). Hence, in general, over-accommodation is perceived better, or more favourably, than under-accommodation.

2.6 CAT and First Language Acquisition

In first language acquisition research studies, motherese (Newport, 1977; Newport, Gleitman, & Gleitman, 1977; Gleitman, Newport, & Gleitman, 1984), child-directed speech (for example Dominey & Dodane, 2004; Matychuk, 2005), and infant-directed speech (for example Werker et al. 2007), more or less, all refer to the same phenomenon. Regardless of terminology, what matters is that there are noticeable characteristics associated with the speech addressed to infants that distinguish it from normal speech as it is addressed to adults. In particular, it is suggested that IDS has characteristics "to support distributional learning of native language phonetic categories" (Werker et al. 2007, p. 158). In the following sections availability of categorization cues contributory to phonetic categorization in the minds of language learners, and the ways categorization may occur, will be discussed.

2.7 Phoneme Categories

One possible account for the way speech sounds are stored in the minds of language learners is to consider that phonemes are stored in the mind as distributional categories or "cognitive architecture with multiple levels of representation" (Pierrehumbert, 2003, p. 116). In such a case, the input language sounds are categorized as mental representations, called phonemes, in the mind of the infant. It is suggested that infants modify or change their categorical representations of the phonemes in their minds in accord with perceived phonemes in the input they receive. This is caused by modifications in distributional categories (Maye, Werker, & Gerken, 2002). To put it simply, by receiving language input the mind of the language learner adds extra pieces to the categorically distributed data stored in the mind representing the phonemes, which in turn causes the change in infant's categorical representation(s). In fact, as illustrated through research "infants show evidence of phonetic categorization and of perceptual parsing of the speech stream before they learn to speak, before they have large vocabularies, and possibly before they even understand that words are referential"

(Pierrehumbert, 2003, p. 115). So it seems that, using the linguistic input, infants categorize speech sounds in their minds, which might be referred to as emerging grammar, and thus assigning different sounds to different categories. It is plausible to argue that having access to clearer input can be effective for faster and easier categorization of these speech sounds.

It has also been found that infant-directed speech includes clearer examples of their target language phones (Werker et al. 2007) than adult-directed speech. This process helps them categorize the input better by providing particularly good examples to the categorical representations in their minds representing those phonemes. Considering the above mentioned argument, one can assume that through IDS infants learning their first language have access to a good source of input, which helps them to categorize the sounds they hear appropriately.

2.8 Infant Sound Discrimination

Infants at the very young ages, less than a year, are capable of discriminating speech sounds of their target language as well as any other language that they hear in their environment (Eimas, Siqueland, Jasczky, & Vigorito, 1971; Streeter, 1976). They can also discriminate speech sounds without having prior experience with the language (Werker &Tees, 1984). Infants have the capability of discriminating language sounds in their surroundings. However, their phonetic discriminatory sensitivity to all languages decreases during the first year of life (Werker and Tees, 1984; Saffran, Werker, and Werner, 2006). It has been concluded that speech sound discrimination power is attenuated in the first year of life (Best and McRoberts, 2003; Kuhl et al. 2006). One of the consequences of this decrease in language sound discriminatory power is the strengthening of their target language speech sound discrimination power (Polka, Colantonio, & Sundara, 2001; Kuhl et al., 2006; Werker et al., 2007). To conclude this section, it seems that children, at the very young age, can learn very quickly about the sound structure of a language. This distinguishing power diminishes as they grow older. Consequently, their discriminative power tends to become biased toward their target language, that is their mother tongue. The result will be less discriminative power in word detection of new languages while more discriminative power for their mother tongue is attained. As it was discussed in the previous sections, infants have access to fine-tuned examples of the speech sounds of their target language through IDS. Another function of IDS is its social function in which infants apply previously learnt sociolinguistic knowledge to new situations. It has also been reported that infants' preference for individuals is highly influenced by their experience with that individual (Schachner and Hannan, 2010). One of the selective factors infants use for their social interaction is language, and more specifically, "IDS and adult-directed speech (ADS) serve as powerful cues guiding infants' visual preferences for potential social partners" (Schachner and Hannan, 2010, p.22). As a result, it seems plausible to argue that infants use IDS as a cue to establish their social network. Additionally, it might be argued that infants, beside any functions that IDS may or may not have on language acquisition, use IDS and ADS as ways of recognizing more caring and need satisfying individuals and probably establish stronger social networks around them. These caring characteristics, as realized through the type of language used, can be traced as the sources of FDS.

2.9 CAT and Second Language Acquisition

Another area of language acquisition that has applied CAT in explanation of the observations is second language acquisition. Research in the field of second language acquisition can be used to suggest that some modifications, similar to the L1 IDS, occur in second language acquisition context. For example Schwartz (1977) studied modification in both native speakers and nonnative speakers of English. Accommodating the nonnative speaker in the conversation has been referred to with different terms. For example Chastain (1988) refers to it as teacher talk when it comes to learning L2 in classes, Hatch, Shapira, and Gough (1978) call it foreigner talk, and Scarborough et al. (2007) refer to it as foreign-directed Speech (FDS). Scarborough et al. (2007) found that native speakers of English in two settings (describing a map between landmarks to real and imaginary nonnative speakers, compared to describing it to native speakers) modified their speech in a range of areas including vowel space expansion, vowel duration, and speech pace. However, one of the potential shortcomings of their study, based on the provided justifications, is that one cannot conclude that accommodating nonnative speakers in terms of speech modifications necessarily provides them with cues of fine-tuned examples of speech sounds that contribute to phoneme category construction in the minds of the nonnative speakers. In other words, asking a couple of native speakers to converse with real and imaginary nonnative speakers just shows us that native speakers may tend to change and thus accommodate their nonnative speaker conversational counterpart, probably the same way they accommodate infants.

To summarize the discussion here, communication accommodation theory has been applied in the explanation of IDS as well as FDS. In fact comparison of L1 acquisition and L2 acquisition is not something new. It is suggested that infants show tendency to use IDS as a way to categorize fine-tuned examples of the target language they are acquiring. Accordingly, they use codes and cues they find in others' speech, such as IDS and ADS, to recognize and establish the social network they want to establish. Comparing IDS to FDS, it has been suggested that native speakers of a language tend to modify their speech while addressing foreigners. However, regarding the potential problems caused by under-accommodation and over-accommodation in interactions are not always expendable luxuries one wants to consume while dealing with nonnative speakers. As a result justification of FDS is an important issue to be resolved through objective research.

In the following chapter, the method used for exploring CAT in L1-L2 conversation, the experiment setting, and the material have been elaborated on. The results of the experiment have also been presented.

Chapter 3: Methodology and Results

The data required for the purpose of this study were collected from 12 conversations taking place between participants in the research. To extract the desired data, in task one, each of the three participants gave directions on a designed map to two native peers separately. Subsequently, in task two, each native speaker gave the directions on the map to two nonnative peers, one at a time. All of these conversations were audio recorded. The result was 12 recorded conversations that were used for vowel duration and formant measurements. The data were analysed for vowel duration and formants. Vowel durations and formants, F1-F3, were measured using Praat software. The data were initially recorded on Excel spreadsheet, and later were transferred to SPSS version 19 for statistical analyses.

3.1 Participants

Subjects participating in this study were three male native speakers of Canadian English. There were also two nonnative confederates involved in the research. The three participants had at least one year of experience working, in the sense of mentorship and interaction, with nonnative speakers of English. The native speaker participants were chosen by contacting a number of writing tutors at the Academic Learning Centre (ALC) at the University of Manitoba, and two student groups, asking about their interest in participation in the research. The first three who contacted the researcher were recruited as the research participants. It was double checked with them that they had worked with international students and nonnative speakers of English for at least a year, in the form of mentorship and close relationships. They were all male native-born speakers of Canadian English. Two of them were 34 and 36 years old, and the other one was 57 years old. They all had Canadian Anglophone backgrounds speaking English as their first language. They had worked and volunteered with organizations dealing with L2 speakers on a daily bases.

Two confederates in the research were nonnative speakers of English enrolled as full time international students at the University of Manitoba. They were studying engineering at the graduate level at the time of the research. The nonnative confederates were chosen by contacting University of Manitoba Iranian Student Association (UMISA). The first two persons who contacted the researcher expressing interest in research participation were used as the confederates. The confederates were both male L1 speakers of Persian/Farsi and spoke English as their L2, and they had met certain language qualifications prior to entry. They were between 24-26 years old. They both had learnt English at their adulthood ages and were recognizable as foreigner and L2 speakers of English, based on their appearance and speech and accent. All the information regarding research description and the consent form were sent to the participants and confederates prior to the data collection session to assure that they have read and understood it by the data collection day.

Choosing experienced native speakers as the participants of the study is justifiable from two perspectives. First, as a matter of experience, it is possible that they have acquired the appropriate level of accommodation when conversing with nonnative speakers, regarding over and under accommodation. Second, it is plausible to assume that through experience they have learnt, and thus apply effective communicative accommodation strategies in such cases. And similarly, the relationship and kind of work they had done was contributory to the development of nonnative peers language development. So it is very probable that they apply the appropriate communication accommodation strategies from two points of view: social and learning. Additionally, it is more logical to consider a better understanding and appreciation of L2 development by those who have mentorship experience working with L2 learners than those who have haphazardly few, if any, encounters with L2 speakers/learners. All the participants were remunerated with 14 CAD per hour for volunteering in this research. This research had University of Manitoba Board of Research Ethics approval, Joint Faculty Research Ethics Board protocol number J2013:027. The data collection procedure was briefly explained to the participants and confederates in the informed consent form. The participants and confederates had a chance to meet with each other and familiarize themselves with the designed map before entering the sound attenuated booth. The reason for the familiarization was to make sure that the native speaker participants know that the confederates are nonnative speakers. There was a short break between every two sessions, about 2 minutes, and there was a longer break between native-nonnative sessions, about five to ten minutes. Familiarization with the task and the breaks were planned in advance to reduce the risk of the tasks becoming routine and repetitive.

3.2 Tasks

The communicative task used in this study was giving directions on a map of a hypothetical city. The map is provided in Appendix A. The participants were asked to give directions from point A named HOME to point B named UNIVERSITY (Appendix A).

One of the important advantages of this map was the use of real English words for the names of streets on the map. All these names have the desired vowels which were intended to be compared in the two situations: u/ʊ, e/ɛ, and i/ɪ. These vowels were elicited in fixed phonological contexts of /s-t/, /h-d/, and /t-k/. The majority of the words used in this research were used in a previous research on vowel quality (Hagiwara, 1997), and also they were common words in Canadian English. To get enough tokens of each word, three examples of each token were used in the map, and to make the task more realistic, names of the streets were presented using X Street North, X Street South, and X Street East/West. In each name, X was the word with the desired vowel in it. This was done to disguise the repeated names on the map, although it might be common in some cities to have the names of some streets repeated in different parts of the city. As a result, at the same time that three similar tokens were extracted, the use of terms such as Avenue, or Drive, or Boulevard, was avoided because of different phonological context that these terms might impose on the desired tokens. In brief, the benefits of using these kinds of terms were the use of unscripted language, having repeated tokens of the same word, and avoiding the use of made-up scripts. Another powerful part of this research was comparing the native speakers’ vowels with their own vowels across the two tasks. In other words, instead of relying on general vowel space of Canadian English speakers analysed and published by others (for example Hagiwara, 2006), in this research vowels of each participant were compared with his own vowels in the two tasks. Comparing the native speakers' vowels across the two tasks allows us to compare the pursued effects of FDS versus ADL within each and all the native speaker participants. Additionally, to control any possible fluctuation(s) that the first language of confederates might have imposed on native speakers' use of the language, the L2 speakers were chosen from the same L1 background, which was Persian/Farsi.

Since real life language tokens have been utilized, through the use of existing English words, as well as a real life language task type, giving directions on a map, the collected data can be regarded as a close representation of similar natural language data. So the use of unscripted language tokens as well as performing a task type similar to real life language use are the two more compelling factor to the authenticity of the research. A fact about humanities research in general, and language-related studies in specific, is that researchers need to test/modify their findings against real life and real situation data, before making strong conclusions and/or generalizations. However in this study, by the use of real language words, a made up task, based on real language use, was developed to make the data extraction as naturalistic as possible.

3.3 Data collection

Data collection sessions were conducted in the Experimental Linguistics Laboratory at the University of Manitoba. Prior to each session, participants were familiarized with the task. The map was shown to them along with the instructions. They were asked to give directions from point A named HOME to point B named UNIVERSITY on the map. The total number of tokens produced by each participant in each session was 54. There were six chosen vowels, three lax and three tense, realized in 18 different words. The words, used as the names of streets, were assigned on the map on a random selection in the way that there were groups of eighteen names that were randomly assigned to the streets. Different suffixes were used after the names of the streets to avoid repetition, North, East, and South. The words used in this study were: Bit, Tick, Sit, Beat, Teak, Seat, Bet, Tech, Set, Bate, Take, Sake, Put, Took, Soot, Suit, Tuque, and Boot. The majority of the list was adapted from Hagiwara (1997). Table (1) summarizes the desired vowels and the used words in this study. Before the sessions, a familiarization session was held for the participants and confederates and they were given the map as well as the instructions. The recording was done, using digital data recorder, in the sound attenuated booth and the data were transferred to computer for measuring vowel durations and formants using Praat software.

Table 1. The words and vowels used in this study

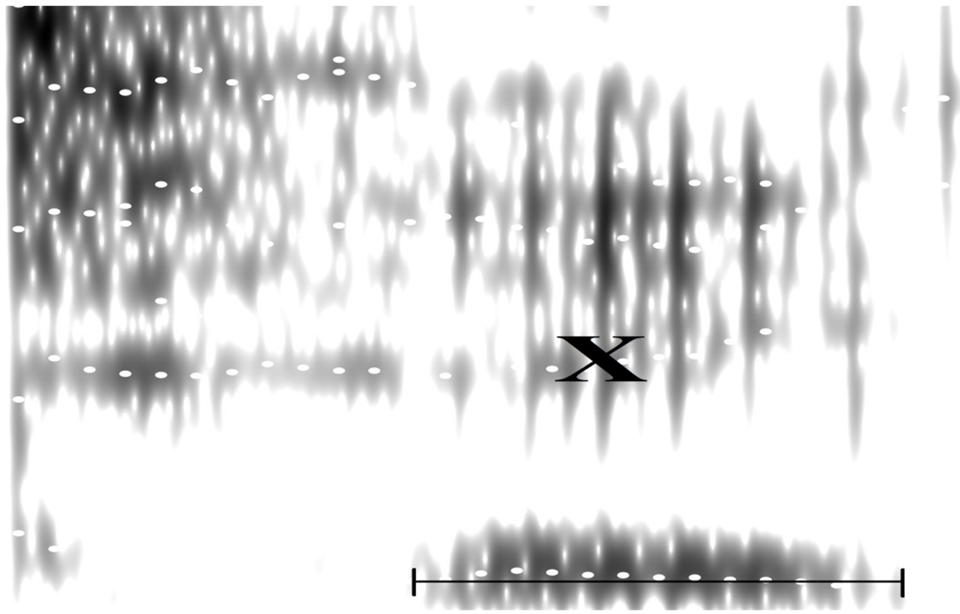
	Front	Front	Back
Lax	ɪ, bit, tick, sit	ɛ, bet, tech, set	ʊ, put, took, soot
Tense	i, beat, teak, seat	e, bate, take, sake	u, suit, tuque, boot

After being familiarized with the task and the data collection procedure, in the first task, each native speaker was asked to give directions on the map to a fellow native speaker. So Speaker A gave directions to Speaker B and then to Speaker C, Speaker B gave direction to Speaker A and later to Speaker C and so on. In the next task, the native speakers were to give directions on the map to nonnative confederates. No session was repeated, and there was a short break, two to three minutes, between two sessions. The total time taken for completion of the tasks was about an hour and fifteen minutes, including 2022 seconds of recording. The first part of the task lasted for 1049 seconds, and the second part lasted for 973 seconds. Thus each session in the first task lasted for an average of 174 seconds, and each session in the second part of the task lasted for an average of 169 seconds. The data was recorded in the sound attenuated booth in the Experimental Linguistics Laboratory. In each session a participant and a confederate were seated together in the booth, while the researcher and the other participants and confederates waited out of sight in the main lab. The data were digitally audio recorded on a chip and later transferred to computer and were analysed using Praat software. In Praat, after to listening to a specific section the spectrogram was visually consulted jointly with sound waves. After that the vowel duration and the first three formants were measured. The formant tracker was set to detect five formants in the range of 0 and 5500 Hz.

3.4 Data Analyses

The data were collected in sessions formed by the themes of native speaker-native speaker interactions and native speaker-nonnative speaker interactions. Prior to the sessions, the participants were familiarized with the task. At the beginning of each session, the researcher named the session as something like “Speaker A-Confederate one” or “Speaker A-Confederate international student number one”. The data measurement was done using Praat software. The formants were measured by putting the cursor in the middle of the vowel and reading the formants. For measuring the vowel durations, first the word was listened to make sure the word being measured is the intended word with the desired vowel in it. In the next stage the beginning and the ending of each vowel was located visually using the spectrogram and the corresponding sounds waves. The two main formants were also used as an asset in specifying the beginning and the ending of the vowels. For measuring the frequencies of the formants, F1-F3, after audio-visual inspection of the vowel, the cursor was placed in the middle of the second formant in the spectrogram, which is the durational centre of the vowel (Figure 1). This point was selected for formant measurement because it is most probably the place where formants are clear and more likely to belong to the desired vowel. The formants frequencies then were measured using Praat interface strike keys. After measuring the vowel durations and formants, all the data were stored in Excel file formats and later were transferred to SPSS for data analysis. Figure (1) shows the spectrogram image for vowel duration and formant frequencies measurements in the word ‘take’. In the image, for vowel duration the beginning and the end of selection were selected considering different factors including waveforms and formants and the spectrogram, and for getting the formants the cursor was placed in the middle of the vowel, it has been marked X in this image. It has to be mentioned here that in one case, one of the participants skipped one street name. In that case the missing word, take, was replaced with a close by word “take” being uttered in the conversation. In another case, the participant mispronounced the word ‘sake’. This word was replaced for with one of the repetitions of the word in the follow-up conversations.

Figure 1. Praat spectrogram image for the word 'take'



Regarding formant frequencies; F1s, F2s, and F3s; as well as vowel durations, to have a more comprehensive understanding, appropriate statistical analyses were applied to different data settings including each native speaker's vowels in the two tasks, all native speakers' vowels across the two tasks, and the corresponding first formants (F1s), second formants (F2s), and third formants (F3s). The representative charts related to formants and vowel durations have also been produced and used in the following section(s). The analyses were done for both vowel duration and formants, using F1s, F2s, and F3s.

