To my parents
ACKNOWLEDGMENTS

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There is ample evidence that speakers align to various linguistic levels with their interlocutors. Recent research has been investigating the role of psychological and social factors in order to better understand how speakers deal with linguistic variation in a myriad of contexts. The current paper modified and replicated a picture description study conducted by Chun, Barrow, and Kaan (2016) to investigate native English speakers’ syntactic alignment to speakers with different English accents (American, Chinese, and Indian). Furthermore, we explored the effect of familiarity, previous exposure, perceived degree of accent, speaker comprehensibility, and communicative ability. Native speakers of American English listened to prime sentences containing prepositional object (PO) or direct object (DO) constructions. They were significantly more likely to repeat the construction they had just heard in the prime when producing their own target utterance. However, this priming was not significantly mediated by type of accent nor any of the accompanying social factors. The effect of previous exposure to the foreign accents (Chinese and Indian only) approached significance with an increase in previous exposure (i.e., more close friends with a Chinese/Indian accent or credit hours with TAs with a Chinese/Indian accent) related to an increase in PO production.
after a PO prime compared to the baseline. Reasons why our results did not confirm findings from previous studies could include the population sample and the nature of the task. Nonetheless, the influence of social context on language processing should continue to be studied to further integrate psycholinguistic and sociolinguistic theories.
CHAPTER 1
INTRODUCTION

When speakers interact, there is a tendency for their speech patterns to become more similar (i.e. converge) or to become less similar (i.e. diverge) on many linguistic levels. For instance, individuals have been shown to adapt concepts and mental models (Garrod and Anderson 1987), vowel productions (Abrego-Collier, Grove, Sonderegger, and Yu 2011), and syntactic structures (Bock 1986). Many scholars are attempting to understand the underlying mechanisms for alignment. However, various motivations have been claimed to be the driving force behind this alignment from implicit learning processes (Bock and Griffin 2000; Chang, Dell, and Bock 2006) to achieving a desired social distance from the interlocutor (Balcetis and Dale 2005; Giles and Powesland 1975). Present theories in speech processing lack unanimity between linguistic, psychological, and sociological factors. With the growing population of bilingual and multilingual speakers in the world and with the rise of technology and mass communication, it is imperative to better understand how listeners align with a variety of speakers, in particular to those with different accents. The aim of this study is to shed some light on how social factors, such as foreign accent and previous exposure to that accent, affect syntactic priming in American English speaking monolinguals.

Alignment

Humans exhibit subtle, and sometimes deliberate, imitations or mimicry in social interactions. Alignment is this phenomenon for the behaviors of individuals to become more similar, or to converge. This can be manifested in many ways; for example, behaviorally with face-touching or foot-shaking (Chartrand and Bargh 1999), which has been named “the chameleon effect”. Alignment can also be observed when the
linguistic behavior of interlocutors becomes more similar, which has been observed on many levels. Speakers have been shown to converge on mental concepts and representations (Garrod and Anderson 1987), referring expressions (Garrod and Doherty 1994), lexical items (Brennan and Clarke 1996), rate of speech (Webb 1972) vowel productions (Babel 2010), and syntactic and grammatical structures (Bock 1986; Lev-Ari 2015).

**Structural Priming**

One common method to investigate alignment is priming, where the exposure to a certain stimulus influences the response to another stimulus on the same linguistic level. The present paper investigates syntactic priming, specifically of the English dative structures. In English, two structures can be used to describe dative events, double object (DO) constructions (e.g., “the boy gives the girl the ball”) and prepositional object (PO) constructions (e.g., “the boy gives the ball to the girl”). In a structural priming paradigm, an individual is more likely to produce an utterance using the same syntactic structure they had previously heard or used (Bock 1986). For example, if an individual is primed with a PO construction, they are more likely to produce a PO construction in the sentence following the prime. In a typical picture description method, participants hear or read, and often repeat aloud, a prime sentence using a manipulated syntactic construction. Next, participants are shown a picture of an event and are asked to give an original description. Participants are more likely to use the structure they had just heard or used in the prime when producing their own description (Bock 1986; Weatherholtz, Campbell-Kibler, and Jaeger 2014; Chun, Barrow and Kaan 2016).
Theoretical Accounts for Structural Priming

Various theories, in both psycholinguistics and social psychology, have been proposed to account for alignment. Pickering and Garrod (2004) proposed that automatic residual activation occurs during priming where representations in memory are temporarily activated and more easily available to be used when producing the target sentence. Others have claimed that alignment is due to implicit learning, which is achieved when cognitive mechanisms undergo long-term adaptation to exposure frequencies of various forms and structures (Bock and Griffin 2000; Chang et al. 2006). Under both of these accounts, alignment is an automatic cognitive process. This view is corroborated through the abundant evidence supporting alignment across a variety of tasks, modalities, and languages. Syntactic alignment effects have been found in laboratory settings (Pickering and Branigan 1998), in natural conversations (Gries 2005), in adults (Bock 1986), in children (Savage, Lieven, Theakston, and Tomasello 2003; de Marneffe, Grimm, Arnon, Kirby, and Bresnan 2013), in written language (Pickering and Branigan 1998), in spoken language (Bock 1986), and across language boundaries (Hartsuiker, Pickering, and Veltkamp 2004; Salamoura and Williams 2007). Thus, it appears that syntactic alignment is somewhat of an automatic response in linguistic contexts. Under this view, exposure to a linguistic structure should have the same influence on production regardless of the social context of the situation. As recent research is entering the field, however, there is a growth of evidence supporting the claim that social factors, such as perceived similarity to the speaker (Weatherholtz et al. 2014), familiarity with the accent (Chun et al. 2016), or disposition of the interlocutor (Balcetis and Dale 2005), can influence alignment. This calls for the unification of
psycho and sociolinguistic theories to better understand socially mediated, automatic linguistic alignment.

In an attempt to bridge these fields, some researchers have conceptualized alignment as a strategy for communication during interaction. The Interactive Alignment account (Pickering and Garrod 2004) is a psycholinguistic theory that seeks to bring in the role of interlocutor and other social factors to achieve alignment. Under this theory, speakers align on various linguistic levels as a means to enhance communicative success during dialogue. There is an assumed link between behavior and perception, or comprehension and production, which allows for listeners to achieve common ground on a variety of representations. Linguistic alignment is achieved through shared mental models that are built upon interaction. However, this model does not clearly detail the specific effect of social factors. One sociolinguistic theory, Communication Accommodation Theory (Giles and Powesland 1975), uses language as a medium to achieve various social goals. Becoming more similar, or converging, with another speaker during interaction can serve as a means of increasing trust, intimacy, positive dispositions, or other social intentions. Conversely, the opposite can be achieved as well, using language divergence instead of alignment to show disaffiliations with another speaker. Communication Accommodation Theory largely draws from the social psychology similarity-attraction theory which claims that the more similar individuals’ attitudes and beliefs are to one another, the more likely it is for them to be attracted to each other (Byrne 1971). Therefore, speakers can use verbal and non-verbal communication to become more or less similar, and increase or decrease attraction. Balcetis and Dale (2005) added evidence supporting interactional alignment by
exploring the role of differences in interpersonal relationships on syntactic alignment. Naïve participants conversed with a confederate who was either nice or mean and found greater priming for active, passive, and PO structures when participants interacted with a nice confederate than with a mean confederate. However, influence from social factors on alignment have been observed in non-interactional or socially impoverished tasks as well (Weatherholtz et al. 2014; Lev-Ari 2015; Chun et al. 2016). That is, alignment has been found when human participants listen to pre-recorded oral and/or written sentences and phrases instead of directly interacting with another human.

**Effects of Social Factors on Alignment**

Weatherholtz et al. (2014) explored various social factors as predictors for English dative alignment. Participants took part in an online picture description task through Amazon’s Mechanical Turk and were primed with passages that had heavy political ideological opinions and different dative constructions; this was done to manipulate perceived similarity to the speaker. The accents that were used to read the passage varied according to “standardness”; the most standard being a Standard American English accent, the next standard being an African-American accent, and the least standard being a Chinese-English accent. Participants completed a questionnaire to assess additional social dimensions. Results of their study showed general priming across the board, indicating an automatic component, however, the degree of alignment was mediated by various social dimensions. Factors such as perceived similarity to the speaker, perceived standardness of the accent, perceived smartness of the speaker, and preferred conflict management style were shown to mediate dative alignment to different degrees. Greater DO and PO alignment was observed when the speaker was perceived to be standard-sounding and when the listener preferred compromise as a
conflict management style. On the other hand, less PO alignment was observed when participants perceived the speaker as similar to themselves and less DO alignment was observed when the speaker was perceived as smart. This study showed both an increase and decrease in priming mediated by different social factors.