Table (2) summarizes vowel durations in the two tasks. Vowel duration for each vowel in task 1 and task two has been classified. This table also includes the minimum and maximum duration of each vowel in each task. Additionally, it shows mean, standard deviation, and the range for each vowel. The range refers to the distance between the maximum and minimum numbers in a set of data (Heiman, 2011).

Table 2.Vowel duration and ranges, in milliseconds, in the two tasks

Vowels and tasks	Minimum	Maximum	Mean	Std. Deviation	Range
ɪ . task 1	44	107	65	14	63
ɪ . task 2	35	93	61	13	58
i. task 1	44	124	88	18	80
i. task 2	50	113	84	15	63
ɛ . task 1	52	116	79	12	64
ɛ . task 2	53	115	79	14	62
e. task 1	68	140	103	18	72
e . task 2	59	132	95	17	73
ʊ . task 1	48	88	66	10	40
ʊ . task 2	38	101	61	11	63
u . task 1	61	136	93	19	75
u . task 2	47	124	86	18	77

Tables (3) and (4) summarize vowel formant frequencies in the two tasks. Each vowel's first three formants, F1-F3, have been presented in these tables. The minimum, maximum, mean, standard deviation, and range for each formant have also been summarized in these tables.

Table 3. Formant frequencies, in Hz, and their ranges in task 1

Formant	Minimum	Maximum	Mean	Std. Deviation	Range
ɪ.F1.1	329	466	413	28	137
ɪ.F2.1	1713	2372	1956	146	659
ɪ.F3.1	2431	3633	2751	228	1201
i.F1.1	262	1659	357	183	1397
i.F2.1	325	3004	2311	313	2679
i.F3.1	2105	3969	3093	277	1864
ɛ.F1.1	266	725	552	68	459
ɛ.F2.1	1559	2448	1747	137	889
ɛ.F3.1	2119	3263	2557	275	1144
e.F1.1	329	666	397	48	337
e.F2.1	1927	2423	2167	108	496
e.F3.1	2286	3377	2892	197	1091
ʊ.F1.1	233	1410	477	172	1177
ʊ.F2.1	393	2253	1430	338	1860
ʊ.F3.1	2065	3499	2749	329	1434
u.F1.1	204	1351	381	165	1147
u.F2.1	868	2219	1616	313	1351

u.F3.1	1857	4005	2705	422	2148

Table 4. Formant frequencies, in Hz, and their ranges in task 2

Formant	Minimum	Maximum	Mean	Std. Deviation	Range
ɪ.F1.2	317	452	403	30	135
ɪ.F2.2	1646	2502	1947	140	856
ɪ.F3.2	2414	3440	2716	251	1026
i.F1.2	275	388	326	24	113
i.F2.2	2042	2682	2299	97	640
i.F3.2	2611	3497	3063	173	886
ɛ.F1.2	346	629	540	55	283
ɛ.F2.2	1573	2396	1745	143	823
ɛ.F3.2	2092	3247	2497	237	1155
e.F1.2	330	494	395	35	164
e.F2.2	1830	2387	2144	106	557
e.F3.2	2395	3492	2854	253	1097
ʊ.F1.2	318	625	436	51	307
ʊ.F2.2	881	2177	1444	296	1296
ʊ.F3.2	1909	3295	2608	383	1386
u.F1.2	292	752	363	79	460
u.F2.2	719	2545	1671	362	1826

u.F3.2	2062	3810	2731	446	1748

To have a general picture of the formants across the two tasks, formant averages have been summarized in table (5). In this table, the average formants of each vowel, F1-F3, have been presented across the two tasks.

Table 5. Formants averages in the two tasks

	ɪ			i			ɛ			e			ʊ			u		
Formant	F1	F2	F3	F1	F2	F3	F1	F2	F3	F1	F2	F3	F1	F2	F3	F1	F2	F3
Task 1	413	357	1956	2311	2751	3093	552	397	1747	2167	2557	2892	477	381	1430	1616	2749	2705
Task 2	403	326	1947	2299	2716	3063	540	395	1745	2144	2497	2854	436	363	1444	1671	2608	2731

Similarly, table (6) is a summary of the average vowel durations across the two tasks. In this table the tense vowels have been preceded lax vowels.

Table 6. Vowel duration average in the two tasks

Vowel	Average in task 1	Average in task 2
ɪ	66	61
i	90	83
ɛ	77	79
e	105	95
ʊ	66	61
u	91	84

Tables (7) and (8) represent vowel duration and formants' means as related to each native speaker and all native speakers together in the two tasks. Table (7) shows vowel duration means for each native speaker in task one immediately followed by vowel duration in task two for the same speaker. At the bottom of the table, vowel duration means for all three native speakers in the two tasks have been presented.

Table 7. Mean of vowel duration

	ɪ	i	ɛ	e	ʊ	u
Speaker A-task 1	72	86	78	101	70	90
Speaker A-task 2	61	78	79	93	64	84
Speak B-task 1	68	94	83	107	66	100
Speaker B-task 2	64	88	80	102	59	92
Speaker C-task 1	68	94	83	107	66	100
Speaker C-task 2	64	88	80	102	59	92
All speakers task 1	65	88	79	102	66	93
All speakers task 2	61	84	79	95	61	86

In table (8), vowel formants means in the two tasks for each native speaker and all native speakers together have been summarized.

Table 8. Vowel formants for all and each native speaker in the two tasks

	ɪ			i			ɛ			e			ʊ			u		
	F1	F2	F3	F1	F2	F3	F1	F2	F3	F1	F2	F3	F1	F2	F3	F1	F2	F3
Speaker A in task 1	409	1884	2728	385	2183	3109	523	1731	2508	389	2120	2913	447	1576	2920	324	1802	2924
Speaker A in task 2	400	1885	2759	318	2208	3084	524	1740	2399	377	2110	2829	437	1638	2741	345	1870	3005
speaker B in task 1	415	1979	2912	347	2382	3203	523	1766	2742	415	2108	2940	443	1202	2799	352	1537	2717
Speaker B in task 2	411	1976	2850	329	2353	3103	511	1792	2661	421	2100	2960	426	1270	2814	353	1561	2837
Speaker C in task 1	415	1979	2912	347	2382	3203	523	1766	2742	415	2108	2940	443	1202	2799	352	1537	2717
Speaker C in task 2	411	1976	2850	329	2353	3103	511	1792	2661	421	2100	2960	426	1270	2814	353	1561	2837

All Speakers in task 1	413	1956	2751	357	2311	3093	552	1747	2557	397	2167	2892	477	1430	2749	381	1616	2705
All Speakers in task 2	403	1947	2716	326	2299	3063	540	1745	2497	395	2144	2856	436	1444	2608	363	1671	2731

In table (8), vowel formants for all and each native speaker(s) across the two tasks have been summarized. In this table each participant's vowel formants' means in task one have been presented and followed by their vowel formants' means in task 2.

In Figure (1) and Figure (2), vowel duration and formant frequencies across the two tasks have been presented. In Figure (1) each vowel as measured for task one is placed next to the same vowel as measured for task two.

Figure 2. Vowel durations in task 1 and task 2

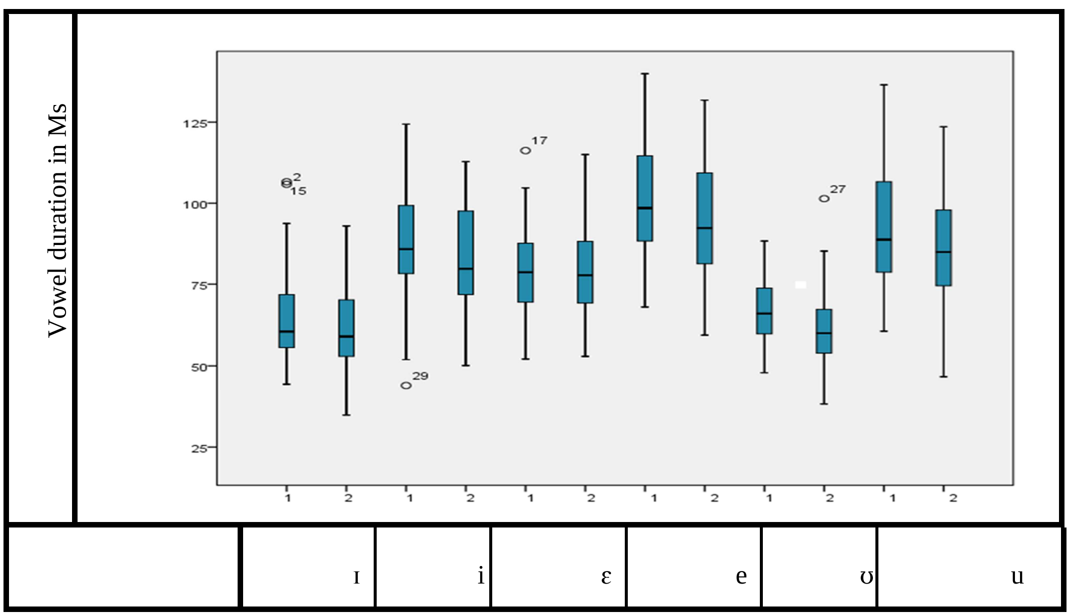
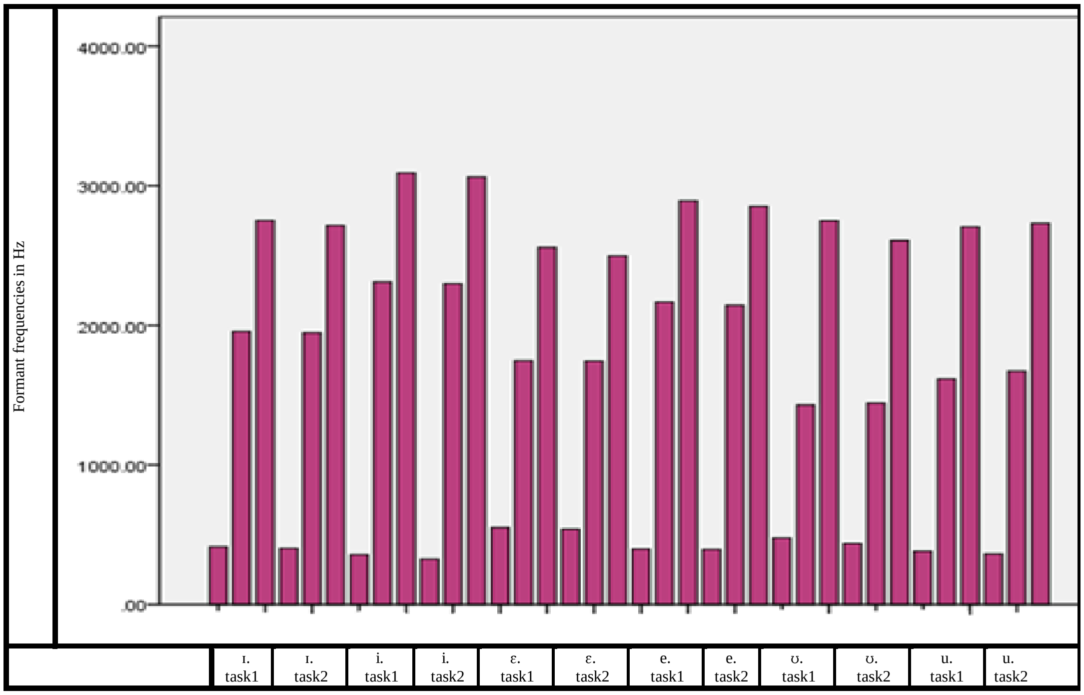


Figure 3. Vowel formants in task 1 and task 2



Following the analyses of the data, applying repeated measures analyses of variance statistical procedure, the effects of different variables have been studied. In the following sections, first the overall analyses for the vowel durations and formants are presented. Consequently, each separate factor has been studied. In complex designs, using ANOVA is a common practice. ANOVA statistical analysis is used when “the hypotheses of the study may require comparing more than two conditions of an independent variable” (Heiman, 2011, p. 291). The measurement adapted in comparing sets of vowel durations and formants was done using repeated measures ANOVA; following Uther, Knoll, & Burnham (2007); Burnham, Kitamura, and Vollmer-cona (2002). In each case there were two levels, and separate analysis was run for vowel durations and formant frequencies.

In the following sections the results of repeated measures analyses of variance as applied to vowel durations and formant frequencies measured in the two tasks in the experiment have been presented. In these tables, the significant column represents the p-value.

Table 9. Vowel durations in the two tasks for all the speakers

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept Error	4138932.125 56627.643	1 53	4138932.125 1068.446	3873.787	.000

As it is observable in from the table, Table (9), the p-value for vowel duration across the two tasks is significant at less than .001. It can be concluded that the differences between the vowel duration across the two tasks is not due to chance.

Table 10. Vowel formants in the two tasks for all the speakers

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept Error	5.533E9 5368149.264	1 53	5.533E9 101285.835	54627.641	.000

Table (10), summarized the results of applying repeated measures analyses of variance to the formants in the two tasks. In using repeated measure measured ANOVA, two sets of data in two related tasks are compared together two by two. As it is observable in Table (10), that p-value is significant at less than .001 for the effects of the formants in the two tasks. It can be concluded that the two sets of formants; F1s-F1s, F2s-F2s, and F3s-F3s; have significant differences across the two tasks.

In the next step, to find where possibly the difference(s) is/are between the sets of vowel pairs, repeated measures statistical procedure was applied to different subsets of data. For the effect of task on the lax-tense pairs, table (11) was resulted. According to the results, the differences between two sets of tense/lax vowels across the two tasks are significant for the ɪ-i set and for ʊ-u, but not for the ɛ-e set. This analyses reveal that considering pairs of lax-tense vowels across the two tasks, the differences are significant for the vowel pairs ɪ-i and ʊ-u.

Table 11. Vowel duration in sets of tense-lax vowel sets in the two tasks

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Task	ɪ-i	964.356	1	964.3	4.177	.042
	ɛ-e	539.918	1	539.9	2.262	.134
	ʊ-u	1889.192	1	1889.1	8.825	.003

For the effects of the speaker on tense-lax vowel sets, the difference between the sets has been significant in all cases at p-value less than .05, table (12). This might be attributed to individual differences in vowel production, which has been elaborated on in the following analyses.

Table 12. ANOVA for the effects of the speaker on vowel pairs

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Speaker	ɪ-i	1672.5	2	836.2	3.622	.028
	ɛ-e	2085.2	2	1042.6	4.367	.014
	ʊ-u	1491.8	2	745.9	3.484	.033

Regarding the tense/lax and the speaker, the resulted analyses have been summarized in table (13). As it can be seen, the difference between different speakers is significant for the ʊ-u set, but not significant for the other two sets.

Table 13. The difference between tense-lax sets in different speakers

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Tense/Lax * Speaker	ɪ-i	291.2	2	145.6	.631	.533
	ɛ-e	445.1	2	222.5	.932	.395
	ʊ-u	1705.6	2	852.8	3.984	.020

To find out the possible sources of the differences in the vowel sets across the three speakers, the Scheffe post hoc results have been summarized and presented in table (14). The post test results reveal that for the vowel sets for each speaker. The results reveal that for the ɪ-i set, speaker A and speaker C are significantly different, and for the vowel sets ɛ-e and ʊ-u, speaker B and speaker C are significantly different. For the rest of situations, vowels sets across the speakers, the differences were not significant.

Table 14. Comparison of speakers vowel duration across the tense-lax sets

Dependent Variable	(I) Speaker	(J) Speaker	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
ɪ-i	A	B	-.9958	2.5	.926	-7.2402	5.2485
		C	-6.3375*	2.5	.046	-12.5818	-.0932
	B	A	.9958	2.5	.926	-5.2485	7.2402
		C	-5.3417	2.5	.111	-11.5860	.9027
	C	A	6.3375*	2.5	.046	.0932	12.5818
		B	5.3417	2.5	.111	-.9027	11.5860
ɛ-e	A	B	1.9694	2.6	.747	-4.3806	8.3195
		C	-5.3819	2.6	.115	-11.7320	.9681
	B	A	-1.9694	2.6	.747	-8.3195	4.3806
		C	-7.3514*	2.6	.018	-13.7014	-1.0013
	C	A	5.3819	2.6	.115	-.9681	11.7320
		B	7.3514*	2.6	.018	1.0013	13.7014
ʊ-u	A	2.00	4.1653	2.4	.235	-1.8478	10.1784
		3.00	-2.1681	2.4	.674	-8.1811	3.8450
	B	1.00	-4.1653	2.4	.235	-10.1784	1.8478
		3.00	-6.3333*	2.4	.036	-12.3464	-.3202
	C	1.00	2.1681	2.4	.674	-3.8450	8.1811
		2.00	6.3333*	2.4	.036	.3202	12.3464

Regarding vowel formants, the statistical procedure was applied to the data to determine whether or not the formant subsets differ significantly in the two different tasks. As it can be inferred from table (15), there is no significant difference between vowel sets' formant frequencies as the result of task. It has to be noted here that vowel formants differ across the two tasks, but the sets do not change just due to the task, rather it is predicted that they change in the two tasks simultaneously. What this means is that the formants change together.

Table 15. The effect of task on vowel pair formants

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Task	ɪ-i.F1	23597.4	1	23597.4	2.349	.127
	ɪ-i F2	6567.5	1	6567.5	.096	.757
	ɪ-i.F3	56875.3	1	56875.3	.672	.413
	ɛ-e.F1	2585.3	1	2585.3	.306	.581
	ɛ-e.F2	8294.4	1	8294.4	.144	.705
	ɛ-e.F3	129668	1	129668	1.468	.227
	ʊ-u.F1	46154.1	1	46154.1	2.553	.112
	ʊ-u.F2	64536.2	1	64536.2	.549	.460
	ʊ-u.F3	178319.3	1	178319.3	1.124	.290

The following table, Table (16), represents the results for the effects of the speaker on the vowel formants for sets of tense-lax vowels. As it can be justified from the table, most of the vowel formants differ significantly with the main effect of the speaker. In other words, eight out of nine vowel set formants are significantly different considering the main effect of the speaker. Just the first formant, F1, of the vowel sets ɪ-i is not significantly different considering the main effect of speaker.

Table 16. The effects of the speakers on vowel formants

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Speaker	ɪ-i.F1	1738.8	2	869.4	.094	.910
	ɪ-i. F2	841395.9	2	420697.9	12.382	.000
	ɪ-i.F3	2046483.5	2	1023241.7	22.235	.000
	ε-e.F1	55392.7	2	27696.3	13.420	.000
	ε-e.F2	141737.3	2	70868.6	5.280	.006
	ε-e.F3	1800023.6	2	900011.8	17.919	.000
	ʊ-u. F1	238995.7	2	119497.8	7.781	.001
	ʊ-u.F2	4014609.7	2	2007304.8	22.563	.000
	ʊ-u.F3	9659992.9	2	4829996.4	42.995	.000

Analysing each individual speaker's vowel duration and formants across the two tasks will answer the question of whether or not individual speaker's vowel duration and formants have changed significantly over the two tasks, and is the main reason for the differences. Tables (17) and (18) summarize the repeated measures analyses of variance statistical procedure as applied to the three speakers' vowel duration and formants across the two tasks.

Table 17. Repeated measures statistics for vowel duration across the two tasks

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Speaker A Intercept Error	 1368944.900 12193.744	 1 17	 1368944.900 717.279	1908.525	.000
Speaker B Intercept Error	 1508796.191 26822.238	 1 17	 1508796.191 1577.779	956.279	.000
Speaker C Intercept Error	 1508796.191 26822.238	 1 17	 1508796.191 1577.779	956.279	.000

Table 18. Repeated measures statistics for vowel formants across the two tasks

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Speaker A					
Intercept	1.894E9	1	1.894E9	24834.371	.000
Error	1296472.882	17	76263.111		
Speaker B					
Intercept	1.892E9	1	1.892E9	39070.965	.000
Error	823123.008	17	48419.000		
Speaker C					
Intercept	1.892E9	1	1.892E9	39070.965	.000
Error	823123.008	17	48419.000		

As is observable in Tables (17) and (18), vowel duration and formant frequencies have significant differences in each individual speaker's speech, and the p-value is significant at less than .001. To test the potential effects of different speakers on the vowel duration and formants, Scheffe post hoc tests were run. The results of the test regarding each phonological environment revealed that for vowel duration in 12 cases, out of 36, two of the three speakers were significantly different from each other (Table 20). This means that roughly in one third of the vowel durations, two speakers produced vowels, in terms of duration, significantly different from each other. Additionally, Table 21 summarizes the effect of speaker in formant frequencies in each vowel environment. According to this table, in a number of the formant frequencies in specific environments, the speakers differ from each other significantly at less than .05. However, as it is discussed these differences are most probably due to individual differences in speech.

The main difference found through repeated measures analyses may be in exaggerating the space in vowel duration between lax and the corresponding tense vowels as well as increased distance between the formants. To clarify this point, it is argued here that the distance between pairing vowels can be a determining factor provided by the native speaker participants for the L2 learners to have a clear(er) picture of the intended vowel. To test this hypothesis, the ranges of each set of vowel durations and formants were calculated as well as the difference between the corresponding tense and lax vowels in the same task. The distances were calculated by subtracting the averages from each other. Moreover, repeated measures analyses was applied to the average of the distances in both vowel duration in each pair and formants F1, F2, and F3. Another contributory factor that might be effective in vowel recognition is the distance between the lax-tense vowels. To test the meaningfulness of possible differences between tense and lax vowels, the differences between tense and lax vowels were calculated. The differences were later used in the analyses to have a better understanding of a significant difference. Table 19 summarizes the analyses of variance between vowel differences and formant differences, which is significant at p–values less than .001.

Table 19. Repeated measures analyses for vowel duration differences and formant differences across the two tasks

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Vowel duration differences Intercept	2737.3	5	547.4	7772151.9	.000
Formants Intercept	16502730	17	970748	6	.000

In these analyses, both vowel duration average differences and formant average differences, in lax-tense vowels, have been significantly different across the two tasks.

Chapter 4: Discussion

The original intentions behind this research were seeking communication accommodation effects in L2 situation and the potential effects they might have on L2 acquisition as realized through vowel duration and quality. The results of the analyses showed significant effects for both vowel duration and quality, as realized through vowel formants. Based on the results, there are significant differences in vowel duration and formant frequencies among the vowels produced in the two settings of the study, which is when the speech is directed to a native peer compared to when the speech is addressed to an L2 learner. This confirms the results of other studies proposing communication accommodation strategies to be at work while native speakers address nonnative peers (for example Scarborough et al. 2007). Similar findings have been reported in research studying infants learning their first language. In fact, infant directed speech (IDS) research indicates that there are significant differences between IDS and adult direct speech (ADS) (Werker et al. 2007). It has been proposed that distinguishing characteristics of IDS may provide infants with linguistic cues that ease their categorization of linguistic sounds (Werker et al. 2007). Similar effects have been reported in FDS while native speakers address nonnative peers through the production of higher formant frequencies and longer vowel durations to accommodate the nonnative peers (Scarborough et al. 2007).

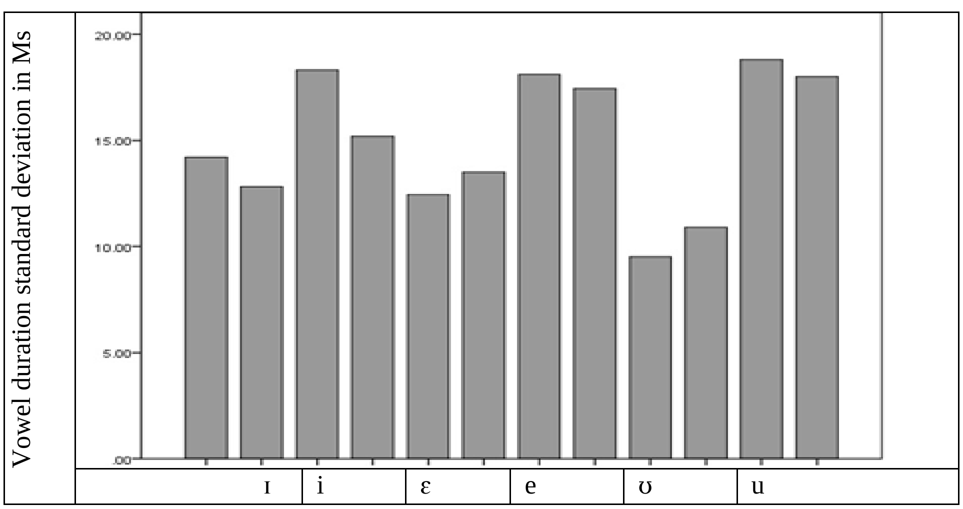
However, it seems that the efficiency and justification of providing longer vowel duration and hyperarticulated formant frequencies have not been explored enough. The mere existence of differences in the two contexts of native versus nonnative peer interlocutor does not provide enough evidence to support the claim that native speakers produce longer vowel duration and higher formants when addressing L2 speakers, nor does it support the benefits of providing that kind of different speech sounds for the L2 development. In the present study, it is specifically suggested that the provision of longer durations and hyper-articulated formants are not necessarily part of accommodating L2 speakers by the native participants, nor is it necessarily helpful in L2 perception and learning. But rather the accommodation might have occurred by using more stereotypical vowels. This has been realized through reducing the variability of the vowel examples. Additionally, it has been proposed that vowel inherent spectral change (VISC) has a significant contribution to the perception of the vowel (Heillenbrand, 2013; Morrison, 2013; Nearey, 2013). However, it seems crucial to investigate more the effects of VISC in vowel duration and formants in terms of lax-tense vowel perception.

4.1 Justifications for the Accommodation Types in the two settings

A careful consideration of the data will clarify that vowel duration and formant frequencies have been varied, and hyperarticulated mainly in native peer context rather than in the nonnative peer context. In fact, vowel duration was reduced in the nonnative peer compared with native peer context. However, it might be naive to conclude that longer vowel duration and hyperarticulated vowel formants can be attributed to accommodation in native peer context or non-accommodation in nonnative peer context. An explanation for the observations and the results is that native participants, with the specific characteristics of having experience working with nonnative speakers, know that nonnative peers can perceive vowels better if the vowels are produced within the stereotypical patterns of the English vowels. It is suggested that the use of longer vowels and wider range of formants in the native-peer task is related to the native speaker perception of larger language example storage available in the mind of the native peers. In other words, generally speaking, standard deviation of the vowel duration in task 1 and task 2 and the corresponding formants reveal higher standard deviations in task 1, which is in four cases out of six. In these situations, it might be the case that native speakers assume a wider range of vowel examples in the mind of native peers, which is lacked in the mind of nonnative peers, thus they feel freer in producing vowel examples.

Vowel duration standard deviation and their formant standard deviations have been summarized in figures (4) and (5) below. The vowel duration in task one, in which native speakers addressed native peers, is generally more variable than in task 2, where natives addressed nonnative peers. Considering mental representations for speech sounds stored in the mind of the language learner while learning the language, and later used for speech sound interpretation, the more variability observed in task one compared to task two is explainable. Vowels produced in task one are generally more variable, which means they exist within a wider space. One explanation of the variety observed in vowel duration in task one is native speaker participants' awareness, conscious or unconscious, of the native peers wider mental capacity in the language perception, and hence existence of more examples of the speech sounds in the native peer's mind to be utilised in perception. However, in the nonnative peer context, the native speakers tried to use more stereotypical examples of the vowel durations, and produced speech samples within a narrower space. A reason for longer vowel duration provision in task one, the native peer context, is the assumed existence of more examples of the intended vowels in the minds of their native peers. Looking it from the variability perspective, the provision of less variable vowel durations by the native speakers when addressing nonnative peers is justifiable when one thinks of the demand on mental faculty for internalizing the corresponding sounds as well as inferring the speech. Providing nonnative peers with less variable durational space will demand less of their mental faculties. Native speakers' production of less variable vowel durations in each set of tense-lax vowels will provide the nonnative peers with two important advantages: 1) a better chance of understanding the message, due to less variable and thus less mental demanding tasks; 2) providing the L2 speaker with fine-tuned/stereotypical examples of the speech sounds to infer the intended sound better. Considering a graphic representation of the standard deviation of the vowel durations will give us a clue in how scattered the duration can be in the native peer group in an imaginary space.

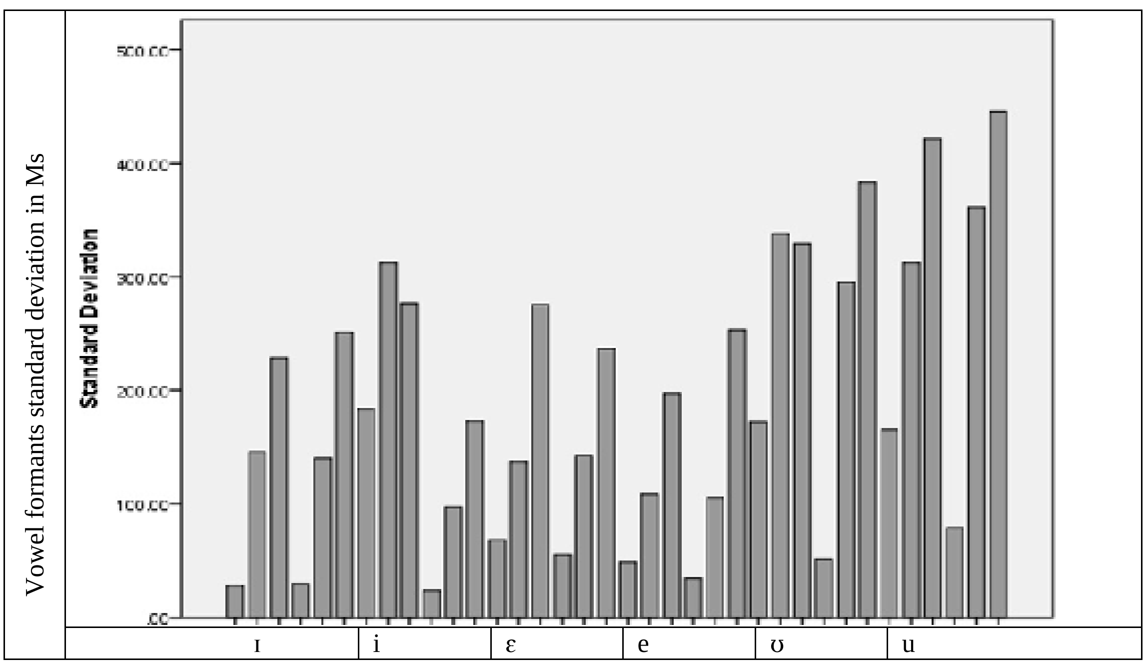
Figure 4. Standard deviation of vowel duration across the two tasks



In Figure (4), vowel duration standard deviations in the two tasks, native versus nonnative peer, have been compared together. Each vowel's standard deviation, shown in a bar graph, in task two is proceeded by the same vowel duration's standard deviation in task one. As it can be perceived from the graph, in most cases the standard deviation is higher in task one compared to task two, thus confirming the idea of providing more variable examples in the native peer context.

Figure (5) summarizes the results of vowel formants standard deviation in the two tasks. In each case the standard deviation of vowel formants, F1-F3, in task one are graphed before the same vowel formants in task two. Figure (5) can be used as a reference to confer that vowel formant frequencies have been more diverse and even higher in most of the cases in native peer than in nonnative peer context.

Figure 5. Standard deviation of vowel formants across the two tasks



In the bar graph representing vowel quality as realized through first three formants, F1-F3, each vowel's formants measured in task one have been followed by the same vowel formants in task two. Again in most cases vowel formants in task one are more variable than in task two.

Although there are also some signs of the role of speaker in tense/lax vowel set formant and duration differences (Tables 13, 14, 15, and 16). Since each speaker's vowel durations and formants were compared with his own in the two tasks and proved significantly different, the possibility of the role of a single speaker in the differences across the two tasks is deemed, and making 'speaker' as the main effect for the differences will be eradicated (Tables 18 and 19).

One note to be taken here is that communication accommodation may be realized differently in native-nonnative peer conversations than generally understood, especially with experienced native peers in such conversations. The original hypotheses of this research were that in native-nonnative peer conversations vowel duration and formants are used in an exaggerated way as communication accommodation strategies employed by native speakers to enhance the L2 learner/speaker understanding of the L2. This did not turn out to be the case. The original expectation was to find enhanced vowel duration and higher frequency in task two than in task one, which is native peer. On the contrary, the results showed that in task one the native speakers produced more enhanced vowel durations and hyperarticulated formants. It is argued here that this fact is due to the provision of more variable examples of the intended vowels. The results suggest meaningful differences across the two tasks as per speaker or for all speakers together. However, the results of this research can be used to suggest that the speakers produced less variable forms of vowel duration and formants in nonnative-directed speech than in native-directed speech. This is not to conclude that communication accommodation is not necessary, or useless, in L2 acquisition. What can be discussed here is that the L2 learner's accommodation through increased formant frequencies and extension of vowel duration was not the strategy employed by native speakers of English while conversing with nonnative peers, as it might be used in IDS. However, based on these results it is argued that accommodation did in fact take place, in that the participants tuned their speech, by providing less variable examples of the sounds both in cases of vowel duration and formant frequencies to their L2 interlocutors. An example may help clarify the point. An old friend once shared one of his stories when he had been travelling abroad. He mentioned that years ago in Serbia, he was walking down a street and he heard a man is yelling at a distance "I just want half a hamburger!" repeatedly raising his voice higher each time. Curious about the source of the noise, my friend and his companion noticed that this weird conversation is going on almost a block away. My friend continued that the poor waiter who was working at a local restaurant was staring at the English Speaker trying to smile and probably having no idea what he was trying to say. He also explained that in Serbia they serve really big hamburgers, and that was probably the reason the mentioned person was trying to get half of it. In this case, raising the tone of the speech apparently was neither the best, nor the most effective, accommodation technique to deploy. In other words, trying to justify the techniques participants used in the current research, a native speaker can use a more stereotypical example of the language sounds to facilitate the L2 learners' understanding and learning of the L2. This way, providing comprehension as well as categorization cues can be realized through providing more familiar sounds in L2 for the L2 learner, and thus helping them better perceive and categorize the L2 sounds.

This process of accommodating the nonnative peers in conversations in such a useful, and maybe effective, way is in support of converting to the interlocutor (Giles, 1973), but at the same time converting in providing more stereotypical examples of the language, that is the language that is probably the most familiar to the L2 learner, rather than just hyper-articulating the sounds and producing enhanced vowel durations. It is also in support of linguistics categorization (Werker, 2007), but in the way of providing more familiar samples of the sounds and probably enhancing the already existing samples in the mind of the L2 learner. And to come up with a reasonable reason for providing vowel formant differences among the speakers, first of all we need to notice that it might be due to individual differences among the speakers. And another reason for that is that learners of L2 who have acquired L2 in a later age, versus early ages, rely more on vowel duration as a cue to recognize the vowel than on formant differences (Rogers, Glasbrenner, DeMasi and Bianchi, 2013). This provides reasons for producing hyperarticulated formants in the L1 context by the native speaker participants, because as a matter of experience they might have internalized that providing hyperarticulated formants for nonnative peers might be counterproductive.

Comparison of first and second language acquisition is not something new, nor unadvisable. For example, it has been argued that there are similarities as well as differences in the order of the morphemes acquired by first and second language learners (Krashen, 1981; Krashen, 1982). However, generalizations based on one's understanding of first language acquisition is not the best scientific method to deploy for understanding language acquisition in general, and second language acquisition in specific.

Additionally, one has to notice that even providing specific sounds in specific ways may be based on the adults' perception of language learning, or even on their generalizations of their childhood image of good caregivers (Schachner and Hannan, 2010), and not on the actual language learning process.

The present research findings are not in support of the idea that hyperarticulated formants and exaggerated vowel durations are typical communication accommodation strategies employed by experienced native speakers when addressing nonnative speakers. One strong point of the present research is that the results of the present research are based on the data extracted in interactions between experienced native speakers and nonnative speakers, thus practicality of the findings can also be inferred indirectly. One proposal for the kind of provision, in terms of vowel duration and formants, is that providing more stereotypical and thus less variable examples of the speech sounds are more likely to attribute to the facilitation and categorization of the L2 sounds by the L2 speakers. However, this is just a proposal to account for the observations, and need further explorations.

The present study reveals that the three native speakers who were experienced working with nonnative speakers did not significantly use exaggerated vowel duration and hyperarticulated vowel formants in communication with nonnative interlocutors. Instead, the native participants tended to use less variable vowel durations and formants, probably to provide the nonnative interlocutors with more stereotypical examples of vowel duration and quality, and hence facilitate their L2 sound perception and categorization.