Additionally, using recorded speech instead of person to person interaction, Lev-Ari (2015) investigated how factors such as prestige, similarity, and disposition influence grammatical alignment in Dutch speakers. Participants listened to passages that were manipulated for word order, either subject-verb or verb-subject, and then completed a sentence unscrambling task to measure alignment. To manipulate prestige participants were told that the speaker who recorded the passage performed in the top 10% or bottom 10% of a language-unrelated intelligence task that was part of the experiment. To manipulate similarity participants were told that the speaker performed better than them, comparable to them, or worse than them on the intelligence task. Finally, at the end of the tasks, participants rated how much they liked the speaker. Results indicated that grammatical alignment was influenced by social status and how much the individual is liked: the more the participants liked the speaker or the more prestigious the participant thought the speaker was, greater priming was observed. Importantly, this experiment provided evidence that alignment is contextual and can change from speaker to speaker and situation to situation.

Recently, Chun et al. (2016) investigated the role of foreign accents in dative structural priming and Native American English speaking participants’ familiarity with those accents. This study employed a noninteractive, picture description task using recordings from a Native American English speaker, a Korean-English speaker, and an
Indian-English speaker. Participants were primed with a prepositional object (PO) construction, double object (DO) construction, or an intransitive sentence for a baseline. Participants then rated their familiarity with each accent on a 7 point Likert scale. Results from this study showed a decrease in PO priming in the American speaker condition compared to the Korean and Indian speaker conditions. Furthermore, familiarity ratings showed a similar pattern with decreased PO priming as accent familiarity increased. That is, participants rated the American accent as the most familiar, followed by the Indian speaker, and then the Korean speaker, and showed less PO priming in the American speaker condition than the Indian and Korean speaker conditions. Results from this study showed that accent can influence structural priming and, moreover, respective familiarity with that accent can further influence syntactic priming.

Social factors have been shown to affect alignment on other linguistic levels, not only syntax. Phonetic convergence has also been shown to be mediated by a myriad of social factors. Some research includes investigation of dialectal accent alignment and VOT convergence mediated by interlocutor disposition during interaction (Babel 2010; Abrego-Collier et al. 2011), language distance between native and nonnative speakers (Kim, Horton, and Bradlow 2011), and the intimate nature of the relationship with the interlocutor (Pardo, Gibbons, Suppes, and Krauss 2012).

The Current Study

Chun et al. (2016) served as a basis for the current study. Although a significant effect for familiarity was found, this aspect could be teased apart further. Chun et al. (2016) laid some good groundwork but adjustments could be made, which was the goal of the current study. As shown in Weatherholtz et al. (2014), many social and
psychological factors may contribute to alignment and there is likely not one sole factor that can be singled out as the most important, but a combination of factors that contribute to the degree of convergence. Therefore, it is imperative to investigate as many potential factors as possible, while still maintaining a degree of control in an experimental setting. Chun et al. (2016) found familiarity to be a contributing factor to alignment to various foreign accents; this study aimed to further investigate this influence by expanding the scope of social factors investigated and probing into individuals' previous exposure with foreign accents. It can be assumed that in order for one to be familiar with an accent they must have significant exposure to that accent. This provided motivation to expand the language questionnaires to assess familiarity by probing into previous exposure through hours of classroom instruction by TAs with foreign accents, or through close personal interaction. To be as inclusive as possible, we attempted to include questions to target other speaker factors such as degree of accent, comprehensibility, and communicative ability. Previous work has shown that listeners are sensitive to speaker dependent perceptions such as accent standardness (Weatherholtz et al. 2014) or prestige (Lev-Ari 2015) which were observed in alignment patterns. Kraut and Wulff (2013) found that participants with low self-reported degrees of familiarity with foreign accented speech rated samples to be less comprehensible and rated speakers to have lower communicative abilities in English only contexts than raters who self-reported higher degrees of familiarity. Using an adapted questionnaire from Kraut and Wulff (2013) we wanted to investigate how these other speaker perceptions, such as communicative ability and comprehensibility, can influence syntactic alignment. Additionally, in the current study, we decided to change the Korean
accent, which was used in Chun et al. (2016), to Chinese because participants in Chun et al. (2016) had difficulty when guessing where the Korean speaker was from. We believed Chinese to be a more recognizable accent for our participants than Korean since there are more TAs at the University of Florida who come from a Chinese speaking background than from a Korean speaking background (Jules Gliesche, personal communication) which could increase the chance participants could identify the accent.

In summary, this study employed a within-subject, immediate priming design to explore how native English speakers’ structural alignment is affected by foreign accents, and moreover, what the effect is of their social perceptions and previous exposure to those accents. This includes examining how factors such as familiarity, degree of accent, comprehensibility, communicative ability, and previous exposure influence syntactic priming of dative constructions to different accents in monolingual English speakers. Under a social-psychological account, we predicted that native, American English speakers would show greater syntactic alignment (i.e. priming) in the American speaker condition than in the foreign accented conditions and that priming would be stronger with increased familiarity, comprehensibility, communicative ability, and previous exposure. According to Chun and colleagues’ (2016) results we would expect that native American English speakers would show less syntactic alignment (i.e. priming) in the American speaker condition than in the foreign accented conditions and that priming would reduce with increased familiarity, comprehensibility, communicative ability, and previous exposure. Finally, under a psycholinguistic account, we would not expect to see a difference in priming modulated by speaker accent or any social factors.
CHAPTER 2
EXPERIMENTAL METHODOLOGY

Participants

Participants for this experiment included 33 students from the University of Florida. Two participants were excluded from data analysis: one because they failed to follow experiment directions resulting in more than half the number of trials being unusable, and one participant because they did not correctly guess where either foreign-accented speaker was from. This left 31 participants for analysis (9 males, ages 18-30, mean age = 20.7). They were all functionally monolingual which was determined through self-reports of only being fluent in English only. They had normal or corrected-to-normal vision and hearing. They had no history of learning or other neurological disorders. Most responded to an ad posted in the Linguistics and Speech, Language and Hearing Sciences online participant pool. Participants were compensated through either one hour of course credit or $5. All participants gave informed consent. The protocol was approved by the University of Florida Institutional Review Board.

Task Order

The experiment consisted of several tasks. First, participants briefly reviewed the approved consent form with the experimenter and were instructed to read it over independently. After the consent form was signed and compensation was discussed, the participants filled out a demographic survey. Then, participants completed 3 experimental blocks of the main priming task. Each experimental block contained only one speaker type with order presentation randomized across participants to reduce ordering effects. Finally, participants were given the language questionnaires. The total
time for the experiment ranged between 35 and 50 minutes depending on how fast the individual made judgements and productions.

Main Priming Task

Materials

The visual and audio stimuli were identical to Chun et al. (2016), but the language speaker questionnaire employed was modified.

Visual stimuli

The visual stimuli consisted of black and white pictures. The prime pictures consisted of a single, concrete image (e.g. a robot) while the target pictures were always dative events containing an animate agent, a concrete and inanimate theme, and an animate experiencer or receiver (e.g. A man showing a car to another man). An example of a trial structure is shown in Figure 2-1. Pictures were hand drawn by an experimenter or downloaded off of the CRL-IPNP website (CRL International Picture Naming Project, Bates et al. 2000). All visual stimuli can be found in appendices A and B.

Critical audio stimuli

The critical trials of the audio recordings contained 6 different verbs: bring, give, pass, send, show, and throw. Each verb was used in a direct object (DO) structure and a prepositional object (PO) structure in prime sentences. Each verb was used once in each of the two prime construction types (DO/PO) in each of the 3 speaker conditions (American, Chinese, and Indian). Baseline prime sentence were constructed from intransitive verbs (e.g., “The man is laughing”). The Baseline sentences were used to get an unprimed structural preference from each subject for each verb. Object noun phrases from the PO and DO structures in the prime were never repeated in the
immediate target picture, but the verb was always shared between critical prime and target pairs. The verb was repeated to achieve a lexical boost effect: greater priming has been observed when lexical items are repeated from the prime to the target (Pickering and Branigan 1998).

Prime sentences were recorded in three speaker conditions: a female native American-English speaker 21 years old, a female native Indian-English speaker 29 years old, and a female native Chinese L2 English speaker 23 years old. All audio was recorded on an external, head mounted Marantz PMD660 Digital Recorder 16-bit stereo PCM sound at a sampling rate of 44.1 kHz. Each trial was recorded 3 times and the best version was chosen by a researcher based on speech rate and sound quality. Finally, all the audio files were normalized on Praat to achieve the same mean amplitude level of volume (Boersma and Weenink 2015). All critical sentences can be found in Appendix A.

**Fillers**

72 filler sentences were also used which were comprised of simple transitive and intransitive sentences. Presentation of the fillers mirrored that of the critical trials. The ratio of fillers to critical stimuli was 4:3. Trials were pseudorandomized so 1 or 2 fillers were inserted between every critical prime-target pair. All filler sentences can be found in Appendix B.

**Prime-Target Paring**

Prime and target pairs were organized into nine versions, totaling 54 unique critical prime-target pairs; six pairs for each prime condition: Baseline intransitive prime, PO prime, and DO prime x three speaker conditions: American, Chinese, and Indian. Additionally, 24 prime-target fillers were used for each speaker condition (totaling 72
fillers per participant) which were composed of both transitive and intransitive sentences. Prime-target pairs were fixed for each speaker condition and the presentation order was counterbalanced across participants. Additionally, the order of each speaker block was counterbalanced across all participants. A list of all materials can be found in Appendix A and B.

**Main Priming Task Procedure**

Participants first signed the informed consent form and filled out the demographic survey. Participants then entered the experiment room for instructions on the main priming task. Stimulus presentation and response collection was controlled by E-prime 2.0 professional (Psychological Software Tools). After oral instruction, participants were given three practice trials consisting of transitive sentences; they could repeat the practice until they fully understood how to complete the experiment. No practice trials contained dative sentences. The researcher remained in the experiment room during the practice session to confirm the participant was following instructions as well as to answer any questions.

The trial structure is illustrated in Figure 2-1. Each trial began with a 100ms presentation of a fixation cross followed by a prime picture (e.g. a rose) which appeared simultaneously with the audio presentation of the prime sentence (e.g. “The boyfriend sends the girlfriend a rose”). Participants were instructed to repeat the prime sentence aloud to increase the salience of the structure. Half of the prime pictures correctly corresponded to an element in the prime sentence while half of the prime pictures did not correspond to the sentence. For example, a participant would hear “The salesman gives the man $100” accompanied with a picture of a paperclip (mismatch) or they would hear “The boyfriend sends the girlfriend a rose” accompanied by a picture of a
rose (match). Participants used a button press to indicate whether or not they thought the picture was related to the sentence they heard by pressing 1 for “YES” or by pressing 2 for “NO”. Subsequently, for target trials, participants saw a picture which displayed some type of event and a written sentence fragment prompt consisting of a subject and a verb (e.g., “The man gives…”). Participants were explicitly instructed to use the given sentence fragment to orally produce a description of what they interpreted to be happening in the displayed picture. Participants controlled the pace of their responses by pressing the space bar after their description to continue to the next prime-target pair. At the end of each block, the experimenter would enter the room and start the next block.

Questionnaires

Questionnaire 1 - Demographic

Participants filled out a short document indicating their age, sex, and languages known. The students participating for course credit also indicated which course they were receiving credit for. The demographic questionnaire is available in Appendix C.

Questionnaire 2 – Language Speakers

After the entire priming task was completed for all three speakers blocks, participants filled out a language survey for each of the speakers. The first four questions were Likert-scale questions quantifying the comprehensibility of the speaker, the communicative ability of the speaker, the degree of accent of the speaker, and the familiarity with each accent. Scales went from 1 to 5, 1 was high, meaning very comprehensible, no accent at all, high communicative ability and very familiar, while 5 was low meaning incomprehensible, very strong accent, low communicative ability, and not familiar at all. Additionally, for the Indian and Chinese speaker conditions, there
were 5 extra questions pertaining to previous personal exposure to each of the accents. The first question asked if the participant knew where the speaker was from. This question addressed the ability of the participants to correctly identify what accent each speaker had. The second question asked if the individual had ever been to a country where this language is spoken, allowing us to identify if someone had spent any time immersed in that accent. Next, participants were asked if they were enrolled in any courses that were taught by a professor or Teaching Assistant that had the related accents and how many credit hours those classes totaled. Finally, as Likert-scale questions, participants were asked how many speakers of that accent they knew well, and within the past week how often they interacted with individuals with said accent.

Language speaker questionnaires can be found in Appendix C.

**Questionnaire Procedure**

Following the main priming task, participants filled out a language questionnaire regarding their perceptions for each of the three speakers. The order in which the surveys were presented mirrored the order of the speakers for the main priming task. For example, if a participant heard the Chinese speaker first, then the American speaker, then the Indian speaker during the main priming task they would receive the Chinese speaker questionnaire first, then the American speaker questionnaire, then the Indian speaker questionnaire. Participants listened to speaker samples that contained intransitive sentences before each questionnaire to remind them what each speaker sounded like. Participants could play the speech samples as many times as they wanted while they filled out the surveys.
Coding and Data Preparation

Main Priming Task Coding

Participants’ target speech productions (i.e., picture descriptions) as well as prime repetitions were coded. Blank recordings were coded as null and excluded from the data. Participants were considered primed if they correctly repeated the given prime sentence. Each prime production was coded as BASE, DO, PO, or OTHER depending on the structure. Prime productions were coded as BASE if an intransitive sentence was repeated (e.g., “the man is laughing”). Both prime and target productions were coded as DO if the utterance contained the indirect object followed by the direct object, and as PO if the utterance contained the direct object followed by a ‘to’ prepositional phrase. Prime or target productions were coded as OTHER when the sentence was an incomplete thought, did not contain a theme or a patient, or used a different preposition other than “to” (e.g. “for”, “at”). Prior to analysis, we excluded OTHER responses which do not relate to a priming effect. All target productions and most prime productions were coded by a second rater and interrater reliability was 98% for prime coding and 97% for target coding, calculated using Cohen’s Kappa.

Language Questionnaire Coding

Scales on the Language Speaker surveys went from 1 to 5. Answers were coded with 1 as high, meaning to “easy to understand”, “no accent at all”, “very successful in communicative competence”, and “very familiar”, and 5 as low, meaning “I understood nothing”, “very strong accent”, “not successful in communicative competence” and “not familiar”. Answers to questions 5 and 6 were qualitative (5. Where is this speaker from? 6. Have you ever been to this country?) and used to exclude any participants if they could not tell where the speaker was from or if they had spent any time in the country of
the foreign accents. Question 7 was coded as is, in the number of credit hours the individual spent during the Spring 2017 semester with a professor or TA with a Chinese or Indian foreign accent. Finally, the exposure questions were coded as questions 1-4 where 1 was high meaning “I know more than 8 people from India/China well” and “in the past week I frequently interacted with individuals with an Indian/Chinese accent” while 5 was low meaning “I know no people from India/China well” and “in the past week I never interacted with individuals with an Indian/Chinese accent”.

Figure 2-1. Example trial structure.
CHAPTER 3
RESULTS

Behavioral Data

With regards to the Language surveys, data for all survey responses is summarized in Table 3-1. No participants reported spending any time in either China or India, apart from a few airport layovers. As mentioned earlier, only one participant was unable to identify both foreign accents so their data was removed prior to analysis. Results from paired t-tests comparing each speaker on each behavioral factor is summarized in Table 3-2. It is important to note that the smaller the score, the higher the perception of the speaker. For example, a score of 1 on communicative ability is interpreted at very high perceived communicative ability while a score of 5 is very low perceived communicative ability; a score of 1 on familiarity is interpreted as being very familiar with that accent while a score of 5 is very unfamiliar. Beginning with comprehensibility, participants rated the American accent as the most comprehensible followed by the Chinese speaker and lastly the Indian speaker. The perceived comprehensibility differed significantly comparing the American speaker to the foreign accented speakers but the comprehensibility ratings between the Indian and Chinese speakers was not significant.