It can be inferred from the findings of the current research that the participants reduced the variation and did not hyperarticulate when they were conversing with nonnative peers. This could be attributed to the speakers' intentions of providing clearer vowel examples within a smaller vowel space in the second task, as discussed above. Longer vowel duration can be related to having a freer vowel production space. In other words, in native peer context, the participant may mentally feel at ease while producing vowels, so the produced vowels can be more variable compared to typical English vowels, while in nonnative peer context the native speakers produced more typical English vowels. The standard deviations in native peer context were generally higher than nonnative peer. Therefore, it can be argued that in conversing with native peers, the experienced native speakers tend to be more comfortable and have a greater variation of vowel duration and formants, while with nonnative speakers being obliged to produce more typical and consistent speech sounds. It can be concluded that the provision of clear-cut examples of L2 vowels is possibly considered by the experienced natives to be an important contributory factor helping L2 learners categorize, and maybe internalize, the L2 sounds. It is understandable in the light of learning strategies; a game with five rules is most probably easier to remember and master than a game with eight rules, and a farm of 5000 Sqf is easier and faster to explore and know than a farm of 50000 Sqf. Similarly, providing second language learners with a less variable vowel and formant dispersion provides the L2 learners with the opportunity of internalizing the vowel categories sooner and understanding the message better, and even enhancing the existing vowel categories in their minds.

Regarding formants, in the present research in task two compared to task one the mean of the first formant in all vowels has been decreased. But for the second formant, the mean of the second formants has decreased in the front vowels; ɪ/i, and ɛ/e; but increased in the back vowels, ʊ/u. There might be a facilitative cue in decreasing the formants for F1s and most of the F2s while increasing just two F2s (Table 19). Table (19) summarizes the mean of the formants in the two tasks. As it is noticeable from the table, all F1 means, but for u, show decrease in task two compared to task one, and all the F2 means have been decreased in task two, and the F2s have been decreased in task two, Table (5).

It has been found that the relationship between first and second formants is important in distinguishing front-back vowels (Ladefoged and Johnson, 2011). It has also been reported that "backness [of the vowels] correlates with the difference between the frequencies of F1 and F2" (Davenport and Hannahs, 2005, p. 63). What was found in the present research is that the distance between the back vowels have been increased in task 2 compared to task 1 (Table 5). This can be explained by the fact that considering the experience of the native participants as a contributory factor, accommodation in this case could mean application of strategies that are helpful in transferring meaning to their interlocutors. Thus not using formants as distinguishing factors in vowel recognition could mean that the use of the formant feature as a distinguishing factor in nonnative peer context is counterproductive, or less productive than vowel duration. In fact it has been found that nonnative speakers, who have learnt English at a late age, do not rely on vowel formants for vowel recognition, but they rely more on vowel duration for vowel perception (Rogers et al. 2013). Another explanation for the decrease in most of the F1s in task two compared to task one is that “high vowels have a low F1s and low vowels have a high F1” (Ashby and Maidment, 2005 p. 73), so lowering the F1s in task two could be attributed to emphasizing the highness of the vowels in the two back vowels. The back vowels were also separated from each other by pushing one of them to the front by increasing the F1 in one of them. It has been found that the relationship between F1-F2 is effective in frontness and backness of the vowels (Davenport and Hannahs, 2005).

The above mentioned fact would also add to the credibility of using experienced participants in the research, and indirectly, the reliability of the research, because the justification behind using experienced native participants could be established. Regarding the data collection, use of map, real English words, number of tokens, and fixed vowel environments made the tasks more realistic in terms of homogeneity of the data sample, and language use. The use of experienced native speakers as participants also added to the benefits of the experiment. Each one of the native speakers had at least one year of experience working with nonnative speakers. This experience has been in forms of mentorship and day to day life. This could be used as an indirect indication of the native peers’ internalization of the effectiveness of the accommodation they are applying to their communications with nonnative peers.

One might argue that the provision of less enhanced vowel durations and less hyperarticulated formants may be due to the repetition of the task. However, the familiarization of the native speakers with the tasks, having breaks in between two sessions and the two tasks would make it less likely to be the case. In the future research this doubt could be removed by making two versions of a map assigning different names to different streets and giving the fresh maps to the participants at the beginning of each session. The order of the tasks could be also changed in two different groups to establish a higher stability on the participants' performance.

The reason that the current research results may look contrary to some of the previous research findings can be explained relying on the unique design of the research. As it was explained on the introduction section, the participants in this research were native speakers of English having experience working with nonnative speakers of English. It is proposed that native speakers having experience working with nonnative speakers in the form of mentorship have inducted the effective strategies employable in native-nonnative peer interactions. Thus they are more probable to use the best techniques in such interactions. This would prioritize the use of experienced language speakers to inexperienced speakers in research studies like this. Another factor which might contribute to the potential differences in the present research result and some other research findings is the design of the present research. In the current research the same task, same speaker, and same language tokens were used for data collection. This would yield to the consistency of the data. In other words, if the data measured through native-nonnative peers were compared with the average Canadian English vowel duration and formant frequencies, then different results might have been produced. But since the same speaker/group were used in the two tasks resulting in the production of vowel tokens used for the analyses, it is less likely to be the matter of inconsistency in the data extracted and analysed. However, it might be argued that the order of the task might affect the data in the sense that native speakers had gone through the task for two times giving directions to the native peers before going through the task with nonnative peers. This is less likely to have happened because the arrangement of the tasks, number of tokens, and length of the task would make it less repetitive. Production of 54 language tokens, giving directions on a map with lots of curves, and having breaks in between the two tasks would make it less probable to become routine and repetitive. Regarding the language acquisition in general, and second language acquisition in specific, the design, in terms of comparing a participant's speech with his/her own speech across two different tasks, language tokens, by using real language words, and participants, in terms of using experienced participants, could be used to better enhance our understanding of language acquisition and effective communication strategies applicable to language acquisition.

4.1 Shortcomings and suggestions for further research

In this research three native speaker participants were used as the research participants. To make stronger claims, more participants with different genders are needed to be involved in the future research. As for the role of experience to be addressed directly, a research could be designed to compare experienced and inexperienced native speaker participants' vowels in conversations with L2 learners. Regarding language tokens, although a fair number of language tokens, 54 tokens per each vowel, extracted in each of the interactions, the use of more participants could help in extracting more different varieties of the tokens and thus enhancing our understanding of the communication accommodation strategies. Use of the same map for extracting the information could be acknowledged as another problematic source, but because of the intervals in between sessions, and the participants' familiarity with the task prior to the sessions, such problem is less likely to happen. This concern can be reduced in the future research by designing slightly different maps and assigning different language tokens to different streets at each version of the map. It has been suggested that VISC has an important role in the perception of the vowel (Hillenbrand, 2013; Morrison, 2013). To test such potentialities, different points in vowels are needed to be tested in another research. The L2 speakers' proficiency might be another attributive factor in the research studies like the present one. In this study international students were used that although were recognizable as L2 learners, they met certain levels of English proficiency. This might have some effects on the participants' application of communication accommodation strategies. In the future research, L2 speakers with different proficiency levels can be used to observe the accommodation strategies used in those cases.

References

Andruski, J. E. &Kuhl, P. K. (1996). The acoustic structure of /i/, /u/, and /a/ in mothers' speech to infants and adults. *Journal of the Acoustical Society of America, 100 (4)*, 2725-2726.

Ashby, M., and Maidment, J. (2005). *Introducing phonetic science*. New York, NY: Cambridge University Press.

Babel, Molly (2009). *Phonetic and social selectivity in speech accommodation* (Doctoral dissertation). Berkeley: University of California.

Best, C. C., & McRoberts, G. W. (2003). Infant perception of non-native consonant contrasts that adults assimilate in different ways. *Language and Speech 46 (2-3)*. 183-216 DOI: 10.1177/00238309030460020701

Bickmore, T., & Schulman, D. (2012). *Empirical Validation of an Accommodation Theory-Based Model of User-Agent Relationship* (Nakano, Y., Neff, M., Paiva, A., Walker, M. Eds.). IVA 2012. LNCS, 7502, 390–403. Springer, Heidelberg

Bilous, F. & R Krauss (1988). Dominance and accommodation in the conversational behaviors of same and mixed-gender dyads. *Language and Communication, 8*, 183-194.

Bourhis, R. Y., and Giles, H. (1977). The language of intergroup distinctiveness. In H. Giles (Ed.), *Language, ethnicity, and intergroup relations* (pp. 119-135). London: academic Press.

Bourhis, R. Y.(1983). Language attitudes and self-reports of French-English language usage in Quebec. *Journal of Multilingual and Multicultural Development, 4, 2-3*, 163-179. DOI: 10.1080/01434632.1983.9994109

Bradac, J. J., Hoper, R., and Wiemann, J. M. (1989). Message effects: retrospect and prospect. In J. J. Bradac (Ed.), *Message effects in communication science* (pp. 294-317). Newburry Park, CA: Sage.

Bruner, Jerome. 1983. *Child Talk.* New York: Norton.

Burnham, D., Kitamura, C., Vollmer-Conna, U. (2002). What's new, Pussycat? On talking to babies and animals. *Neuroscience*, 296, 1435.

Burleson, B. R. (1986). Communication skills and peer childhood relationships: An overview. In M. Mclaughlin (ed.), *Communication Yearbook 9* (pp. 143-180). Beverley Hills, CA: Sage.

Burleson, B. R., and Fennelly, D. A. (1981). The effects of persuasive appeal form and cognitive complexity on children's sharing behaviour. *Child Study Journal, 11*, 75-90.

Chastain, K. (1988). *Developing Second Language Skills*: *Theory and Practice.* New York: Harcourt Brace Jovanovich.

Coupland, N., Coupland, J., Giles, H., & Henwood, K. (1988). Accommodating the elderly: Invoking and extending a theory. *Language in Society*, *17,* 1-41.

de Boer, B. (2005). Infant directed speech and the evolution of language. In: M. Tallerman(ed.) *Evolutionary Prerequisites for Language* (pp. 100-121). Oxford: Oxford University Press.

Derwing, T.M. (1990). Speech rate is no simple matter: Rate adjustment and NS-NNS communicative success. *Studies in Second Language Acquisition, 12*, 303-313.

Davenport, M., & Hannahs, S. J. (2005). *Introducing phonetics & phonology* (2nd edition). London: Arnold.

Dings, A. (2012). Native speaker/nonnative speaker interaction and orientation to novice/expert identity. Journal of Pragmatics 44 (2012) 1503--1518

Dominey, P. F., and Dodane, C. (2004). Indeterminacy in language acquisition: the role of child directed speech and joint attention. Journal of Neurolinguistics 17 (2004) 121–145

Eimas, P. D, Siqueland, E. R., Jasczky, P., and Vigorito, J. (1971). Speech perception in infants. Science, New Series. 171, 3968. 303-306.

Erickson, M. L. (2000). Simultaneous effects on vowel duration in American English: A covariance structure modeling approach. *Journal of the Acoustical Society of America*, 108(6), 2980–2995.

Escudero, P. (2005). *Linguistic perception and second language acquisition*. The Netherlands: LOT.

Fang, X. (2010). The Role of Input and Interaction in Second Language Acquisition. Cross-Cultural Communication, 6 (1), 11-17.

Fernald, A. (1993). Approval and disapproval: infant responsiveness tovocal affect in familiar and unfamiliar languages. *Child Development*, *64 (3),* 657–674.

Ferguson, C. A. (1971). Absence of copula and the notion of simplicity: A study of normal speech, baby talk, foreigner talk and pidgins. In D. Holmes (Ed.).

Pidginization and creolization of languages (pp.141-150). Cambridge: Cambridge University Press.

Gallois, C., Ogay, T., & Giles, H. (2005). Communication accommodation theory: A look back and a look ahead. In W. B. Gudykunst (Ed.). *Theorizing about intercultural communication* (pp. 121-148). Thousand Oaks, CA: Sage.

Gilbert, D. T., Pelham, B. W., Krull, D. S. (1988). On cognitive busyness: When person perceivers meet persons perceived. *Journal of Personality and Social Psychology, 54 (5)*, 733-740.

Giles, H., and Powesland, P. F. (1975). *Speech style and social evaluation*. London: Academic Press.

Giles, H., & Coupland, N. (1991). *Language: Contexts and consequences.* Buckingham: Open University Press.

Giles, H., Coupland, N., & Coupland, J. (1991). Accommodation theory: Communication, context, and consequence. In H. Giles, J. Coupland & N. Coupland (Eds.), *The contexts of accommodation* (pp. 1-68). New York: Cambridge University Press.

Giles, H., & Gasiorek, J. (in press). Parameters of non-accommodation: Refining and elaborating communication accommodation theory. In J. Forgas, J. László , & V. Orsolya (Eds.), *Social cognition and communication*. New York: Psychology Press.

Gleitman, L. R., Newport, E. L., and Gleitman, H. (1984). The current status of the motherese hypothesis. *Journal of Child Language, 11*, 43-79. Doi:10.1017/S0305000900005584

Hatch, E., Shapira, R., and Gough, J. (1978). “foreigner-talk” discourse. *ITL Review of applied Linguistics*, 39-60.

Hatch, E. and Long, M. (1980). Discourse analysis, what’s that? In Larsen-Freeman (ed.), *Discourse Analysis in Second Language Research* (pp. 1-40). Rowley, Mass: Newburry House.

Gallois, C., Ogay, T. & Giles, H. (2005). Communication accommodation theory. In W. Gundykunst (Ed.), *Theorizing about intercultural communication* (pp. 121-148). Thousand Oaks: Sage.

Giles, H. (1973). Accent mobility: A model and some data. *Anthropological Linguistics, 15*, 87-105.

Hagiwara, R. (1997). Dialect variation and formant frequency: The American English vowels revisited. *Journal of the Acoustical Society of America, 102 (1)*, 655-658.

Hagiwara, R. (2006). Vowel production in Winnipeg. *Canadian Journal of Linguistics/La revue canadienne de linguistique, 51 (2/3)*. 127-141.

Heiman, G. W. (2011). *Basic statistics for behavioral sciences* (6th ed.). Belmont, CA: Cengage Learning.

Hillenbrand, J. M. (2013). Static and Dynamic Approaches to Vowel Perception. (2013). In G. S. Morrison and P. F. Assmann (eds.), *Vowel Inherent Spectral Change*. Berlin: Heidelberg. DOI: 10.1007/978-3-642-14209-3_2.

Kline, S. L., and Ceropski, J. M. (1984). Person-centered communication in medical practice. In J. T. Wood, and G. M. Phillips (Eds.). *Human decision making* (pp. 120-141). Carbondale, IL: Southern Illinois University Press.

Knoll, M., Scharrer, L., &Costall, A. (2011). "Look at the shark": Evaluation of student- and actress-produced standardised sentences of infant- and foreigner-directed speech. *Speech Communication, 53*, 12–22.

Kuhl, P. K., Andruski, J. E., Chistovich, I. A., Chistovich, L. A., Kozhevnikova, E. V., Ryskina, V. L., Stolyarova, E. I., Sundberg, U., and Lacerda, F. (1997). Cross-language analysis of phonetic units in language addressed to infants. *Science, 277*, 684–686.

Kuhl, P. K., Stevens, E., Hayashi, A., Deguchi, T., Kiritani, S., & Iverson, P. (2006). Infants show a facilitation effect for native language perception between 6 and 12 months. *Developmental Science, 9 (2),* F1–F9.

Krashen, S. 1981. *Second language acquisition and second language learning.* Oxford: Pergamon Press.

Krashen, S. (1982). *Principles and practice in second language acquisition*. New York: Prentice Hall.

Kuhl, P. K., Williams, K. A., Lacerda, F., Stevens, K. N., Lindblom, B. (1992). Linguistic experience alters phonetic perception in infants by 6 months of age. *Science, New Series, 255,* 5044, 606-608.

Ladefoged, P. and Johnson, K. (2001). *A course in phonetics* (6th edition). Boston: Cengage Learning.

Lindblom, B. (1963). Spectrographic study of vowel reduction. *Journal of the Acoustical Society of America, 35*, 1773–1781.

Matychuk, P. (2005). The role of child-directed speech in language acquisition: a case study. *Language Sciences 27*, 301–379

Maye, J., Werker, J. F., & Gerken, L. (2002). Infant sensitivity to distributional information can affect phonetic discrimination. *Cognition, 82(3)*, B101–B111.

Morrison, G. S. (2013). Theories of vowel inherent spectral change. In G. S. Morrison and P. F. Assmann (Eds.), *Vowel Inherent Spectral Change (pp. 31-47)*. Berlin: Heidelberg. DOI: 10.1007/978-3-642-14209-3_10.

Nearey, T. M. (2013). Vowel Inherent Spectral Change in the Vowels of North American English. In G. S. Morrison and P. F. Assmann (Eds.), *Vowel Inherent Spectral Change (pp. 31-47)*. Berlin: Heidelberg. DOI: 10.1007/978-3-642-14209-3_10.

Newport, E. L. (1977). Motherese: the speech of mothers to young children. In N. J. Castellan, D. B. Pisoni, and G. Potts (Eds.), *Cognitive theory* (pp. 177-217). Hillsdale, N. J.: Erlbaum.

Newport, E. L., Gleitman, H. & Gleitman, L. R. (1977). Mother, I'd rather do it myself: some effects and non-effects of maternal speech style. In C. E. Snow&C. A. Ferguson (Eds.), *Talking to children: language input and acquisition* (pp. 109-150). New York: C.U.

Pickering, Martin J., and Simon Garrod. 2004b. Toward a mechanistic psychology of dialogue.
Behavioral and Brain Sciences 27, 169–226.

Pierrehumbert, J. B. (2003). Phonetic Diversity, Statistical Learning, and Acquisition of Phonology. *Language and speech, 46 (2 –3)*, 115 –154.

Phillips, J. (1973). Syntax and vocabulary of mothers' speech to young children: Age and sex comparisons. *Child Development*, *44*, 182-185

Polka, L., Colantonio, C. & Sundara, M. (2001). Cross-language perception of /d – ð/: Evidence for a new developmental pattern. *Journal of the Acoustical Society of America*, *109(5)*, 2190-2200.

Rivers, W. M. (1981). *Teaching foreign language skills*. Chicago: University of Chicago Press.

Rogers, C. L., Glasbrenner, M. M., DeMasi, T. M., and Bianchi, M. (2013). Vowel Inherent Spectral Change and the Second-Language Learner. In G. S. Morrison and P. F. Assmann (Eds.), *Vowel Inherent Spectral Change*. Berlin: Heidelberg. DOI: 10.1007/978-3-642-14209-3_10.

Saffran, J.R., Werker, J., & Werner, L. (2006). The infant's auditory world: Hearing, speech, and the beginnings of language. In R. Siegler and D. Kuhn (Eds.), *Handbook of Child Development* (pp. 58-108). New York: Wiley.

Scarborough, R., Brenier, J., Zhao, Y., Hall-Lew, L., and Dmitrieva, O. (2007) An Acoustic Study of Real and Imagined Foreigner-Directed Speech. *Proceedings of the International Congress of Phonetic Sciences*.

Schachner, A., Hannon E. E. (2010). Infant-Directed Speech Drives Social Preferences in 5-Month-Old Infants. *Developmental Psychology, 47(1)*, 19–25. DOI: 10.1037/a0020740

Schwartz, J. L. (1977). *Repair in Conversations between Adult Second Language Learners of English* (M. A. Thesis). University of California, Los Angeles.