Additionally, the American accent was rated as having the highest communicative ability followed by the Chinese accent and then Indian accent. The perceived communicative ability differed significantly across the speaker conditions.

Regarding strength of accent, the Indian accent was identified as the strongest followed by the Chinese accent and the American accent was almost rated as having
“no accent at all”. The perceived degree of accent differed significantly across the speaker conditions.

Finally, the participants were the most familiar with the American accent while the Chinese accent and Indian accent received very similar ratings. The perceived familiarity differed significantly between the American and foreign accented conditions, however, there was no significant difference between the familiarity ratings for the Chinese and the Indian speaker.

Participants were asked additional questions about their previous exposure to the Chinese and Indian accents. Just as with the four factors mentioned above (comprehensibility, communicative ability, degree of accent, and familiarity), exposure questions were coded in the same way; a score of 1 for personal exposure was interpreted as having more than 8 close friends with the accent in question while a score of 5 was interpreted as having no close relationships with speakers of the accent in question. Participants had significantly more credit hours during the Spring 2017 semester with professors or TAs who had a Chinese accent compared to professors or TAs with an Indian accent. With regards to their personal interactions with accented speakers, we also designed questions that asked how many people the participants knew well with each accent. Participants had significantly more close relationships with individuals with a Chinese accent compared to an Indian accent. Finally, we asked how often in the past week the participants interacted with individuals who had foreign accents. Participants had similar responses on amount of interaction with a Chinese speaker and an Indian speaker which was not significantly different.
Main Priming Task

In order to explore the priming effect, only correctly repeated prime trials were included for data analysis. If the participant correctly repeated the prime sentence it can be assumed they processed the sentence structure. This resulted in 1653 analyzable trials out of 1674, approximately 1.3% data loss. An overview of the response types as a function of prime type for each speaker condition is available in Table 3-3. The Native American English speaking participants had a slight preference for the DO construction, and produced more DO constructions after the DO prime and more PO constructions after the PO prime.

To investigate syntactic priming in response to different speaker conditions and responses on the language surveys, we used a logistic linear mixed-effects model (R version 3.2.4: R Core Team, 2016). Since “OTHER” responses were not related to a priming effect they were excluded from the analysis. The final data set included 1506 data points. The number of PO responses was the dependent variable for all models which was coded as 1 and DO responses coded as 0. First, we constructed a model to investigate whether syntactic priming differs depending on the type of speaker, that is native speech compared to foreign, or accented speech. We used a Helmert contrast coding for the fixed predictor of Speaker Type. This created two contrasts (1) the American speaker vs. the foreign speakers (the Chinese speaker and the Indian speaker: coded negative) (2) The Chinese speaker vs. the Indian speaker (the latter coded negative). These contrasts are based on the native English speaking participants’ conventional categorization of the American accent as a native speaker and the foreign accents as non-U.S. speakers. We used treatment coding for the fixed predictor Prime Type which created two contrasts: (1) DO vs. Baseline and (2) PO vs. Baseline;
Baseline coded as ‘0’. We used treatment coding instead of sum coding for the Prime Type since the difference between Baseline and DO is the DO priming effect while the difference between Baseline and PO is the PO priming effect. Participants’ ratings on the four factors (comprehensibility, communicative ability, familiarity, and degree of accent) investigated in the language speaker surveys were highly correlated, (see Appendix D) so a composite score was created by taking the z scores for each factor on the language speaker surveys and calculating the mean. The composite score did not include any of the three exposure measures (credit hours, personal exposure, and weekly exposure). The composite score was centered around the mean to reduce collinearity. The models reported include the maximum random intercepts for by-participants and by-item random effects that would converge. Although the presentations of accent conditions was randomized, Speaker Order was initially included to test if the presentation order influenced the overall priming effect. Model comparisons using an ANOVA revealed that the factor Speaker Order was not significant and thus the summary is of the simple models which were run without the factor Speaker Order. Results for the effect of Speaker Type and Composite score are reported in Table 3-4.

According to the results of this model, Native English speakers showed a priming effect for both PO and DO primes versus baseline primes. That is, their PO production increased with a PO prime and their PO production decreased with a DO prime. However, PO production did not show effects of Speaker, nor of the Composite score on the language surveys. Moreover, there was a lack of interaction between Speaker Type (native vs. nonnative) and Prime Type as well as Composite scores.
To better understand how previous exposure affected priming for the foreign accented speakers, we structured another model, based on the foreign speaker trials only, and using sum coding for speaker (Chinese vs. Indian). Ratings for personal and weekly exposure were highly correlated, so another composite score was calculated for previous exposure. A larger value on the Exposure Composite score is interpreted as less exposure while a smaller value on the composite score is interpreted as more exposure. This Exposure Composite did not include credit hours since there was a significant difference between amount of credit hours with a Chinese accented instructor compared to an Indian accented instructor, and credit hours was not significantly correlated to personal or weekly exposure. The other fixed factors and random effect structures remained the same as the previous model.

As shown in the summary of results in Table 3-5, the model revealed priming effects for both DO and PO priming but lacked any main effect for speaker or Exposure Composite and lacked significant interactions. Interestingly, the Exposure Composite score and PO prime interaction approached significance.¹ That is, as participants had less previous exposure (i.e., larger (positive) values on the exposure composite measure) they produced fewer PO structures with a PO prime compared to the baseline.

To summarize, although participants showed strong overall priming for both DO and PO structures, this was not significantly mediated by different accents, nor participants’ perceptions of those accents, as scored by the language questionnaires.

¹ Another model was constructed using the foreign accent Exposure Composite but omitting the factor Speaker. This Exposure Composite and PO prime interaction reached significance (p = 0.04)
Furthermore, participants’ previous exposure composite and PO priming approached significance, as decreased previous exposure was associated with numerically less PO production following a PO prime compared to the baseline prime.

Table 3-1. Summary of the means and standard deviations for responses on the language speaker questionnaire

<table>
<thead>
<tr>
<th></th>
<th>Comprehensibility</th>
<th>Communicative Ability</th>
<th>Degree Accent</th>
<th>Familiarity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
</tr>
<tr>
<td>American</td>
<td>1.00 (0)</td>
<td>1.00 (0)</td>
<td>1.10 (0.30)</td>
<td>1.06 (0.25)</td>
</tr>
<tr>
<td>Chinese</td>
<td>2.06 (0.85)</td>
<td>2.00 (0.73)</td>
<td>2.58 (0.76)</td>
<td>3.06 (1.03)</td>
</tr>
<tr>
<td>Indian</td>
<td>2.38 (1.01)</td>
<td>2.48 (1.12)</td>
<td>3.35 (0.84)</td>
<td>3.00 (1.15)</td>
</tr>
</tbody>
</table>

Table 3-1. Continued

<table>
<thead>
<tr>
<th></th>
<th>Credit hours</th>
<th>Personal Exposure</th>
<th>Weekly Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
</tr>
<tr>
<td>American</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Chinese</td>
<td>1.74 (1.69)</td>
<td>3.65 (1.17)</td>
<td>3.42 (1.39)</td>
</tr>
<tr>
<td>Indian</td>
<td>0.45 (1.23)</td>
<td>4.06 (0.77)</td>
<td>3.85 (1.29)</td>
</tr>
</tbody>
</table>
Table 3-2. Results from paired t-tests for language speaker questionnaire data