Shepard, Carolyn A., Howard Giles, and Beth A. LePoire. (2001). Communication accommodation theory. In W. Peter Robinson and Howard Giles. *The New Handbook of Language and Social Psychology* (Eds.), 33–56. John Wiley & Sons Incorporated.

Simon, G., & Doherty, G. (1994). Conversation, co-ordination, and convention: An empirical investigation of how groups establish linguistic conventions. *Cognition, 53*,181–215.

Streeter, L. L. (1976). Language perception of two-monthold infants shows effects of both innate mechanisms and experience. *Nature, 259*, 39-41.

Thanasoulas, D. (1999). *Accommodation theory*. Retrieved on March, 19, 2013, from http://www.tefl.net/esl-articles/accommodation.htm

Trainor, L. J., Desjardins, R. N. (2002). Pitch characteristics of infant-directed speech affect infants' ability to discriminate vowels. *Psychonomic Bulletin and Review, 9 (2)*, 335–340.

Taylor, D. M., Simard, L., & Papineau, D. (1978). Perceptions of cultural differences and language use: A field study in a bilingual environment. *Canadian Journal of Behavioural Science, 10*, 181-191.

Trubetzkoy, N. S. (1969). *Principles of Phonology*. Berkeley, CA: University of California Press.

Uther, M., Knoll, M.A., and Burnham, D. (2007). Do you speak E-NG-L-I-SH? A comparison of foreigner- and infant-directed speech. *Speech Communication*, *49*, 2-7.

Werker, J. F., & Tees, R. C. (1984). Cross-language speech perception: evidence for perceptual reorganization during the first year of life. *Infant Behaviour and Development*, *7,* 49–63.

Werker, J. F., Pons, F., Dietrich, C., Kajikawa , S., Fais, L., Amano, S. (2007). Infant-directed speech supports phonetic category learning in English and Japanese. *Cognition*, *103*, 147–162.

Werker, J.F., Pegg, J.E., McLeod, P.J., 1994. A cross-language investigation of infant preference for infant-directed communication. *Infant Behavior and Development, 17 (3)*, 323–333.

West, R. and Turner, L. H. (2010). *Introducing communication accommodation theory analysis and application* (4th edition). New York: McGraw-Hill.

Apendix A

The map. Please tell your partner how to get from point A/HOME to point B/UNIVERSITY on the map. Read the name of each street your partner needs to pass through to get to point B/UNIVERSITY. Please notice that these names and directions are the desired data to be collected. You are required to read all of them. You can use expressions such as “turn left at, turn left on, turn right at, turn right on”.

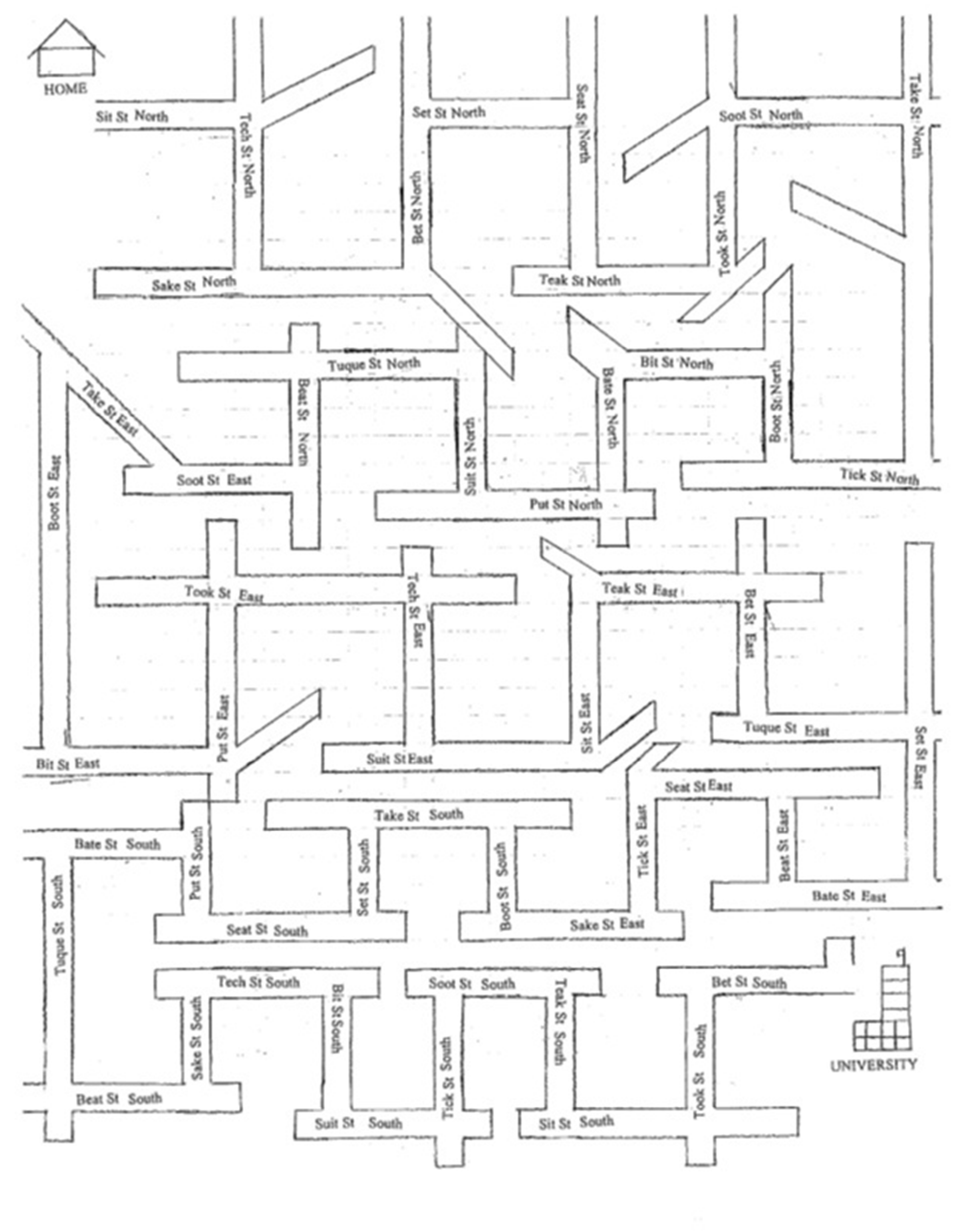

HOME
Sit St North
Tech St North
Set St North
Seat St North
Soot St North
Take St North
Bet St North
Took St North
Sake St North
Teak St North
Tuque St North
Bit St North
Beat St North
Bate St North
Take St East
Suit St North
Boot St North
Boot St East
Soot St East
Tick St North
Put St North
Took St East
Tech St East
Teak St East
Bet St East
Put St East
Sit St East
Tuque St East
Bit St East
Suit St East
Set St East
Seat St East
Take St South
Bate St South
Put St South
Set St South
Boot St South
Tick St East
Beat St East
Bate St East
Tuque St South
Seat St South
Sake St East
Tech St South
Bit St South
Soot St South
Teak St South
Bet St South
Sake St South
Tick St South
Took St South
UNIVERSITY
Beat St South
Suit St South
Sit St South

Table 20. Vowel duration differences with the main effect of the speaker

Scheffe test

Dependent Variable	Speaker	Speaker	Mean Difference	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
Bit1	1.00	2.00	-3.2833	8.70588	.932	-26.9092	20.3426
		3.00	-13.9167	8.70588	.307	-37.5426	9.7092
	2.00	1.00	3.2833	8.70588	.932	-20.3426	26.9092
		3.00	-10.6333	8.70588	.491	-34.2592	12.9926
	3.00	1.00	13.9167	8.70588	.307	-9.7092	37.5426
		2.00	10.6333	8.70588	.491	-12.9926	34.2592
Tick1	1.00	2.00	3.3833	4.01040	.706	-7.5000	14.2667
		3.00	.4000	4.01040	.995	-10.4834	11.2834
	2.00	1.00	-3.3833	4.01040	.706	-14.2667	7.5000
		3.00	-2.9833	4.01040	.762	-13.8667	7.9000
	3.00	1.00	-.4000	4.01040	.995	-11.2834	10.4834
		2.00	2.9833	4.01040	.762	-7.9000	13.8667
Sit1	1.00	2.00	3.5500	6.47124	.862	-14.0116	21.1116
		3.00	1.2333	6.47124	.982	-16.3282	18.7949
	2.00	1.00	-3.5500	6.47124	.862	-21.1116	14.0116
		3.00	-2.3167	6.47124	.938	-19.8782	15.2449
	3.00	1.00	-1.2333	6.47124	.982	-18.7949	16.3282
		2.00	2.3167	6.47124	.938	-15.2449	19.8782
Beat1	1.00	2.00	-11.2500	6.51936	.257	-28.9422	6.4422
		3.00	-20.4500*	6.51936	.023	-38.1422	-2.7578
	2.00	1.00	11.2500	6.51936	.257	-6.4422	28.9422
		3.00	-9.2000	6.51936	.393	-26.8922	8.4922
	3.00	1.00	20.4500*	6.51936	.023	2.7578	38.1422
		2.00	9.2000	6.51936	.393	-8.4922	26.8922
Teak1	1.00	2.00	11.9000	9.54639	.477	-14.0069	37.8069
		3.00	.6833	9.54639	.997	-25.2235	26.5902
	2.00	1.00	-11.9000	9.54639	.477	-37.8069	14.0069
		3.00	-11.2167	9.54639	.517	-37.1235	14.6902
	3.00	1.00	-.6833	9.54639	.997	-26.5902	25.2235
		2.00	11.2167	9.54639	.517	-14.6902	37.1235
Seat1	1.00	2.00	3.3333	5.09478	.810	-10.4928	17.1595
		3.00	-3.7167	5.09478	.770	-17.5428	10.1095
	2.00	1.00	-3.3333	5.09478	.810	-17.1595	10.4928
		3.00	-7.0500	5.09478	.406	-20.8761	6.7761
	3.00	1.00	3.7167	5.09478	.770	-10.1095	17.5428
		2.00	7.0500	5.09478	.406	-6.7761	20.8761
Bet1	1.00	2.00	4.6500	7.94143	.844	-16.9013	26.2013
		3.00	-19.1167	7.94143	.086	-40.6680	2.4347
	2.00	1.00	-4.6500	7.94143	.844	-26.2013	16.9013
		3.00	-23.7667*	7.94143	.030	-45.3180	-2.2153
	3.00	1.00	19.1167	7.94143	.086	-2.4347	40.6680
		2.00	23.7667*	7.94143	.030	2.2153	45.3180
Tech1	1.00	2.00	4.7167	3.58826	.441	-5.0211	14.4544
		3.00	9.4167	3.58826	.059	-.3211	19.1544

	2.00	1.00	-4.7167	3.58826	.441	-14.4544	5.0211
		3.00	4.7000	3.58826	.444	-5.0378	14.4378
	3.00	1.00	-9.4167	3.58826	.059	-19.1544	.3211
		2.00	-4.7000	3.58826	.444	-14.4378	5.0378
Set1	1.00	2.00	-4.6000	4.18398	.559	-15.9544	6.7544
		3.00	-4.9500	4.18398	.512	-16.3044	6.4044
	2.00	1.00	4.6000	4.18398	.559	-6.7544	15.9544
		3.00	-.3500	4.18398	.997	-11.7044	11.0044
	3.00	1.00	4.9500	4.18398	.512	-6.4044	16.3044
		2.00	.3500	4.18398	.997	-11.0044	11.7044
Bate1	1.00	2.00	-.6000	5.71959	.995	-16.1217	14.9217
		3.00	-11.1833	5.71959	.182	-26.7051	4.3384
	2.00	1.00	.6000	5.71959	.995	-14.9217	16.1217
		3.00	-10.5833	5.71959	.214	-26.1051	4.9384
	3.00	1.00	11.1833	5.71959	.182	-4.3384	26.7051
		2.00	10.5833	5.71959	.214	-4.9384	26.1051
Take1	1.00	2.00	6.0167	4.70486	.460	-6.7513	18.7847
		3.00	-6.1833	4.70486	.442	-18.9513	6.5847
	2.00	1.00	-6.0167	4.70486	.460	-18.7847	6.7513
		3.00	-12.2000	4.70486	.062	-24.9680	.5680
	3.00	1.00	6.1833	4.70486	.442	-6.5847	18.9513
		2.00	12.2000	4.70486	.062	-.5680	24.9680
Sake1	1.00	2.00	5.7167	4.21601	.420	-5.7247	17.1580
		3.00	-1.5167	4.21601	.938	-12.9580	9.9247
	2.00	1.00	-5.7167	4.21601	.420	-17.1580	5.7247
		3.00	-7.2333	4.21601	.261	-18.6747	4.2080
	3.00	1.00	1.5167	4.21601	.938	-9.9247	12.9580
		2.00	7.2333	4.21601	.261	-4.2080	18.6747
Put1	1.00	2.00	6.5667	4.78327	.412	-6.4141	19.5475
		3.00	1.1333	4.78327	.972	-11.8475	14.1141
	2.00	1.00	-6.5667	4.78327	.412	-19.5475	6.4141
		3.00	-5.4333	4.78327	.539	-18.4141	7.5475
	3.00	1.00	-1.1333	4.78327	.972	-14.1141	11.8475
		2.00	5.4333	4.78327	.539	-7.5475	18.4141
Took1	1.00	2.00	6.9667	5.01596	.404	-6.6456	20.5789
		3.00	9.0333	5.01596	.230	-4.5789	22.6456
	2.00	1.00	-6.9667	5.01596	.404	-20.5789	6.6456
		3.00	2.0667	5.01596	.919	-11.5456	15.6789
	3.00	1.00	-9.0333	5.01596	.230	-22.6456	4.5789
		2.00	-2.0667	5.01596	.919	-15.6789	11.5456
Soot1	1.00	2.00	9.6167	4.68298	.156	-3.0919	22.3253
		3.00	1.9833	4.68298	.915	-10.7253	14.6919
	2.00	1.00	-9.6167	4.68298	.156	-22.3253	3.0919
		3.00	-7.6333	4.68298	.294	-20.3419	5.0753
	3.00	1.00	-1.9833	4.68298	.915	-14.6919	10.7253
		2.00	7.6333	4.68298	.294	-5.0753	20.3419
Suit1	1.00	2.00	-9.8333	5.93893	.284	-25.9503	6.2837
		3.00	-16.8500*	5.93893	.040	-32.9670	-.7330
	2.00	1.00	9.8333	5.93893	.284	-6.2837	25.9503
		3.00	-7.0167	5.93893	.513	-23.1337	9.1003

	3.00	1.00	16.8500*	5.93893	.040	.7330	32.9670
		2.00	7.0167	5.93893	.513	-9.1003	23.1337
Tuque1	1.00	2.00	7.7667	4.82313	.302	-5.3223	20.8556
		3.00	-9.4000	4.82313	.184	-22.4890	3.6890
	2.00	1.00	-7.7667	4.82313	.302	-20.8556	5.3223
		3.00	-17.1667*	4.82313	.010	-30.2556	-4.0777
	3.00	1.00	9.4000	4.82313	.184	-3.6890	22.4890
		2.00	17.1667*	4.82313	.010	4.0777	30.2556
Boot1	1.00	2.00	10.3667	7.88783	.442	-11.0392	31.7726
		3.00	-2.6500	7.88783	.945	-24.0559	18.7559
	2.00	1.00	-10.3667	7.88783	.442	-31.7726	11.0392
		3.00	-13.0167	7.88783	.286	-34.4226	8.3892
	3.00	1.00	2.6500	7.88783	.945	-18.7559	24.0559
		2.00	13.0167	7.88783	.286	-8.3892	34.4226
Bit2	1.00	2.00	-.0167	4.88746	1.000	-13.2802	13.2469
		3.00	-5.7000	4.88746	.522	-18.9635	7.5635
	2.00	1.00	.0167	4.88746	1.000	-13.2469	13.2802
		3.00	-5.6833	4.88746	.523	-18.9469	7.5802
	3.00	1.00	5.7000	4.88746	.522	-7.5635	18.9635
		2.00	5.6833	4.88746	.523	-7.5802	18.9469
Tick2	1.00	2.00	3.6333	3.39422	.576	-5.5779	12.8445
		3.00	7.5000	3.39422	.121	-1.7112	16.7112
	2.00	1.00	-3.6333	3.39422	.576	-12.8445	5.5779
		3.00	3.8667	3.39422	.537	-5.3445	13.0779
	3.00	1.00	-7.5000	3.39422	.121	-16.7112	1.7112
		2.00	-3.8667	3.39422	.537	-13.0779	5.3445
Sit2	1.00	2.00	-1.1500	7.31119	.988	-20.9910	18.6910
		3.00	-11.0667	7.31119	.344	-30.9077	8.7744
	2.00	1.00	1.1500	7.31119	.988	-18.6910	20.9910
		3.00	-9.9167	7.31119	.420	-29.7577	9.9244
	3.00	1.00	11.0667	7.31119	.344	-8.7744	30.9077
		2.00	9.9167	7.31119	.420	-9.9244	29.7577
Beat2	1.00	2.00	-15.0500*	4.35241	.012	-26.8615	-3.2385
		3.00	-20.3333*	4.35241	.001	-32.1449	-8.5218
	2.00	1.00	15.0500*	4.35241	.012	3.2385	26.8615
		3.00	-5.2833	4.35241	.495	-17.0949	6.5282
	3.00	1.00	20.3333*	4.35241	.001	8.5218	32.1449
		2.00	5.2833	4.35241	.495	-6.5282	17.0949
Teak2	1.00	2.00	-3.6500	5.89094	.827	-19.6368	12.3368
		3.00	1.2167	5.89094	.979	-14.7701	17.2034
	2.00	1.00	3.6500	5.89094	.827	-12.3368	19.6368
		3.00	4.8667	5.89094	.716	-11.1201	20.8534
	3.00	1.00	-1.2167	5.89094	.979	-17.2034	14.7701
		2.00	-4.8667	5.89094	.716	-20.8534	11.1201
Seat2	1.00	2.00	-3.3500	3.87857	.695	-13.8756	7.1756
		3.00	-11.9000*	3.87857	.026	-22.4256	-1.3744
	2.00	1.00	3.3500	3.87857	.695	-7.1756	13.8756
		3.00	-8.5500	3.87857	.122	-19.0756	1.9756
	3.00	1.00	11.9000*	3.87857	.026	1.3744	22.4256
		2.00	8.5500	3.87857	.122	-1.9756	19.0756