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Lower</th>
<th>Upper</th>
<th>t</th>
<th>df</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Comprehensibility</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>American vs. Chinese</td>
<td>-1.06</td>
<td>-1.37</td>
<td>-0.75</td>
<td>-6.94</td>
<td>30</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>American vs. Indian</td>
<td>-1.32</td>
<td>-1.69</td>
<td>-0.95</td>
<td>-7.27</td>
<td>30</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Chinese vs. Indian</td>
<td>-0.26</td>
<td>-0.59</td>
<td>0.07</td>
<td>-1.61</td>
<td>30</td>
<td>0.12</td>
</tr>
<tr>
<td><strong>Communicative Ability</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>American vs. Chinese</td>
<td>1.00</td>
<td>0.73</td>
<td>1.27</td>
<td>7.62</td>
<td>30</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>American vs. Indian</td>
<td>1.48</td>
<td>1.07</td>
<td>1.90</td>
<td>7.37</td>
<td>30</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Chinese vs. Indian</td>
<td>-0.48</td>
<td>-0.84</td>
<td>-0.13</td>
<td>-2.80</td>
<td>30</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td><strong>Degree Accent</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>American vs. Chinese</td>
<td>1.48</td>
<td>1.20</td>
<td>1.77</td>
<td>10.74</td>
<td>30</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>American vs. Indian</td>
<td>2.26</td>
<td>1.94</td>
<td>2.57</td>
<td>14.70</td>
<td>30</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Chinese vs. Indian</td>
<td>-0.77</td>
<td>-1.16</td>
<td>-0.39</td>
<td>-4.01</td>
<td>30</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td><strong>Familiarity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>American vs. Chinese</td>
<td>2.00</td>
<td>1.63</td>
<td>2.36</td>
<td>11.13</td>
<td>30</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>American vs. Indian</td>
<td>1.94</td>
<td>1.52</td>
<td>2.35</td>
<td>9.59</td>
<td>30</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Chinese vs. Indian</td>
<td>0.06</td>
<td>-0.39</td>
<td>0.52</td>
<td>0.29</td>
<td>30</td>
<td>0.77</td>
</tr>
<tr>
<td><strong>Chinese and Indian</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exposure only</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Credit Hours</td>
<td>1.29</td>
<td>0.54</td>
<td>2.04</td>
<td>3.50</td>
<td>30</td>
<td>0.001*</td>
</tr>
<tr>
<td>Weekly Exposure</td>
<td>-0.42</td>
<td>-1.06</td>
<td>0.22</td>
<td>-1.34</td>
<td>30</td>
<td>0.19</td>
</tr>
<tr>
<td>Personal Exposure</td>
<td>-0.42</td>
<td>-0.81</td>
<td>-0.03</td>
<td>-2.21</td>
<td>30</td>
<td>0.04*</td>
</tr>
</tbody>
</table>

* p < .05;  + p < .1

Table 3-3. Responses as a function of prime condition for each speaker condition

<table>
<thead>
<tr>
<th>Prime Response</th>
<th>American speaker</th>
<th>Chinese speaker</th>
<th>Indian speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Base</td>
<td>DO</td>
<td>PO</td>
</tr>
<tr>
<td>DO</td>
<td>89</td>
<td>117</td>
<td>48</td>
</tr>
<tr>
<td>PO</td>
<td>72</td>
<td>48</td>
<td>122</td>
</tr>
<tr>
<td>Other</td>
<td>25</td>
<td>19</td>
<td>13</td>
</tr>
<tr>
<td>Prop. PO</td>
<td>0.39 (0.45)</td>
<td>0.26 (0.29)</td>
<td>0.67 (0.72)</td>
</tr>
</tbody>
</table>

Proportion of PO production based on the number of PO, DO and Other responses. Number between parentheses is the proportion of PO production based on the number of PO and DO completions. Base- Baseline prime condition; PO - Prepositional object prime condition; DO - double object prime condition.
<table>
<thead>
<tr>
<th></th>
<th>β</th>
<th>SE</th>
<th>Z</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intercept)</td>
<td>-.19</td>
<td>.38</td>
<td>-.50</td>
<td>.62</td>
</tr>
<tr>
<td>Prime DO vs. Base</td>
<td>-1.43</td>
<td>.46</td>
<td>-3.69</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Prime PO vs. Base</td>
<td>2.13</td>
<td>.46</td>
<td>4.66</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Chinese: Indian speaker</td>
<td>-.57</td>
<td>.58</td>
<td>-.98</td>
<td>.33</td>
</tr>
<tr>
<td>American: Non-US speakers</td>
<td>-.31</td>
<td>.78</td>
<td>-.40</td>
<td>.69</td>
</tr>
<tr>
<td>Composite</td>
<td>-.02</td>
<td>.10</td>
<td>-.26</td>
<td>.80</td>
</tr>
<tr>
<td>Prime DO vs. Base: Chinese vs. Indian speaker</td>
<td>.69</td>
<td>.77</td>
<td>.89</td>
<td>.37</td>
</tr>
<tr>
<td>Prime PO vs. Base: Chinese vs. Indian speaker</td>
<td>.11</td>
<td>.80</td>
<td>.13</td>
<td>.89</td>
</tr>
<tr>
<td>Prime DO vs. Base: American vs. Non-US speakers</td>
<td>.51</td>
<td>1.00</td>
<td>.51</td>
<td>.61</td>
</tr>
<tr>
<td>Prime PO vs. Base: American vs. Non-US speakers</td>
<td>1.13</td>
<td>1.01</td>
<td>1.05</td>
<td>.29</td>
</tr>
<tr>
<td>Prime DO vs. Base: Composite</td>
<td>.02</td>
<td>.12</td>
<td>.19</td>
<td>.85</td>
</tr>
<tr>
<td>Prime PO vs. Base: Composite</td>
<td>.15</td>
<td>.13</td>
<td>1.18</td>
<td>.24</td>
</tr>
</tbody>
</table>

*p < .05;  + p < .1
Base = Baseline Prime condition; Prime DO = DO Prime condition; Prime PO = PO Prime condition; Composite = the average of the z scores for all 4 language survey factors (comprehensibility, communicative ability, degree of accent, and familiarity).

Model: TargetPO ~ PrimeType_cond + Speaker.Helmert + cComposite + (PrimeType_cond:Speaker.Helmert) + (PrimeType_cond:cComposite) + (1 + PrimeType_cond + Speaker.Helmert | Subject) + (1 + PrimeType_cond | ItemID)
Table 3-5. Summary of the logistics mixed effect model regarding the effect of previous exposure on non-US accents only

<table>
<thead>
<tr>
<th></th>
<th>β</th>
<th>SE</th>
<th>Z</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intercept)</td>
<td>-0.16</td>
<td>0.43</td>
<td>-0.38</td>
<td>0.70</td>
</tr>
<tr>
<td>Prime DO vs. Base</td>
<td>-1.45</td>
<td>0.48</td>
<td>-3.29</td>
<td>0.001*</td>
</tr>
<tr>
<td>Prime PO vs. Base</td>
<td>2.02</td>
<td>0.48</td>
<td>4.19</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Chinese and Indian: Speaker</td>
<td>-0.63</td>
<td>0.63</td>
<td>-1.00</td>
<td>0.32</td>
</tr>
<tr>
<td>Exposure Composite</td>
<td>0.07</td>
<td>0.27</td>
<td>2.4</td>
<td>0.81</td>
</tr>
<tr>
<td>Prime DO vs. Base: Speaker</td>
<td>0.82</td>
<td>0.77</td>
<td>1.19</td>
<td>0.29</td>
</tr>
<tr>
<td>Prime PO vs. Base: Speaker</td>
<td>0.53</td>
<td>0.78</td>
<td>0.68</td>
<td>0.50</td>
</tr>
<tr>
<td>Prime DO vs. Base: Exposure Composite</td>
<td>-0.32</td>
<td>0.31</td>
<td>-1.03</td>
<td>0.30</td>
</tr>
<tr>
<td>Prime PO vs. Base: Exposure Composite</td>
<td>-0.61</td>
<td>0.34</td>
<td>-1.77</td>
<td>0.08+</td>
</tr>
</tbody>
</table>

* p < .05;  + p < .1

Base = Baseline Prime condition; Prime DO = DO Prime condition; Prime PO = PO Prime condition; Exposure Composite = the average of the z scores for responses on Personal Exposure and Weekly Exposure.

Model: TargetPO ~ PrimeType_cond + Speaker + cComposite + (PrimeType_cond:Speaker) + (PrimeType_cond:cComposite) + (1 + PrimeType_cond + Speaker | Subject) + (1 + PrimeType_cond | ItemID)
CHAPTER 4
DISCUSSION AND CONCLUSIONS

This study aimed to further examine the effect of social factors on structural priming of native speakers of American English. Particularly, this study focused on speaker dependent factors such as degree of perceived accent, comprehensibility, and communicative ability as well as listener dependent factors such as familiarity with the accents and previous exposure to nonnative speech. Participants listened to and repeated prepositional object or double object constructions, and then orally described a pictured event using a given prompt. When describing the target pictures, participants showed an overall tendency to repeat the construction they had just previously heard, regardless of speaker condition. That is, participants showed significant DO and PO structural alignment irrespective of if the prime was spoken in an American, Chinese, or Indian accent, and irrespective of participants’ perceptions of or exposure to these accents.

These results contribute to the already vast body of evidence supporting the phenomenon of syntactic alignment across a variety of tasks and manipulations. This is in line with the psycholinguistic accounts of automatic alignment such as Implicit Learning and Residual Activation (see Introduction) as we did not find a significant influence of social factors such as accent or familiarity. In other words, the degree of alignment was not mediated by any social factors, which is inconsistent with previous findings and the Communication Accommodation Theory, although, there was a near significant effect of previous exposure. As previous exposure increased, more POs were produced following a PO prime when compared to the baseline prime. The results obtained in this study are oppositional to the original conducted by Chun and colleagues.
(2016) who found an inverse relationship between familiarity and priming. However, this near significance of the previous exposure component with increased PO priming would be predicted by CAT. An increase in previous exposure could increase the amount of interaction and the similarity between interlocutors to facilitate priming.

Relation to Similar Studies

In particular, the current study is directly comparable to Chun, Barrow, and Kaan’s (2016) study as the latter served as the basis for the current experiment. Chun et al. (2016) investigated Native English speakers’ structural alignment to different foreign accents of English mediated by familiarity. Overall, in Chun et al. (2016), participants showed a robust priming effect which was broken down to smaller PO priming in the American speaker condition compared to the accented speaker conditions (Korean and Indian). This was thought to be motivated by familiarity as participants showed smaller PO priming the more familiar participants rated the accent. In other words, as familiarity increased, PO priming decreased; there was an inverse relationship between familiarity and PO priming. Participants rated the American accent as the most familiar, and showed decreased PO priming in the American speaker condition. This is inconsistent with the results obtained by the current study. We too found an overall robust priming effect for both DO and PO construction, however, although the effect was not statistically significant, there was a tendency for participants to show deceased PO priming as their previous exposure decreased. This suggests a general positive relationship between previous exposure to foreign accents and PO priming.

The differences in results between the two studies could be due to the slight methodological changes between the two studies. Participants had trouble correctly
identifying the Korean speaker’s accent in Chun et al. (2016), so the current study opted to use a Chinese accent, which was expected to be more salient to the college aged participants. It could be, that the change in accent conditions allowed for a smaller distribution of familiarity ratings which affected the results. Additionally, the language questionnaires used in both studies were vastly different. Chun et al. (2016) had participants rate their familiarity with each accent and the perceived degree of strength (i.e., no foreign accent to very strong foreign accent) on a 7 point Likert scale. The current study attempted to expand this survey to include additional factors and explore more social avenues for language priming. Hoping to tease apart these factors, we had participants rate familiarity, accent strength (same as Chun et al. 2016), but also accent comprehensibility, speaker communicative ability, and three levels of previous exposure on a 5 point Likert scale. However, it was found that answers on all of these questionnaires were highly correlated and therefore impossible to disentangle using the current methodology. This led to the use of a composite score for analysis which may have contributed to the differences in results to Chun et al. (2016). Our composite score was more inclusive of multiple, related ratings, as opposed to one familiarity rating, which may have allowed for a more accurate quantification of previous exposure.

Previous studies have also found significant effects of social factors on syntactic alignment, inconsistent with our results. However, these differences could be due to the exact social factors investigated and the methods used to quantify and analyze them. Weatherholtz et al. (2014) employed a similar picture description method to investigate the influence on social perception and found that degree of alignment was significantly mediated by an array of social factors, such as perceived standardness of the speakers’
accent, perceived similarity, and preference for conflict management. Greater alignment for both structures was observed when participants rated the speaker as more “standard” and when they had a preference for compromise as a management style. However, only PO priming was reduced when participants perceived the speaker to be more similar to themselves, while DO priming was unaffected. This observance is related to the familiarity effect observed in Chun et al. (2016). These differences in results can be attributed various study manipulations. Weatherholtz et al. (2014) took their Likert-survey results to an exploratory factor analysis which combines “correlated responses into aggregate measures of latent social variables” (p. 19). Interpersonal similarity accounted for the most variance, but also comprised a very broad range of survey items including I would want the speaker as a friend, the speaker is similar to me, the speaker would have an easy time understanding me, the speaker speaks like I do. Comparing these questions to the survey questions used in the current study shows some inconsistencies with categorization between studies. We explicitly asked how many friends participants had who spoke with the accents in question and used that as a measure of previous exposure, not of similarity. Finally, Lev-Ari (2015) manipulated similarity, prestige, and likability to investigate grammatical convergence in Dutch speakers using sentence scrambling. Effects were found for speaker status and likability to increase alignment, but there was no effect for similarity. Once again, the methodology and manipulations between Lev-Ari (2015) and the one in this current paper are vastly different. Participants in her study were given perceptions on the identity and characteristics of their prime speaker while the current study did not manipulate the participants’ impressions of the speakers. Furthermore, Lev-Ari looked
at grammatical alignment through written sentence unscrambling while the present study used an oral picture description task to look at syntactic alignment. Any single or combination of these factors could have led to differences in results.

**Limitations**

Crucially, we must not discount the possibility that the lack of significant differences in alignment between language groups is due the highly automatic nature of priming. However, certain aspects of this study should be carefully considered when planning future research. One possible explanation for the null results in the current study stems from the spread, or representativeness, of participants. Participants for this experiment were largely recruited from the Linguistics department and Speech, Language, and Hearing Sciences department. These individuals can be assumed to have some experience or knowledge working with accents. Previous research on foreign accent ratings and perception has shown that the type of rater (i.e., experienced or naïve) can have an influence on the results. For example, Huang and Jun (2015) used three different groups of raters to judge degree of accent in L1 Mandarin speakers learning English on a 9 point Likert scale. One group of raters was advanced L1 Mandarin L2 English individuals; one group was comprised of monolingual Native English speakers who had not taken classes on speech or phonetics, had no experience teaching or rating nonnative speech, and self-reported little familiarity with foreign accented speech in general; the final group was comprised of native English speakers who had experience teaching English as a second language or involved in speech therapy and self-reported high levels of familiarity with foreign accented speech. Results showed significant consistencies between the groups, however, upon closer investigation of the native speaker ratings, inexperienced native raters were consistently
strict (i.e., assigned less native-like ratings) compared to their experienced counterparts. The authors provide some speculations as to why, one being that experienced raters are more lenient because they are familiar with a wider range of foreign accents and may be more sympathetic and favorable to nonnative speakers. Since most of the participants in the current study had experience in linguistics and are not representative of a general population, they may have responded differently than say, for example, engineering students, affecting their prime patterns.

Another possible explanation could be due to various methodological aspects of the current study. As with any psychological measurement, it is possible that the techniques used were not sufficient to measure the intended factors. Although using Likert-scales for accent ratings is by far the most common method, more research needs to be conducted on the reliability and validity of using these scales for psychological perceptions. Additionally, although measures were taken to reduce experimental confounds, further replications of this study should aim to further counterbalance the stimuli by repeating prime-target pairs throughout each different speaker condition and not limiting stimuli to one specific speaker condition.