Bet2	1.00	2.00	-2.6833	6.29909	.914	-19.7777	14.4111
		3.00	-15.7667	6.29909	.073	-32.8611	1.3277
	2.00	1.00	2.6833	6.29909	.914	-14.4111	19.7777
		3.00	-13.0833	6.29909	.150	-30.1777	4.0111
	3.00	1.00	15.7667	6.29909	.073	-1.3277	32.8611
		2.00	13.0833	6.29909	.150	-4.0111	30.1777
Tech2	1.00	2.00	-3.4000	4.47397	.753	-15.5414	8.7414
		3.00	10.3000	4.47397	.103	-1.8414	22.4414
	2.00	1.00	3.4000	4.47397	.753	-8.7414	15.5414
		3.00	13.7000*	4.47397	.026	1.5586	25.8414
	3.00	1.00	-10.3000	4.47397	.103	-22.4414	1.8414
		2.00	-13.7000*	4.47397	.026	-25.8414	-1.5586
Set2	1.00	2.00	6.8167	3.29632	.152	-2.1288	15.7622
		3.00	2.1000	3.29632	.819	-6.8455	11.0455
	2.00	1.00	-6.8167	3.29632	.152	-15.7622	2.1288
		3.00	-4.7167	3.29632	.383	-13.6622	4.2288
	3.00	1.00	-2.1000	3.29632	.819	-11.0455	6.8455
		2.00	4.7167	3.29632	.383	-4.2288	13.6622
Bate2	1.00	2.00	-2.4000	5.49256	.909	-17.3056	12.5056
		3.00	-10.4500	5.49256	.198	-25.3556	4.4556
	2.00	1.00	2.4000	5.49256	.909	-12.5056	17.3056
		3.00	-8.0500	5.49256	.367	-22.9556	6.8556
	3.00	1.00	10.4500	5.49256	.198	-4.4556	25.3556
		2.00	8.0500	5.49256	.367	-6.8556	22.9556
Take2	1.00	2.00	7.4667	7.00419	.578	-11.5412	26.4746
		3.00	-6.3833	7.00419	.668	-25.3912	12.6246
	2.00	1.00	-7.4667	7.00419	.578	-26.4746	11.5412
		3.00	-13.8500	7.00419	.176	-32.8579	5.1579
	3.00	1.00	6.3833	7.00419	.668	-12.6246	25.3912
		2.00	13.8500	7.00419	.176	-5.1579	32.8579
Sake2	1.00	2.00	1.9333	4.68743	.919	-10.7874	14.6540
		3.00	-10.8500	4.68743	.101	-23.5707	1.8707
	2.00	1.00	-1.9333	4.68743	.919	-14.6540	10.7874
		3.00	-12.7833*	4.68743	.049	-25.5040	-.0626
	3.00	1.00	10.8500	4.68743	.101	-1.8707	23.5707
		2.00	12.7833*	4.68743	.049	.0626	25.5040
Put2	1.00	2.00	7.7500	4.83186	.305	-5.3626	20.8626
		3.00	4.3667	4.83186	.672	-8.7460	17.4793
	2.00	1.00	-7.7500	4.83186	.305	-20.8626	5.3626
		3.00	-3.3833	4.83186	.786	-16.4960	9.7293
	3.00	1.00	-4.3667	4.83186	.672	-17.4793	8.7460
		2.00	3.3833	4.83186	.786	-9.7293	16.4960
Took2	1.00	2.00	-4.2000	7.56992	.859	-24.7432	16.3432
		3.00	9.1833	7.56992	.496	-11.3598	29.7265
	2.00	1.00	4.2000	7.56992	.859	-16.3432	24.7432
		3.00	13.3833	7.56992	.242	-7.1598	33.9265
	3.00	1.00	-9.1833	7.56992	.496	-29.7265	11.3598
		2.00	-13.3833	7.56992	.242	-33.9265	7.1598
Soot2	1.00	2.00	6.1500	4.96489	.482	-7.3236	19.6236
		3.00	.3333	4.96489	.998	-13.1403	13.8070

	2.00	1.00	-6.1500	4.96489	.482	-19.6236	7.3236
		3.00	-5.8167	4.96489	.519	-19.2903	7.6570
	3.00	1.00	-.3333	4.96489	.998	-13.8070	13.1403
		2.00	5.8167	4.96489	.519	-7.6570	19.2903
Suit2	1.00	2.00	4.4667	6.25331	.778	-12.5035	21.4368
		3.00	-1.4333	6.25331	.974	-18.4035	15.5368
	2.00	1.00	-4.4667	6.25331	.778	-21.4368	12.5035
		3.00	-5.9000	6.25331	.649	-22.8701	11.0701
	3.00	1.00	1.4333	6.25331	.974	-15.5368	18.4035
		2.00	5.9000	6.25331	.649	-11.0701	22.8701
Tuque2	1.00	2.00	4.4167	7.03741	.823	-14.6814	23.5147
		3.00	-5.7500	7.03741	.721	-24.8480	13.3480
	2.00	1.00	-4.4167	7.03741	.823	-23.5147	14.6814
		3.00	-10.1667	7.03741	.376	-29.2647	8.9314
	3.00	1.00	5.7500	7.03741	.721	-13.3480	24.8480
		2.00	10.1667	7.03741	.376	-8.9314	29.2647
Boot2	1.00	2.00	-.0500	5.88620	1.000	-16.0239	15.9239
		3.00	-15.9667	5.88620	.050	-31.9406	.0072
	2.00	1.00	.0500	5.88620	1.000	-15.9239	16.0239
		3.00	-15.9167	5.88620	.051	-31.8906	.0572
	3.00	1.00	15.9667	5.88620	.050	-.0072	31.9406
		2.00	15.9167	5.88620	.051	-.0572	31.8906

Table 21. Scheffe results for the effect of speaker

Scheffe

Dependent Variable	Speaker	Speaker	Mean Difference	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Bit.F1.1	A	B	1.1917	21.68621	.998	-57.6601	60.0434
		C	15.9294	21.68621	.767	-42.9224	74.7811
	B	A	-1.1917	21.68621	.998	-60.0434	57.6601
		C	14.7377	21.68621	.797	-44.1141	73.5895
	C	A	-15.9294	21.68621	.767	-74.7811	42.9224
		B	-14.7377	21.68621	.797	-73.5895	44.1141
Bit.F2.1	A	B	-106.1767	69.73443	.340	-295.4211	83.0677
		C	-124.3955	69.73443	.236	-313.6399	64.8489
	B	A	106.1767	69.73443	.340	-83.0677	295.4211
		C	-18.2188	69.73443	.967	-207.4632	171.0256
	C	A	124.3955	69.73443	.236	-64.8489	313.6399
		B	18.2188	69.73443	.967	-171.0256	207.4632
Bit.F3.1	A	B	44.9812	105.20704	.913	-240.5283	330.4907
		C	-263.4218	105.20704	.073	-548.9313	22.0877
	B	A	-44.9812	105.20704	.913	-330.4907	240.5283
		C	-308.4030*	105.20704	.033	-593.9125	-22.8935
	C	A	263.4218	105.20704	.073	-22.0877	548.9313
		B	308.4030*	105.20704	.033	22.8935	593.9125
Tick.F1.1	A	2.00	-2.0840	12.39336	.986	-35.7169	31.5489
		3.00	-22.5208	12.39336	.225	-56.1538	11.1121
	B	1.00	2.0840	12.39336	.986	-31.5489	35.7169
		3.00	-20.4368	12.39336	.287	-54.0698	13.1961
	C	1.00	22.5208	12.39336	.225	-11.1121	56.1538
		2.00	20.4368	12.39336	.287	-13.1961	54.0698
Tick.F2.1	A	2.00	-157.1331*	38.42084	.004	-261.3991	-52.8671
		3.00	-163.6824*	38.42084	.003	-267.9484	-59.4164
	B	1.00	157.1331*	38.42084	.004	52.8671	261.3991
		3.00	-6.5493	38.42084	.986	-110.8153	97.7167
	C	1.00	163.6824*	38.42084	.003	59.4164	267.9484
		2.00	6.5493	38.42084	.986	-97.7167	110.8153
Tick.F3.1	A	2.00	204.9553	159.56935	.457	-228.0820	637.9926
		3.00	-132.3264	159.56935	.714	-565.3636	300.7109
	B	1.00	-204.9553	159.56935	.457	-637.9926	228.0820
		3.00	-337.2817	159.56935	.142	-770.3189	95.7556
	C	1.00	132.3264	159.56935	.714	-300.7109	565.3636
		2.00	337.2817	159.56935	.142	-95.7556	770.3189
Sit.F1.1	A	2.00	-19.0862	15.19489	.472	-60.3219	22.1495
		3.00	-9.6961	15.19489	.818	-50.9318	31.5396
	B	1.00	19.0862	15.19489	.472	-22.1495	60.3219
		3.00	9.3902	15.19489	.828	-31.8456	50.6259
	C	1.00	9.6961	15.19489	.818	-31.5396	50.9318
		2.00	-9.3902	15.19489	.828	-50.6259	31.8456
Sit.F2.1	A	2.00	-101.8593*	29.44454	.012	-181.7655	-21.9531
		3.00	5.5751	29.44454	.982	-74.3311	85.4813

	B	1.00	101.8593*	29.44454	.012	21.9531	181.7655
		3.00	107.4344*	29.44454	.009	27.5282	187.3406
	C	1.00	-5.5751	29.44454	.982	-85.4813	74.3311
		2.00	-107.4344*	29.44454	.009	-187.3406	-27.5282
Sit.F3.1	A	2.00	93.8961	72.23487	.449	-102.1339	289.9262
		3.00	-157.2509	72.23487	.128	-353.2810	38.7791
	B	1.00	-93.8961	72.23487	.449	-289.9262	102.1339
		3.00	-251.1471*	72.23487	.012	-447.1771	-55.1170
	C	1.00	157.2509	72.23487	.128	-38.7791	353.2810
		2.00	251.1471*	72.23487	.012	55.1170	447.1771
Beat.F1.1	A	2.00	6.2200	14.42305	.912	-32.9211	45.3611
		3.00	-59.0638*	14.42305	.004	-98.2049	-19.9227
	B	1.00	-6.2200	14.42305	.912	-45.3611	32.9211
		3.00	-65.2838*	14.42305	.002	-104.4249	-26.1427
	C	1.00	59.0638*	14.42305	.004	19.9227	98.2049
		2.00	65.2838*	14.42305	.002	26.1427	104.4249
Beat.F2.1	A	2.00	-446.5158	273.16637	.292	-1187.8312	294.7996
		3.00	-396.5770	273.16637	.373	-1137.8924	344.7384
	B	1.00	446.5158	273.16637	.292	-294.7996	1187.8312
		3.00	49.9388	273.16637	.983	-691.3766	791.2542
	C	1.00	396.5770	273.16637	.373	-344.7384	1137.8924
		2.00	-49.9388	273.16637	.983	-791.2542	691.3766
Beat.F3.1	A	2.00	-21.8935	179.75895	.993	-509.7211	465.9340
		3.00	-174.8189	179.75895	.632	-662.6465	313.0086
	B	1.00	21.8935	179.75895	.993	-465.9340	509.7211
		3.00	-152.9254	179.75895	.702	-640.7529	334.9021
	C	1.00	174.8189	179.75895	.632	-313.0086	662.6465
		2.00	152.9254	179.75895	.702	-334.9021	640.7529
Teak.F1.1	A	2.00	164.9309	185.14607	.679	-337.5161	667.3780
		3.00	200.1215	185.14607	.570	-302.3255	702.5686
	B	1.00	-164.9309	185.14607	.679	-667.3780	337.5161
		3.00	35.1906	185.14607	.982	-467.2564	537.6376
	C	1.00	-200.1215	185.14607	.570	-702.5686	302.3255
		2.00	-35.1906	185.14607	.982	-537.6376	467.2564
Teak.F2.1	A	2.00	55.0563	117.07122	.896	-262.6501	372.7627
		3.00	-60.1968	117.07122	.877	-377.9032	257.5095
	B	1.00	-55.0563	117.07122	.896	-372.7627	262.6501
		3.00	-115.2532	117.07122	.625	-432.9595	202.4532
	C	1.00	60.1968	117.07122	.877	-257.5095	377.9032
		2.00	115.2532	117.07122	.625	-202.4532	432.9595
Teak.F3.1	A	2.00	433.6213*	148.59862	.034	30.3563	836.8863
		3.00	38.1601	148.59862	.968	-365.1050	441.4251
	B	1.00	-433.6213*	148.59862	.034	-836.8863	-30.3563
		3.00	-395.4612	148.59862	.055	-798.7263	7.8038
	C	1.00	-38.1601	148.59862	.968	-441.4251	365.1050
		2.00	395.4612	148.59862	.055	-7.8038	798.7263
Seat.F1.1	A	2.00	-37.9944	15.10042	.071	-78.9737	2.9849
		3.00	-29.4849	15.10042	.183	-70.4642	11.4944
	B	1.00	37.9944	15.10042	.071	-2.9849	78.9737
		3.00	8.5095	15.10042	.855	-32.4699	49.4888

	C	1.00	29.4849	15.10042	.183	-11.4944	70.4642
		2.00	-8.5095	15.10042	.855	-49.4888	32.4699
Seat.F2.1	A	2.00	-163.5822*	43.81719	.007	-282.4927	-44.6716
		3.00	-139.1978*	43.81719	.021	-258.1084	-20.2873
	B	1.00	163.5822*	43.81719	.007	44.6716	282.4927
		3.00	24.3843	43.81719	.858	-94.5262	143.2949
	C	1.00	139.1978*	43.81719	.021	20.2873	258.1084
		2.00	-24.3843	43.81719	.858	-143.2949	94.5262
Seat.F3.1	A	2.00	22.0640	109.79088	.980	-275.8851	320.0131
		3.00	-145.3971	109.79088	.436	-443.3461	152.5520
	B	1.00	-22.0640	109.79088	.980	-320.0131	275.8851
		3.00	-167.4611	109.79088	.339	-465.4101	130.4880
	C	1.00	145.3971	109.79088	.436	-152.5520	443.3461
		2.00	167.4611	109.79088	.339	-130.4880	465.4101
Bet.F1.1	A	2.00	-101.1894	50.37287	.167	-237.8906	35.5119
		3.00	-8.2906	50.37287	.987	-144.9918	128.4107
	B	1.00	101.1894	50.37287	.167	-35.5119	237.8906
		3.00	92.8988	50.37287	.216	-43.8025	229.6000
	C	1.00	8.2906	50.37287	.987	-128.4107	144.9918
		2.00	-92.8988	50.37287	.216	-229.6000	43.8025
Bet.F2.1	A	2.00	10.7800	123.74335	.996	-325.0331	346.5931
		3.00	-60.0854	123.74335	.890	-395.8986	275.7277
	B	1.00	-10.7800	123.74335	.996	-346.5931	325.0331
		3.00	-70.8654	123.74335	.850	-406.6786	264.9477
	C	1.00	60.0854	123.74335	.890	-275.7277	395.8986
		2.00	70.8654	123.74335	.850	-264.9477	406.6786
Bet.F3.1	A	2.00	298.6073	138.51158	.132	-77.2836	674.4983
		3.00	-107.1892	138.51158	.746	-483.0802	268.7017
	B	1.00	-298.6073	138.51158	.132	-674.4983	77.2836
		3.00	-405.7966*	138.51158	.034	-781.6875	-29.9056
	C	1.00	107.1892	138.51158	.746	-268.7017	483.0802
		2.00	405.7966*	138.51158	.034	29.9056	781.6875
Tech.F1.1	A	2.00	-93.8626*	19.98379	.001	-148.0944	-39.6309
		3.00	21.3964	19.98379	.576	-32.8353	75.6282
	B	1.00	93.8626*	19.98379	.001	39.6309	148.0944
		3.00	115.2590*	19.98379	.000	61.0273	169.4908
	C	1.00	-21.3964	19.98379	.576	-75.6282	32.8353
		2.00	-115.2590*	19.98379	.000	-169.4908	-61.0273
Tech.F2.1	A	2.00	-32.6201	20.70662	.317	-88.8135	23.5733
		3.00	-97.1222*	20.70662	.001	-153.3155	-40.9288
	B	1.00	32.6201	20.70662	.317	-23.5733	88.8135
		3.00	-64.5021*	20.70662	.024	-120.6954	-8.3087
	C	1.00	97.1222*	20.70662	.001	40.9288	153.3155
		2.00	64.5021*	20.70662	.024	8.3087	120.6954
Tech.F3.1	A	2.00	-18.9310	154.11218	.992	-437.1587	399.2966
		3.00	-282.7390	154.11218	.219	-700.9667	135.4886
	B	1.00	18.9310	154.11218	.992	-399.2966	437.1587
		3.00	-263.8080	154.11218	.262	-682.0356	154.4197
	C	1.00	282.7390	154.11218	.219	-135.4886	700.9667
		2.00	263.8080	154.11218	.262	-154.4197	682.0356

Set.F1.1	A	2.00	-64.9437*	16.77544	.006	-110.4687	-19.4187
		3.00	-15.6958	16.77544	.653	-61.2208	29.8292
	B	1.00	64.9437*	16.77544	.006	19.4187	110.4687
		3.00	49.2479*	16.77544	.033	3.7229	94.7729
	C	1.00	15.6958	16.77544	.653	-29.8292	61.2208
		2.00	-49.2479*	16.77544	.033	-94.7729	-3.7229
Set.F2.1	A	2.00	-17.3641	18.19775	.643	-66.7489	32.0207
		3.00	53.2811*	18.19775	.034	3.8963	102.6660
	B	1.00	17.3641	18.19775	.643	-32.0207	66.7489
		3.00	70.6452*	18.19775	.005	21.2604	120.0300
	C	1.00	-53.2811*	18.19775	.034	-102.6660	-3.8963
		2.00	-70.6452*	18.19775	.005	-120.0300	-21.2604
Set.F3.1	A	2.00	-21.0475	79.11415	.965	-235.7464	193.6515
		3.00	-313.2112*	79.11415	.005	-527.9102	-98.5122
	B	1.00	21.0475	79.11415	.965	-193.6515	235.7464
		3.00	-292.1637*	79.11415	.008	-506.8627	-77.4648
	C	1.00	313.2112*	79.11415	.005	98.5122	527.9102
		2.00	292.1637*	79.11415	.008	77.4648	506.8627
Bate.F1.1	A	2.00	-3.2768	13.08504	.969	-38.7869	32.2332
		3.00	-18.5977	13.08504	.388	-54.1077	16.9124
	B	1.00	3.2768	13.08504	.969	-32.2332	38.7869
		3.00	-15.3208	13.08504	.519	-50.8308	20.1892
	C	1.00	18.5977	13.08504	.388	-16.9124	54.1077
		2.00	15.3208	13.08504	.519	-20.1892	50.8308
Bate.F2.1	A	2.00	-164.6645*	42.57450	.006	-280.2027	-49.1264
		3.00	9.0983	42.57450	.977	-106.4399	124.6364
	B	1.00	164.6645*	42.57450	.006	49.1264	280.2027
		3.00	173.7628*	42.57450	.004	58.2247	289.3009
	C	1.00	-9.0983	42.57450	.977	-124.6364	106.4399
		2.00	-173.7628*	42.57450	.004	-289.3009	-58.2247
Bate.F3.1	A	2.00	184.0503	135.69666	.420	-184.2016	552.3021
		3.00	33.4169	135.69666	.970	-334.8349	401.6688
	B	1.00	-184.0503	135.69666	.420	-552.3021	184.2016
		3.00	-150.6333	135.69666	.553	-518.8852	217.6185
	C	1.00	-33.4169	135.69666	.970	-401.6688	334.8349
		2.00	150.6333	135.69666	.553	-217.6185	518.8852
Take.F1.1	A	2.00	-14.2122	14.04005	.609	-52.3139	23.8895
		3.00	-60.1091*	14.04005	.003	-98.2108	-22.0074
	B	1.00	14.2122	14.04005	.609	-23.8895	52.3139
		3.00	-45.8969*	14.04005	.018	-83.9986	-7.7952
	C	1.00	60.1091*	14.04005	.003	22.0074	98.2108
		2.00	45.8969*	14.04005	.018	7.7952	83.9986
Take.F2.1	A	2.00	-181.1161*	33.81120	.000	-272.8725	-89.3597
		3.00	-17.7927	33.81120	.872	-109.5491	73.9637
	B	1.00	181.1161*	33.81120	.000	89.3597	272.8725
		3.00	163.3234*	33.81120	.001	71.5670	255.0798
	C	1.00	17.7927	33.81120	.872	-73.9637	109.5491
		2.00	-163.3234*	33.81120	.001	-255.0798	-71.5670
Take.F3.1	A	2.00	78.3151	67.36669	.524	-104.5038	261.1339
		3.00	16.5186	67.36669	.970	-166.3002	199.3375

	B	1.00	-78.3151	67.36669	.524	-261.1339	104.5038
		3.00	-61.7964	67.36669	.664	-244.6153	121.0225
	C	1.00	-16.5186	67.36669	.970	-199.3375	166.3002
		2.00	61.7964	67.36669	.664	-121.0225	244.6153
Sake.F1.1	A	2.00	25.8541	40.78376	.820	-84.8243	136.5326
		3.00	.7065	40.78376	1.000	-109.9719	111.3849
	B	1.00	-25.8541	40.78376	.820	-136.5326	84.8243
		3.00	-25.1476	40.78376	.829	-135.8261	85.5308
	C	1.00	-.7065	40.78376	1.000	-111.3849	109.9719
		2.00	25.1476	40.78376	.829	-85.5308	135.8261
Sake.F2.1	A	2.00	-109.7156*	37.55136	.034	-211.6220	-7.8092
		3.00	47.0687	37.55136	.474	-54.8377	148.9751
	B	1.00	109.7156*	37.55136	.034	7.8092	211.6220
		3.00	156.7843*	37.55136	.003	54.8779	258.6907
	C	1.00	-47.0687	37.55136	.474	-148.9751	54.8377
		2.00	-156.7843*	37.55136	.003	-258.6907	-54.8779
Sake.F3.1	A	2.00	12.9787	125.08947	.995	-326.4875	352.4449
		3.00	-127.8306	125.08947	.604	-467.2967	211.6356
	B	1.00	-12.9787	125.08947	.995	-352.4449	326.4875
		3.00	-140.8092	125.08947	.544	-480.2754	198.6570
	C	1.00	127.8306	125.08947	.604	-211.6356	467.2967
		2.00	140.8092	125.08947	.544	-198.6570	480.2754
Put.F1.1	A	2.00	-92.6525	94.99398	.631	-350.4459	165.1409
		3.00	-3.7129	94.99398	.999	-261.5063	254.0806
	B	1.00	92.6525	94.99398	.631	-165.1409	350.4459
		3.00	88.9397	94.99398	.653	-168.8538	346.7331
	C	1.00	3.7129	94.99398	.999	-254.0806	261.5063
		2.00	-88.9397	94.99398	.653	-346.7331	168.8538
Put.F2.1	A	2.00	216.8516	106.90905	.162	-73.2768	506.9800
		3.00	487.9533*	106.90905	.001	197.8249	778.0817
	B	1.00	-216.8516	106.90905	.162	-506.9800	73.2768
		3.00	271.1017	106.90905	.069	-19.0267	561.2301
	C	1.00	-487.9533*	106.90905	.001	-778.0817	-197.8249
		2.00	-271.1017	106.90905	.069	-561.2301	19.0267
Put.F3.1	A	2.00	417.3750	169.43609	.078	-42.4385	877.1885
		3.00	3.7344	169.43609	1.000	-456.0790	463.5479
	B	1.00	-417.3750	169.43609	.078	-877.1885	42.4385
		3.00	-413.6406	169.43609	.081	-873.4540	46.1729
	C	1.00	-3.7344	169.43609	1.000	-463.5479	456.0790
		2.00	413.6406	169.43609	.081	-46.1729	873.4540
Took.F1.1	A	2.00	-74.6977	43.06999	.254	-191.5805	42.1851
		3.00	11.8019	43.06999	.963	-105.0809	128.6847
	B	1.00	74.6977	43.06999	.254	-42.1851	191.5805
		3.00	86.4996	43.06999	.168	-30.3832	203.3824
	C	1.00	-11.8019	43.06999	.963	-128.6847	105.0809
		2.00	-86.4996	43.06999	.168	-203.3824	30.3832
Took.F2.1	A	2.00	114.7583	156.22639	.767	-309.2068	538.7235
		3.00	622.1779*	156.22639	.004	198.2128	1046.1431
	B	1.00	-114.7583	156.22639	.767	-538.7235	309.2068
		3.00	507.4196*	156.22639	.018	83.4544	931.3848

	C	1.00	-622.1779*	156.22639	.004	-1046.1431	-198.2128
		2.00	-507.4196*	156.22639	.018	-931.3848	-83.4544
Took.F3.1	A	2.00	405.5918	181.41739	.116	-86.7364	897.9200
		3.00	103.9077	181.41739	.850	-388.4205	596.2359
	B	1.00	-405.5918	181.41739	.116	-897.9200	86.7364
		3.00	-301.6841	181.41739	.281	-794.0123	190.6441
	C	1.00	-103.9077	181.41739	.850	-596.2359	388.4205
		2.00	301.6841	181.41739	.281	-190.6441	794.0123
Soot.F1.1	A	2.00	-111.8783	145.67202	.749	-507.2012	283.4445
		3.00	5.7860	145.67202	.999	-389.5368	401.1089
	B	1.00	111.8783	145.67202	.749	-283.4445	507.2012
		3.00	117.6643	145.67202	.727	-277.6585	512.9872
	C	1.00	-5.7860	145.67202	.999	-401.1089	389.5368
		2.00	-117.6643	145.67202	.727	-512.9872	277.6585
Soot.F2.1	A	2.00	-135.0974	220.24820	.830	-732.8041	462.6093
		3.00	10.6666	220.24820	.999	-587.0402	608.3733
	B	1.00	135.0974	220.24820	.830	-462.6093	732.8041
		3.00	145.7640	220.24820	.806	-451.9428	743.4707
	C	1.00	-10.6666	220.24820	.999	-608.3733	587.0402
		2.00	-145.7640	220.24820	.806	-743.4707	451.9428
Soot.F3.1	A	2.00	357.3275	161.10835	.119	-79.8862	794.5413
		3.00	254.4951	161.10835	.315	-182.7187	691.7089
	B	1.00	-357.3275	161.10835	.119	-794.5413	79.8862
		3.00	-102.8324	161.10835	.818	-540.0462	334.3813
	C	1.00	-254.4951	161.10835	.315	-691.7089	182.7187
		2.00	102.8324	161.10835	.818	-334.3813	540.0462
Suit.F1.1	A	2.00	-46.2462	19.22241	.087	-98.4117	5.9194
		3.00	-20.6603	19.22241	.573	-72.8258	31.5052
	B	1.00	46.2462	19.22241	.087	-5.9194	98.4117
		3.00	25.5859	19.22241	.433	-26.5797	77.7514
	C	1.00	20.6603	19.22241	.573	-31.5052	72.8258
		2.00	-25.5859	19.22241	.433	-77.7514	26.5797
Suit.F2.1	A	2.00	339.0790*	70.36763	.001	148.1163	530.0418
		3.00	184.4348	70.36763	.059	-6.5280	375.3976
	B	1.00	-339.0790*	70.36763	.001	-530.0418	-148.1163
		3.00	-154.6443	70.36763	.123	-345.6070	36.3185
	C	1.00	-184.4348	70.36763	.059	-375.3976	6.5280
		2.00	154.6443	70.36763	.123	-36.3185	345.6070
Suit.F3.1	A	2.00	380.1566*	138.63195	.047	3.9391	756.3742
		3.00	-101.1888	138.63195	.770	-477.4064	275.0288
	B	1.00	-380.1566*	138.63195	.047	-756.3742	-3.9391
		3.00	-481.3454*	138.63195	.012	-857.5630	-105.1278
	C	1.00	101.1888	138.63195	.770	-275.0288	477.4064
		2.00	481.3454*	138.63195	.012	105.1278	857.5630
Tuque.F1.1	A	2.00	-274.5338	135.99121	.165	-643.5850	94.5174
		3.00	-9.0945	135.99121	.998	-378.1457	359.9567
	B	1.00	274.5338	135.99121	.165	-94.5174	643.5850
		3.00	265.4393	135.99121	.183	-103.6119	634.4904
	C	1.00	9.0945	135.99121	.998	-359.9567	378.1457
		2.00	-265.4393	135.99121	.183	-634.4904	103.6119

Tuque.F2.1	A	2.00	121.4954	143.63341	.705	-268.2951	511.2860
		3.00	163.7475	143.63341	.536	-226.0430	553.5380
	B	1.00	-121.4954	143.63341	.705	-511.2860	268.2951
		3.00	42.2521	143.63341	.958	-347.5384	432.0426
	C	1.00	-163.7475	143.63341	.536	-553.5380	226.0430
		2.00	-42.2521	143.63341	.958	-432.0426	347.5384
Tuque.F3.1	A	2.00	357.1832	277.13422	.455	-394.9001	1109.2665
		3.00	463.4120	277.13422	.277	-288.6713	1215.4953
	B	1.00	-357.1832	277.13422	.455	-1109.2665	394.9001
		3.00	106.2287	277.13422	.930	-645.8545	858.3120
	C	1.00	-463.4120	277.13422	.277	-1215.4953	288.6713
		2.00	-106.2287	277.13422	.930	-858.3120	645.8545
Boot.F1.1	A	2.00	-113.4457	64.90030	.249	-289.5713	62.6799
		3.00	-54.5374	64.90030	.708	-230.6630	121.5882
	B	1.00	113.4457	64.90030	.249	-62.6799	289.5713
		3.00	58.9083	64.90030	.670	-117.2173	235.0339
	C	1.00	54.5374	64.90030	.708	-121.5882	230.6630
		2.00	-58.9083	64.90030	.670	-235.0339	117.2173
Boot.F2.1	A	2.00	415.8401	197.18722	.143	-119.2840	950.9643
		3.00	448.4775	197.18722	.108	-86.6466	983.6017
	B	1.00	-415.8401	197.18722	.143	-950.9643	119.2840
		3.00	32.6374	197.18722	.986	-502.4867	567.7615
	C	1.00	-448.4775	197.18722	.108	-983.6017	86.6466
		2.00	-32.6374	197.18722	.986	-567.7615	502.4867
Boot.F3.1	A	2.00	608.3648*	210.32198	.036	37.5958	1179.1339
		3.00	259.6634	210.32198	.484	-311.1057	830.4325
	B	1.00	-608.3648*	210.32198	.036	-1179.1339	-37.5958
		3.00	-348.7014	210.32198	.283	-919.4705	222.0676
	C	1.00	-259.6634	210.32198	.484	-830.4325	311.1057
		2.00	348.7014	210.32198	.283	-222.0676	919.4705
Bit.F1.2	A	2.00	3.6578	11.92152	.954	-28.6947	36.0103
		3.00	-20.4489	11.92152	.261	-52.8014	11.9036
	B	1.00	-3.6578	11.92152	.954	-36.0103	28.6947
		3.00	-24.1067	11.92152	.164	-56.4592	8.2458
	C	1.00	20.4489	11.92152	.261	-11.9036	52.8014
		2.00	24.1067	11.92152	.164	-8.2458	56.4592
Bit.F2.2	A	2.00	-107.9924*	19.75238	.000	-161.5962	-54.3887
		3.00	-67.7342*	19.75238	.013	-121.3380	-14.1305
	B	1.00	107.9924*	19.75238	.000	54.3887	161.5962
		3.00	40.2582	19.75238	.160	-13.3456	93.8619
	C	1.00	67.7342*	19.75238	.013	14.1305	121.3380
		2.00	-40.2582	19.75238	.160	-93.8619	13.3456
Bit.F3.2	A	2.00	157.8033	131.46291	.503	-198.9591	514.5657
		3.00	-277.7517	131.46291	.142	-634.5140	79.0107
	B	1.00	-157.8033	131.46291	.503	-514.5657	198.9591
		3.00	-435.5550*	131.46291	.016	-792.3173	-78.7926
	C	1.00	277.7517	131.46291	.142	-79.0107	634.5140
		2.00	435.5550*	131.46291	.016	78.7926	792.3173
Tick.F1.2	A	2.00	10.8321	13.48640	.729	-25.7671	47.4314
		3.00	-19.8949	13.48640	.362	-56.4941	16.7044

	B	1.00	-10.8321	13.48640	.729	-47.4314	25.7671
		3.00	-30.7270	13.48640	.108	-67.3262	5.8722
	C	1.00	19.8949	13.48640	.362	-16.7044	56.4941
		2.00	30.7270	13.48640	.108	-5.8722	67.3262
Tick.F2.2	A	2.00	-51.8089	31.70111	.293	-137.8390	34.2212
		3.00	-72.3992	31.70111	.107	-158.4293	13.6309
	B	1.00	51.8089	31.70111	.293	-34.2212	137.8390
		3.00	-20.5903	31.70111	.812	-106.6203	65.4398
	C	1.00	72.3992	31.70111	.107	-13.6309	158.4293
		2.00	20.5903	31.70111	.812	-65.4398	106.6203
Tick.F3.2	A	2.00	304.7416	141.86613	.134	-80.2529	689.7361
		3.00	-39.2849	141.86613	.962	-424.2794	345.7096
	B	1.00	-304.7416	141.86613	.134	-689.7361	80.2529
		3.00	-344.0266	141.86613	.084	-729.0210	40.9679
	C	1.00	39.2849	141.86613	.962	-345.7096	424.2794
		2.00	344.0266	141.86613	.084	-40.9679	729.0210
Sit.F1.2	A	2.00	-10.3570	22.22889	.898	-70.6814	49.9675
		3.00	4.9930	22.22889	.975	-55.3314	65.3175
	B	1.00	10.3570	22.22889	.898	-49.9675	70.6814
		3.00	15.3500	22.22889	.791	-44.9745	75.6745
	C	1.00	-4.9930	22.22889	.975	-65.3175	55.3314
		2.00	-15.3500	22.22889	.791	-75.6745	44.9745
Sit.F2.2	A	2.00	-122.3931	103.31826	.511	-402.7768	157.9907
		3.00	-135.2263	103.31826	.444	-415.6101	145.1575
	B	1.00	122.3931	103.31826	.511	-157.9907	402.7768
		3.00	-12.8332	103.31826	.992	-293.2170	267.5505
	C	1.00	135.2263	103.31826	.444	-145.1575	415.6101
		2.00	12.8332	103.31826	.992	-267.5505	293.2170
Sit.F3.2	A	2.00	195.2373	95.43846	.158	-63.7623	454.2370
		3.00	45.9712	95.43846	.891	-213.0284	304.9709
	B	1.00	-195.2373	95.43846	.158	-454.2370	63.7623
		3.00	-149.2661	95.43846	.322	-408.2658	109.7336
	C	1.00	-45.9712	95.43846	.891	-304.9709	213.0284
		2.00	149.2661	95.43846	.322	-109.7336	408.2658
Beat.F1.2	A	2.00	.4886	13.44557	.999	-35.9998	36.9770
		3.00	-27.8769	13.44557	.151	-64.3653	8.6115
	B	1.00	-.4886	13.44557	.999	-36.9770	35.9998
		3.00	-28.3655	13.44557	.142	-64.8539	8.1229
	C	1.00	27.8769	13.44557	.151	-8.6115	64.3653
		2.00	28.3655	13.44557	.142	-8.1229	64.8539
Beat.F2.2	A	2.00	-96.2657*	22.77696	.003	-158.0776	-34.4539
		3.00	-73.5992*	22.77696	.019	-135.4110	-11.7874
	B	1.00	96.2657*	22.77696	.003	34.4539	158.0776
		3.00	22.6665	22.77696	.619	-39.1453	84.4783
	C	1.00	73.5992*	22.77696	.019	11.7874	135.4110
		2.00	-22.6665	22.77696	.619	-84.4783	39.1453
Beat.F3.2	A	2.00	90.9115	75.59763	.501	-114.2444	296.0674
		3.00	-2.0942	75.59763	1.000	-207.2501	203.0617
	B	1.00	-90.9115	75.59763	.501	-296.0674	114.2444
		3.00	-93.0057	75.59763	.486	-298.1616	112.1502