Furthermore, the nature of the task could have also contributed to the null results. Participants listened to accented speech and completed a picture description task without having to interact with the speakers of those accents. It is possible that the non-interactive nature of the task prevented participants from elucidating a social interaction and altered their priming patterns and ratings of the language questionnaires. One study conducted by Fehér, Wonnacott, and Smith (2016) has investigated the effect of unpredictable linguistic variation on structural priming during
both human to human and human to computer interaction. The dependent variable was
language entropy which measures how variable an individual’s productions are. A score
of 0 means that individuals consistently uses one word order, a score of 1 means both
word orders are used equiprobably. Fehér et al. (2016) also looked for immediate trial to
trial structural priming of word order in addition to convergence by measuring the
difference in partners’ usage of each word order during interaction, with a low difference
indicating high similarity or convergence. Fifty-two participants were trained to read and
write in the artificial language which included two grammatical structures – Verb, Agent,
Patient (VAP) and Verb, Patient, preposition, Agent (VPpA) equivalent to DO and PO
structures. Subsequently, participants completed recall tests and engaged in a “director-
matcher” task which is similar to a picture description task except it uses video clips
instead of static images. Participants must describe what occurred in the scene to their
partner by typing it on a keyboard and the partner must identify the correct scene grab
being described. Participants were grouped into three partner conditions – Single
truthfully believed they were interacting with a computer, Dyad truthfully believed they
were interacting with another human, and Pseudodyad were told they were interacting
with another human but they were actually interacting with a computer. Results show
structural priming occurred in all conditions even in the absence of lexical boost. Where
the groups differed was in their convergence. Fehér and colleagues (2016) clarify by
extending the following definitions: “[b]y convergence we mean that interacting
participants produce languages with similar statistical properties, and by priming we
mean the matching of moment-to-moment linguistic behavior between communication
partners” (p. 162). The authors calculated convergence by measuring the magnitude of
the difference in frequency of use of VAP order between pairs. For example, if one partner used VAP order on 75% of their trials and their partner used it on 85% of their trials, the within-pair difference would be 10%. The Dyad group closely converged with their partners while Single and Pseudodyad did not as closely mirror the word order frequency use of their partners, however, all pairs showed significant trial to trial priming. The authors suggest that local, moment to moment structural priming can be dissociated from overall linguistic convergence of systems and that these can be affected differently depending on the task type. Based on the results of that study, it is possible that the participants in the current study did not equate the recorded speaker to a real interlocutor which could have affected their convergence patterns. An important distinction to note is that this study used text-based language where the participants read and write the language while the current study used listening and speaking.

Conclusions and Future Directions

Future research should carefully consider what factors to investigate and the methods used to measure their questions. Confederate scripting may be a better task to allow for interactional alignment since it depends on a human interlocutor. Furthermore, participants may be able to glean characteristics about the speaker through interaction that may not be as salient from a recorded voice. Additionally, future research into accent and alignment should investigate various types of accents and characteristics that accompany them to get a better picture of what defines foreign accent and how it can affect language processing. Previous research has found effects for the prestige of the speaker by manipulating factors such as smartness (Lev-Ari, 2015) which could also be investigated by manipulating accent. Many English speakers report certain British English dialects as sounding more or less prestigious or smarter than the other English
dialects (Hughes, Trudgill, and Watt 2012), lending an interesting possible comparison between alignment of British English and American English.

In conclusion, only a few studies to date have explored the effect of social factors on structural convergence and have found a varying influence of social contexts (Chun et al. 2016; Weatherholtz et al. 2014; Lev-Ari 2015; Balcetis and Dale 2005). The results of the current study did not find a significant effect of accent or other social factors on structural priming, suggesting a highly automatic nature of alignment. However, the effect of previous exposure approached significance which warrants further investigation. Everything considered, language processing should not discount the effects of social cues and speaker variation. Given that language is a social construct and used in social situations, it is crucial to investigate it in this light. The current theoretical accounts for alignment and language processing should strive to integrate social, pragmatic, and cognitive factors.
APPENDIX A
CRITICAL STIMULI

Appendix A lists all of the critical prime and target pictures for all speaker conditions used in the study along with the corresponding sentence that was used for recordings or written prompts. Half of the prime pictures will match with the prime sentence while the other half will not.

**Chinese Critical Prime**

<table>
<thead>
<tr>
<th>Prime Picture</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPB1</td>
<td>The girl is standing</td>
</tr>
<tr>
<td>CPB2</td>
<td>The woman is surfing</td>
</tr>
<tr>
<td>CPB3</td>
<td>The boy is winking</td>
</tr>
<tr>
<td>CPB4</td>
<td>The man is falling</td>
</tr>
<tr>
<td>CPB5</td>
<td>The man is laughing</td>
</tr>
<tr>
<td>CPB6</td>
<td>The man is cooking</td>
</tr>
</tbody>
</table>
CP1: The woman gives the businessman $20

CP2: The woman shows the customer the violin

CP3: The chef brings the lady the cake

CP4: The man passes the girl a ticket

CP5: The baby throws the father an ice cream cone

CP6: The mother sends the student the backpack

CP7: The boy gives the wheelchair to the grandmother

CP8: The actor shows the radio to the actress

CP9: The man brings the skateboard to the champion
CP10: The father passes the desk to the son

CP11: The teacher throws a jacket to the student

CP12: The man sends the cherry to the farmer

**Chinese Critical Target Prompt**

CTB1: The housewife gives

CTB2: The boy shows

CTB3: The librarian brings
CTB4: The girl passes

CTB5: The boy throws

CTB6: The student sends

CT1: The chef gives

CT2: The cowboy shows

CT3: The waitress brings
CT4: The husband passes

CT5: The woman throws

CT6: The girl sends

CT7: The principle gives

CT8: The man shows

CT9: The boy brings
CT10: The girl passes

CT11: The girl throws

CT12: The man sends

Native American Critical Prime
NPB1: The boy is hiding

NPB2: The man is skiing

NPB3: The man is fencing

NPB4: The girl is speaking
NPB5: The woman is typing

NPB6: The man is coming

NP1: The salesman gives the man $100

NP2: The student shows the child a roller-skate

NP3: The girl brings the roommate's shirt

NP4: The father passes the child a kite

NP5: The farmer throws the driver a pumpkin

NP6: The boyfriend sends the girlfriend a rose

NP7: The worker gives the paper to the secretary
NP8: The scientists shows the robot to the man

NP9: The show host brings the phone to the man

NP10: The worker passes the tent to the man

NP11: The man throws the nail to the camper

NP12: The traveler sends the postcard to the friend

Native American Critical Target Prompt
NTB1: The boy gives

NTB2: The girl shows
NTB3: The boy brings

NTB4: The mother passes

NTB5: The lifeguard throws

NTB6: The girl sends

NT1: The nurse gives

NT2: The man shows
NT3: The waitress brings

NT4: The man passes

NT5: The boy throws

NT6: The girl sends

NT7: The president gives

NT8: The salesman shows
NT9: The girl brings

NT10: The boy passes

NT11: The driver throws

NT12: The boy sends

Indian Critical Prime
IBP1: The man is sliding

IBP2: The girl is singing

IBP3: The dancer is dancing
IBP4: The girl is bowling

IBP5: The doctor is clapping

IBP6: The lady is calling

IP1: The grandfather gives the boy $1

IP2: The dealer shows the girl a piano

IP3: The father brings the son a cello

IP4: The woman passes the boyfriend a strawberry

IP5: The husband throws the wife a tie

IP6: The teacher sends the student a puzzle
IP7: The policeman gives a helmet to the rider

IP8: The general shows a tank to the soldier

IP9: The manager brings a T.V. to the worker

IP10: The saleswoman passes a scarf to the grandmother

IP11: The boss throws a key to the engineer

IP12: The student sends a card to the professor

Indian Critical Target Prompt
ITB1: The girl gives
ITB2: The clown shows

ITB3: The waitress brings

ITB4: The boy passes

ITB5: The boy throws

ITB6: The mother sends

IT1: The man gives
IT2: The woman shows

IT3: The boy brings

IT4: The painter passes

IT5: The man throws

IT6: The queen sends

IT7: The man gives
IT8: The saleswoman shows

IT9: The mayor brings

IT10: The girl passes

IT11: The boy throws

IT12: The shopkeeper sends
APPENDIX B
FILLER STIMULI

Appendix B is a list of all of the prime and target filler sentences and pictures for all speaker conditions. Half of the prime pictures will correspond to the sentence while the other half will not.