	C	1.00	2.0942	75.59763	1.000	-203.0617	207.2501
		2.00	93.0057	75.59763	.486	-112.1502	298.1616
Teak.F1.2	A	2.00	-3.7917	13.96847	.964	-41.6992	34.1158
		3.00	6.7124	13.96847	.892	-31.1950	44.6199
	B	1.00	3.7917	13.96847	.964	-34.1158	41.6992
		3.00	10.5041	13.96847	.758	-27.4033	48.4116
	C	1.00	-6.7124	13.96847	.892	-44.6199	31.1950
		2.00	-10.5041	13.96847	.758	-48.4116	27.4033
Teak.F2.2	A	2.00	-135.5972	60.31004	.113	-299.2658	28.0714
		3.00	-193.2095*	60.31004	.020	-356.8781	-29.5409
	B	1.00	135.5972	60.31004	.113	-28.0714	299.2658
		3.00	-57.6123	60.31004	.642	-221.2810	106.0563
	C	1.00	193.2095*	60.31004	.020	29.5409	356.8781
		2.00	57.6123	60.31004	.642	-106.0563	221.2810
Teak.F3.2	A	2.00	86.2447	120.11942	.776	-239.7338	412.2233
		3.00	48.6660	120.11942	.922	-277.3125	374.6445
	B	1.00	-86.2447	120.11942	.776	-412.2233	239.7338
		3.00	-37.5788	120.11942	.952	-363.5573	288.3998
	C	1.00	-48.6660	120.11942	.922	-374.6445	277.3125
		2.00	37.5788	120.11942	.952	-288.3998	363.5573
Seat.F1.2	A	2.00	-32.0543*	10.58366	.028	-60.7761	-3.3325
		3.00	-11.2147	10.58366	.582	-39.9365	17.5072
	B	1.00	32.0543*	10.58366	.028	3.3325	60.7761
		3.00	20.8397	10.58366	.178	-7.8821	49.5615
	C	1.00	11.2147	10.58366	.582	-17.5072	39.9365
		2.00	-20.8397	10.58366	.178	-49.5615	7.8821
Seat.F2.2	A	2.00	-154.4774*	32.91969	.001	-243.8144	-65.1403
		3.00	-168.1402*	32.91969	.001	-257.4772	-78.8031
	B	1.00	154.4774*	32.91969	.001	65.1403	243.8144
		3.00	-13.6628	32.91969	.918	-102.9999	75.6742
	C	1.00	168.1402*	32.91969	.001	78.8031	257.4772
		2.00	13.6628	32.91969	.918	-75.6742	102.9999
Seat.F3.2	A	2.00	70.1567	107.66279	.811	-222.0172	362.3306
		3.00	-103.0389	107.66279	.641	-395.2128	189.1350
	B	1.00	-70.1567	107.66279	.811	-362.3306	222.0172
		3.00	-173.1956	107.66279	.303	-465.3695	118.9783
	C	1.00	103.0389	107.66279	.641	-189.1350	395.2128
		2.00	173.1956	107.66279	.303	-118.9783	465.3695
Bet.F1.2	A	2.00	-30.0751	34.52452	.691	-123.7673	63.6171
		3.00	82.2349	34.52452	.090	-11.4573	175.9271
	B	1.00	30.0751	34.52452	.691	-63.6171	123.7673
		3.00	112.3100*	34.52452	.018	18.6178	206.0021
	C	1.00	-82.2349	34.52452	.090	-175.9271	11.4573
		2.00	-112.3100*	34.52452	.018	-206.0021	-18.6178
Bet.F2.2	A	2.00	7.6947	114.54380	.998	-303.1528	318.5421
		3.00	-181.2585	114.54380	.314	-492.1060	129.5889
	B	1.00	-7.6947	114.54380	.998	-318.5421	303.1528
		3.00	-188.9532	114.54380	.286	-499.8007	121.8943
	C	1.00	181.2585	114.54380	.314	-129.5889	492.1060
		2.00	188.9532	114.54380	.286	-121.8943	499.8007

Bet.F3.2	A	2.00	71.4457	106.26054	.800	-216.9228	359.8142
		3.00	-378.4387*	106.26054	.010	-666.8072	-90.0703
	B	1.00	-71.4457	106.26054	.800	-359.8142	216.9228
		3.00	-449.8844*	106.26054	.003	-738.2529	-161.5160
	C	1.00	378.4387*	106.26054	.010	90.0703	666.8072
		2.00	449.8844*	106.26054	.003	161.5160	738.2529
Tech.F1.2	A	2.00	-94.1926*	14.98783	.000	-134.8664	-53.5188
		3.00	-13.7832	14.98783	.663	-54.4570	26.8906
	B	1.00	94.1926*	14.98783	.000	53.5188	134.8664
		3.00	80.4094*	14.98783	.000	39.7356	121.0832
	C	1.00	13.7832	14.98783	.663	-26.8906	54.4570
		2.00	-80.4094*	14.98783	.000	-121.0832	-39.7356
Tech.F2.2	A	2.00	66.1339	34.25732	.189	-26.8332	159.1009
		3.00	-28.0541	34.25732	.720	-121.0211	64.9130
	B	1.00	-66.1339	34.25732	.189	-159.1009	26.8332
		3.00	-94.1880*	34.25732	.047	-187.1550	-1.2209
	C	1.00	28.0541	34.25732	.720	-64.9130	121.0211
		2.00	94.1880*	34.25732	.047	1.2209	187.1550
Tech.F3.2	A	2.00	-222.6228	126.92573	.247	-567.0722	121.8266
		3.00	-221.8665	126.92573	.249	-566.3159	122.5829
	B	1.00	222.6228	126.92573	.247	-121.8266	567.0722
		3.00	.7563	126.92573	1.000	-343.6931	345.2057
	C	1.00	221.8665	126.92573	.249	-122.5829	566.3159
		2.00	-.7563	126.92573	1.000	-345.2057	343.6931
Set.F1.2	A	2.00	-58.9827*	17.34159	.014	-106.0440	-11.9213
		3.00	-27.8103	17.34159	.305	-74.8717	19.2511
	B	1.00	58.9827*	17.34159	.014	11.9213	106.0440
		3.00	31.1724	17.34159	.232	-15.8890	78.2337
	C	1.00	27.8103	17.34159	.305	-19.2511	74.8717
		2.00	-31.1724	17.34159	.232	-78.2337	15.8890
Set.F2.2	A	2.00	36.0990	18.95032	.197	-15.3281	87.5261
		3.00	53.0267*	18.95032	.043	1.5996	104.4539
	B	1.00	-36.0990	18.95032	.197	-87.5261	15.3281
		3.00	16.9278	18.95032	.678	-34.4994	68.3549
	C	1.00	-53.0267*	18.95032	.043	-104.4539	-1.5996
		2.00	-16.9278	18.95032	.678	-68.3549	34.4994
Set.F3.2	A	2.00	56.8930	62.94906	.672	-113.9374	227.7233
		3.00	-184.8083*	62.94906	.033	-355.6386	-13.9779
	B	1.00	-56.8930	62.94906	.672	-227.7233	113.9374
		3.00	-241.7013*	62.94906	.006	-412.5316	-70.8709
	C	1.00	184.8083*	62.94906	.033	13.9779	355.6386
		2.00	241.7013*	62.94906	.006	70.8709	412.5316
Bate.F1.2	A	2.00	-9.2343	16.74745	.860	-54.6833	36.2148
		3.00	-38.8705	16.74745	.100	-84.3196	6.5785
	B	1.00	9.2343	16.74745	.860	-36.2148	54.6833
		3.00	-29.6363	16.74745	.241	-75.0853	15.8128
	C	1.00	38.8705	16.74745	.100	-6.5785	84.3196
		2.00	29.6363	16.74745	.241	-15.8128	75.0853
Bate.F2.2	A	2.00	-97.7656	57.24333	.264	-253.1118	57.5806
		3.00	6.1784	57.24333	.994	-149.1678	161.5246

	B	1.00	97.7656	57.24333	.264	-57.5806	253.1118
		3.00	103.9440	57.24333	.225	-51.4022	259.2902
	C	1.00	-6.1784	57.24333	.994	-161.5246	149.1678
		2.00	-103.9440	57.24333	.225	-259.2902	51.4022
Bate.F3.2	A	2.00	22.9903	133.28349	.985	-338.7127	384.6933
		3.00	-44.6098	133.28349	.946	-406.3128	317.0933
	B	1.00	-22.9903	133.28349	.985	-384.6933	338.7127
		3.00	-67.6001	133.28349	.880	-429.3031	294.1029
	C	1.00	44.6098	133.28349	.946	-317.0933	406.3128
		2.00	67.6001	133.28349	.880	-294.1029	429.3031
Take.F1.2	A	2.00	-25.2808	18.62465	.419	-75.8242	25.2625
		3.00	-60.7081*	18.62465	.018	-111.2514	-10.1648
	B	1.00	25.2808	18.62465	.419	-25.2625	75.8242
		3.00	-35.4273	18.62465	.198	-85.9706	15.1161
	C	1.00	60.7081*	18.62465	.018	10.1648	111.2514
		2.00	35.4273	18.62465	.198	-15.1161	85.9706
Take.F2.2	A	2.00	-152.6598*	39.80930	.006	-260.6937	-44.6258
		3.00	-51.9619	39.80930	.446	-159.9959	56.0721
	B	1.00	152.6598*	39.80930	.006	44.6258	260.6937
		3.00	100.6979	39.80930	.070	-7.3361	208.7318
	C	1.00	51.9619	39.80930	.446	-56.0721	159.9959
		2.00	-100.6979	39.80930	.070	-208.7318	7.3361
Take.F3.2	A	2.00	69.2087	129.13197	.867	-281.2279	419.6454
		3.00	-164.9784	129.13197	.461	-515.4150	185.4583
	B	1.00	-69.2087	129.13197	.867	-419.6454	281.2279
		3.00	-234.1871	129.13197	.226	-584.6238	116.2496
	C	1.00	164.9784	129.13197	.461	-185.4583	515.4150
		2.00	234.1871	129.13197	.226	-116.2496	584.6238
Sake.F1.2	A	2.00	4.2264	17.13371	.970	-42.2708	50.7237
		3.00	-30.6143	17.13371	.235	-77.1115	15.8829
	B	1.00	-4.2264	17.13371	.970	-50.7237	42.2708
		3.00	-34.8407	17.13371	.161	-81.3380	11.6565
	C	1.00	30.6143	17.13371	.235	-15.8829	77.1115
		2.00	34.8407	17.13371	.161	-11.6565	81.3380
Sake.F2.2	A	2.00	-91.8741*	18.62738	.001	-142.4248	-41.3234
		3.00	73.5931*	18.62738	.005	23.0424	124.1439
	B	1.00	91.8741*	18.62738	.001	41.3234	142.4248
		3.00	165.4672*	18.62738	.000	114.9165	216.0180
	C	1.00	-73.5931*	18.62738	.005	-124.1439	-23.0424
		2.00	-165.4672*	18.62738	.000	-216.0180	-114.9165
Sake.F3.2	A	2.00	74.7122	109.61143	.796	-222.7499	372.1743
		3.00	-184.6071	109.61143	.273	-482.0691	112.8550
	B	1.00	-74.7122	109.61143	.796	-372.1743	222.7499
		3.00	-259.3192	109.61143	.093	-556.7813	38.1429
	C	1.00	184.6071	109.61143	.273	-112.8550	482.0691
		2.00	259.3192	109.61143	.093	-38.1429	556.7813
Put.F1.2	A	2.00	-13.7822	14.81705	.657	-53.9925	26.4281
		3.00	-41.1723*	14.81705	.044	-81.3826	-.9620
	B	1.00	13.7822	14.81705	.657	-26.4281	53.9925
		3.00	-27.3901	14.81705	.215	-67.6004	12.8202

	C	1.00	41.1723*	14.81705	.044	.9620	81.3826
		2.00	27.3901	14.81705	.215	-12.8202	67.6004
Put.F2.2	A	2.00	88.5846	142.88602	.827	-299.1777	476.3469
		3.00	392.1019*	142.88602	.047	4.3396	779.8641
	B	1.00	-88.5846	142.88602	.827	-476.3469	299.1777
		3.00	303.5173	142.88602	.139	-84.2450	691.2795
	C	1.00	-392.1019*	142.88602	.047	-779.8641	-4.3396
		2.00	-303.5173	142.88602	.139	-691.2795	84.2450
Put.F3.2	A	2.00	33.3593	150.86959	.976	-376.0687	442.7873
		3.00	-611.1479*	150.86959	.004	-1020.5759	-201.7200
	B	1.00	-33.3593	150.86959	.976	-442.7873	376.0687
		3.00	-644.5072*	150.86959	.003	-1053.9352	-235.0793
	C	1.00	611.1479*	150.86959	.004	201.7200	1020.5759
		2.00	644.5072*	150.86959	.003	235.0793	1053.9352
Took.F1.2	A	2.00	.9453	24.47793	.999	-65.4826	67.3732
		3.00	32.0691	24.47793	.444	-34.3588	98.4970
	B	1.00	-.9453	24.47793	.999	-67.3732	65.4826
		3.00	31.1238	24.47793	.464	-35.3041	97.5517
	C	1.00	-32.0691	24.47793	.444	-98.4970	34.3588
		2.00	-31.1238	24.47793	.464	-97.5517	35.3041
Took.F2.2	A	2.00	473.6575*	93.76460	.001	219.2003	728.1146
		3.00	733.2088*	93.76460	.000	478.7516	987.6660
	B	1.00	-473.6575*	93.76460	.001	-728.1146	-219.2003
		3.00	259.5513*	93.76460	.045	5.0942	514.0085
	C	1.00	-733.2088*	93.76460	.000	-987.6660	-478.7516
		2.00	-259.5513*	93.76460	.045	-514.0085	-5.0942
Took.F3.2	A	2.00	940.6050*	108.08797	.000	647.2773	1233.9327
		3.00	367.8630*	108.08797	.014	74.5353	661.1908
	B	1.00	-940.6050*	108.08797	.000	-1233.9327	-647.2773
		3.00	-572.7420*	108.08797	.000	-866.0697	-279.4142
	C	1.00	-367.8630*	108.08797	.014	-661.1908	-74.5353
		2.00	572.7420*	108.08797	.000	279.4142	866.0697
Soot.F1.2	A	2.00	-13.4840	37.62616	.938	-115.5934	88.6254
		3.00	41.3609	37.62616	.559	-60.7485	143.4703
	B	1.00	13.4840	37.62616	.938	-88.6254	115.5934
		3.00	54.8449	37.62616	.370	-47.2645	156.9543
	C	1.00	-41.3609	37.62616	.559	-143.4703	60.7485
		2.00	-54.8449	37.62616	.370	-156.9543	47.2645
Soot.F2.2	A	2.00	82.0110	110.98379	.765	-219.1754	383.1974
		3.00	-23.4548	110.98379	.978	-324.6412	277.7316
	B	1.00	-82.0110	110.98379	.765	-383.1974	219.1754
		3.00	-105.4658	110.98379	.645	-406.6522	195.7206
	C	1.00	23.4548	110.98379	.978	-277.7316	324.6412
		2.00	105.4658	110.98379	.645	-195.7206	406.6522
Soot.F3.2	A	2.00	442.4440*	157.28912	.042	15.5948	869.2932
		3.00	24.6411	157.28912	.988	-402.2081	451.4903
	B	1.00	-442.4440*	157.28912	.042	-869.2932	-15.5948
		3.00	-417.8030	157.28912	.055	-844.6522	9.0462
	C	1.00	-24.6411	157.28912	.988	-451.4903	402.2081
		2.00	417.8030	157.28912	.055	-9.0462	844.6522

Suit.F1.2	A	2.00	-34.3970	15.59107	.122	-76.7079	7.9138
		3.00	-21.7126	15.59107	.402	-64.0235	20.5982
	B	1.00	34.3970	15.59107	.122	-7.9138	76.7079
		3.00	12.6844	15.59107	.723	-29.6264	54.9952
	C	1.00	21.7126	15.59107	.402	-20.5982	64.0235
		2.00	-12.6844	15.59107	.723	-54.9952	29.6264
Suit.F2.2	A	2.00	308.0950*	91.26479	.014	60.4218	555.7682
		3.00	175.7106	91.26479	.191	-71.9626	423.3838
	B	1.00	-308.0950*	91.26479	.014	-555.7682	-60.4218
		3.00	-132.3845	91.26479	.374	-380.0577	115.2888
	C	1.00	-175.7106	91.26479	.191	-423.3838	71.9626
		2.00	132.3845	91.26479	.374	-115.2888	380.0577
Suit.F3.2	A	2.00	683.3931*	184.40863	.008	182.9474	1183.8389
		3.00	9.6460	184.40863	.999	-490.7998	510.0917
	B	1.00	-683.3931*	184.40863	.008	-1183.8389	-182.9474
		3.00	-673.7472*	184.40863	.008	-1174.1930	-173.3014
	C	1.00	-9.6460	184.40863	.999	-510.0917	490.7998
		2.00	673.7472*	184.40863	.008	173.3014	1174.1930
Tuque.F1.2	A	2.00	26.0077	29.36945	.682	-53.6947	105.7101
		3.00	14.7500	29.36945	.882	-64.9525	94.4524
	B	1.00	-26.0077	29.36945	.682	-105.7101	53.6947
		3.00	-11.2577	29.36945	.930	-90.9602	68.4447
	C	1.00	-14.7500	29.36945	.882	-94.4524	64.9525
		2.00	11.2577	29.36945	.930	-68.4447	90.9602
Tuque.F2.2	A	2.00	246.3524	91.90717	.053	-3.0641	495.7689
		3.00	338.4949*	91.90717	.008	89.0784	587.9115
	B	1.00	-246.3524	91.90717	.053	-495.7689	3.0641
		3.00	92.1426	91.90717	.615	-157.2739	341.5591
	C	1.00	-338.4949*	91.90717	.008	-587.9115	-89.0784
		2.00	-92.1426	91.90717	.615	-341.5591	157.2739
Tuque.F3.2	A	2.00	922.3358*	160.58517	.000	486.5418	1358.1298
		3.00	367.4368	160.58517	.106	-68.3571	803.2308
	B	1.00	-922.3358*	160.58517	.000	-1358.1298	-486.5418
		3.00	-554.8990*	160.58517	.012	-990.6929	-119.1050
	C	1.00	-367.4368	160.58517	.106	-803.2308	68.3571
		2.00	554.8990*	160.58517	.012	119.1050	990.6929
Boot.F1.2	A	2.00	-128.0451	66.07623	.187	-307.3619	51.2717
		3.00	-17.2530	66.07623	.967	-196.5698	162.0638
	B	1.00	128.0451	66.07623	.187	-51.2717	307.3619
		3.00	110.7921	66.07623	.276	-68.5247	290.1089
	C	1.00	17.2530	66.07623	.967	-162.0638	196.5698
		2.00	-110.7921	66.07623	.276	-290.1089	68.5247
Boot.F2.2	A	2.00	306.3916	307.49062	.618	-528.0724	1140.8557
		3.00	412.4053	307.49062	.428	-422.0588	1246.8694
	B	1.00	-306.3916	307.49062	.618	-1140.8557	528.0724
		3.00	106.0137	307.49062	.943	-728.4504	940.4777
	C	1.00	-412.4053	307.49062	.428	-1246.8694	422.0588
		2.00	-106.0137	307.49062	.943	-940.4777	728.4504
Boot.F3.2	A	2.00	356.7923	233.94585	.339	-278.0870	991.6715
		3.00	128.0861	233.94585	.862	-506.7931	762.9653

	B	1.00	-356.7923	233.94585	.339	-991.6715	278.0870
		3.00	-228.7062	233.94585	.629	-863.5854	406.1730
	C	1.00	-128.0861	233.94585	.862	-762.9653	506.7931
		2.00	228.7062	233.94585	.629	-406.1730	863.5854