**Chinese Filler Prime**

| CF1: The sailor is washing the boat | Picture |
| CF2: The man is looking out the window | |
| CF3: The child is eating the donut | |
| CF4: The man is breaking the fish tank | |
| CF5: The girl is jumping the jump rope | |
| CF6: The wife is cooking on the stove | |
| CF7: The man is painting the bench | |
CF8: The hairstylist is buying the comb

CF9: The boy is wearing the shirt

CF10: The main is building the swimming pool

CF11: The lady is fishing

CF12: The girl is jumping

CF13: The girl is feeding the ducks

CF14: The boy is flying the kite

CF15: The firefighter is catching the fire

CF16: The waiter is washing the glass
CF17: The baby is dreaming

CF18: The gentleman is drinking wine

CF19: The man is balancing

CF20: The chick is flying

CF21: The man is planting the tree

CF22: The student is doing homework

CF23: The girl is playing with the drill

CF24: The farmer is growing the corn

Chinese Filler Target Prompt
CFT1: The boy is
CFT2: The teacher is

CFT3: The man is

CFT4: The woman is

CFT5: The man is

CFT6: The girl is

CFT7: The player is

CFT8: The boy is

CFT9: The woman is

CFT10: The boy is
CFT11: The lady is

CFT12: The bird is

CFT13: The man is

CFT14: The man is

CFT15: The sister is

CFT16: The lady is

CFT17: The policeman is

CFT18: The lady is

CFT19: The man is
CFT20: The father is

CFT21: The man is

CFT22: The boy is

CFT23: The man is

CFT24: The secretary is

Native American Filler Prime
NF1: The working is using the drill

NF2: The man is climbing the ladder

NF3: The student is playing with the magnet

NF4: The woman is selling the microphone
NF5: The wife is making toast

NF6: The boy is dragging the chair

NF7: The student is writing with the pen

NF8: The girl is typing on the keyboard

NF9: The hiker is wearing the coat

NF10: The lady is smiling

NF11: The man is camping

NF12: The kid is crying

NF13: The kid is coloring the book
NF14: The boy is counting numbers

NF15: The boy is walking

NF16: The dog is dying

NF17: The man is smoking

NF18: The lady is expecting a baby

NF19: The kid is eating the sandwich

NF20: The wife is sweeping the floor

NF21: The girl is buying the pear

NF22: The man is touching the folder
NF23: The child is holding the marker

NF24: The boy is buying the earring

Native American Filler Target Prompt
NFT1: The boy is

NFT2: The boy is

NFT3: The hairdresser is

NFT4: The baseball player is

NFT5: The man is

NFT6: The lady is
NFT7: The girl is

NFT8: The man is

NFT9: The man is

NFT0: The woman is

NFT11: The man is

NFT12: The lady is

NFT13: The family is

NFT14: The man is

NFT15: The woman is
NFT16: The woman is

NFT17: The man is

NFT18: The man is

NFT19: The wife is

NFT20: The woman is

NFT21: The man is

NFT22: The lady is

NFT23: The shepherd is

NFT24: The man is

Indian Filler Prime
IF1: The musician is listening to the cassette tape

IF2: The girl is washing the dish

IF3: The grandmother is knitting the rug

IF4: The boy is cleaning the bathtub

IF5: The teacher is displaying the skeleton

IF6: The artist is making the teapot

IF7: The thief is stealing the wallet

IF8: The girl is drawing the feather

IF9: The man is running
IF10: The grandpa is sleeping

IF11: The man is sitting

IF12: The nurse is getting the Band-Aid

IF13: The man is drumming

IF14: The father is driving a car

IF15: The boy is feeling cold

IF16: The pilot is flying an airplane

IF17: The cook is frying the chicken

IF18: The child is spilling the juice
IF19: The soldier is drilling

IF20: The man is hitchhiking

IF21: The lady is reading a magazine

IF22: The boy is kicking the ball

IF23: The mother is wearing a blouse

IF24: The kid is cutting the tape

**Indian Filler Target Prompt**

IFT1: The man is

IFT2: The lad is

IFT3: The lady is
IFT4: The man is

IFT5: The girl is

IFT6: The girl is

IFT7: the girl is

IFT8: The woman is

IFT9: The girl is

IFT10: The man is

IFT11: The girl is

IFT12: The man is
IFT13: The man is

IFT14: The man is

IFT15: The woman is

IFT16: The girl is

IFT17: The girl is

IFT18: The man is

IFT19: The husband is

IFT20: The boy is

IFT21: The woman is
IFT22: The man is

IFT23: The boy is

IFT24: The boy is
APPENDIX C
QUESTIONAIRES

<table>
<thead>
<tr>
<th>Last Name</th>
<th>First Name</th>
<th>Today’s Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td>Male [ ]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Female [ ]</td>
</tr>
</tbody>
</table>

1. What language(s) do you use in daily life?

__________________________________________________________________________

2. For each language list the age you learned it.

__________________________________________________________________________

Figure C-1. Demographic questionnaire.
### Speaker C

1. **How easy was this speaker to understand?**

<table>
<thead>
<tr>
<th>Easy to understand</th>
<th>Mostly easy to understand</th>
<th>Somewhat difficult to understand</th>
<th>I understood nothing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

2. **How strong was this speaker's accent?**

<table>
<thead>
<tr>
<th>No accent at all</th>
<th>Mild accent</th>
<th>Strong accent</th>
<th>Very strong accent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

3. **This speaker is applying to a university program where clarity in spoken English is necessary. Based on this person's accent, how successful do you think this speaker would be in clearly communicating with native English speakers at this program?**

<table>
<thead>
<tr>
<th>Very successful</th>
<th>Mostly successful</th>
<th>Somewhat unsuccessful</th>
<th>Not successful</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

4. **How familiar are you with this accent?**

<table>
<thead>
<tr>
<th>Not familiar</th>
<th>Somewhat familiar</th>
<th>Mostly familiar</th>
<th>Very familiar</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

---

**Figure C-2.** American speaker questionnaire.
Figure C-3.  Chinese speaker questionnaire.
Figure C-4. Indian speaker questionnaire.
Correlational analyses were used to examine the relationship between the behavioral factors measured on the language speaker questionnaires. Table D-1 shows results from a two-tailed Pearson’s product moment correlation of the four factors: comprehensibility, communicative ability, degree accent, and familiarity for all three accents (df = 91). Table D-2 shows results from a two-tailed Pearson’s product moment correlation on the three previous exposure factors: credit hours, personal exposure, and weekly exposure for the two foreign accent conditions: Chinese and Indian (df = 60).

Table D-1. Correlations between language speakers survey factors for all accents

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Comprehensibility</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Communicative Ability</td>
<td>.752*</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Degree Accent</td>
<td>.695*</td>
<td>.670*</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>4. Familiarity</td>
<td>.439*</td>
<td>.517*</td>
<td>.436*</td>
<td>-</td>
</tr>
</tbody>
</table>

* p < 0.05; + p < 0.1

Table D-2. Correlations between foreign accent language speaker survey factors

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Credit Hours</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Personal Exp.</td>
<td>-.123</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>3. Weekly Exp.</td>
<td>-.165</td>
<td>.520*</td>
<td>-</td>
</tr>
</tbody>
</table>

* p < 0.05; + p < 0.1
LIST OF REFERENCES


Chun, Eunjin, Julia Barrow, & Edith Kaan. 2016. Native English speakers’ structural alignment mediated by foreign-accented speech. Linguistics Vanguard, 2(s1).


BIOGRAPHICAL SKETCH

Julia Barrow was born in Bradenton, Florida to Anne and Steve Barrow where she spent the majority of her life. She graduated in the top 10% from Lakewood Ranch High School in 2012 and promptly began classes at the University of Florida that summer.

Julia spent three years as an undergraduate at the University of Florida, graduating with a major in linguistics and minor in Spanish in August 2015. She was a part of the UF women’s novice rowing team and active in the Linguistics Society. In 2014, Julia joined Dr. Wind Cowles’ Language and Cognition Lab as a volunteer research assistant working on an eye tracking project investigating topic and focus. Upon the dissipation of the Language and Cognition Lab in 2015, Julia transitioned into the Brain and Language lab of Dr. Edith Kaan. There, she assisted a fellow lab member, graduate student Eunjin Chun, on a syntactic priming project.

Wanting to further her education, Julia enrolled as a master’s student in the Department of Linguistics at the University of Florida. She continued her research in the Brain and Language lab collaborating with Eunjin Chun, which led to the inspiration for her thesis project. During her time as a master’s student, Julia also worked at the University Writing Program where she was an instructor for first year college argumentative writing. Additionally, she received the Second Language Acquisition and Teaching (SLAT) certificate in the summer of 2017.