

# The Effect of Age of Entry and Contact on Backward Transfer of Glaswegian English (L2) on Hindi and Indian English (L1)

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## ABSTRACT

This study investigated phonological backward transfer in the ethnolinguistic minority of first-generation bilingual immigrant Indians in Glasgow 'Glaswasians' [1] in relation to Flege's Speech Learning Model [2, 3], which predicts 'assimilation' and 'dissimilation' of sound categories. The study explored whether and how sounds of Glaswasian native language (Hindi) and dialect (Indian English) are influenced by sounds of the dominant host language/dialect (Glaswegian English). Age of Entry (AoE) in Glasgow and amount of Indian Contact were also examined. Two control groups (Indians and Glaswegians) and an experimental group (Glaswasians) were recorded reading in English and Hindi words containing two phones (/t/ - VOT, /l/-F2-F1 difference). In both languages, Glaswasian VOT became more Glaswegian-like (assimilation), whereas F2-F1 difference diverged to an even greater degree than the Indians (dissimilation). Increasing AoE and Indian Contact decreased assimilation of /t/ or increased dissimilation of /l/.

**Keywords:** Glasgow Indians, Indian English, Hindi, Glaswegian English, Backward Transfer

## 1. INTRODUCTION

Languages in the bilingual mind interact and influence each other [2, 4]. This influence can be from the native language (L1) to the second language (L2) (*Forward Transfer*) [5] or from the L2 to L1 (*Backward Transfer*) [6–9]. The focus of the present study is the latter. In the wider context of Second Language Acquisition, much evidence has been found for phonological backward transfer across languages [6–9]. However, it is much less studied in dialects, and further still, even less is known about how backward transfer across languages is different from backward transfer across dialects.

The present study investigates first-generation bilingual Indian immigrants in Glasgow who are native speakers of Hindi and Indian English and are termed 'Glaswasians' [1]. It examines how certain sounds of speakers' native and heritage language (Hindi) and dialect (Indian English - IE) have changed after coming into contact with a new language and dialect (Glaswegian English - GE),

which is the host language and majority variety in their current environment (Glasgow).

An explanation for backward transfer comes from the Speech Learning Model (SLM) [2, 3] which proposes that all speech sounds of a bilingual's languages exist in the same phonetic space. This allows for these phonological systems to interact and mutually influence each other which causes bidirectional transfer. With increased L2 input, an L2 learner may sense enough dissimilarity between two perceptually similar L1-L2 categories, to seek to maintain a contrast between these L1 and L2 categories in the common phonetic space. One way to maintain this contrast is by deflecting the categories away from each other. This is called *phonetic category dissimilation* [2] and may lead to non-native like pronunciation of the native sound.

However, as the age of acquisition increases, this ability to distinguish between phonetically similar sounds is reduced by the *Perceptual Mechanism of Equivalence Classification* [2]. Such perceptually linked L1 and L2 sounds will then over time come to resemble one another and processed as the same sound category. Thus, a new L2 category is not formed, but the existing L1 category is appropriated. This may happen because in late L2 learners, the phonological categories of their L1 are so well established, that instead of creating new categories for the similar L2 sound, they rather assimilate it to the existing similar L1 category. A similar argument is made by the Perceptual Assimilation Model [10], where L2 learners perceptually assimilate non-native phones to native phone categories based on perceived similarity between them.

In contrast, early learners of L2, are exposed to both the host language (which in this case is GE and is both a new language and a new dialect) and heritage languages from an early age. Thus, they acquire the linguistic features of both the host and heritage languages in childhood when their categories are more plastic and still developing [2, 11]. Furthermore, early L2 learners may have more exposure to the host language by way of education and communicating with multiple social groups and peer networks. Thus, their L2 may even become dominant allowing transfer to similar L1 categories. Additionally, the quality of input received by early

and late L2 learners (here, first-generation immigrants) may also be different. While late first-generation speakers are more likely to learn L2 from speakers of their own community, who are themselves L2 speakers of the host language, early first-generation speakers are more likely to learn L2 from those who speak it as a native language in the host country [11]. Thus, early or late Age of Entry (AoE) in the L2 country can also have implications for transfer in first-generation immigrants [11].

In addition to the AoE in the host country, much research has found evidence that the amount of contact with the host or heritage community also has implications for transfer, such that higher contact with the host community is associated with more transfer from the host language [12 – 15].

In light of these findings, the current study seeks to better understand the nature of backward transfer from host to heritage languages, and further asks whether the patterns of transfer across languages are replicated in patterns of transfer across dialects. It focusses on the following three research questions.

### 1.1. Is there a backward transfer of GE on Hindi and IE? If yes, does it appear as assimilation or dissimilation?

Transfer was studied in two phonetic features: Acoustic darkness of /l/ and aspiration (VOT) of /t/.

GE has darker /l/, and therefore smaller F2-F1 difference [16, 17]. IE and Hindi, on the other hand, are known to have clearer /l/, therefore, larger F2-F1 difference [17, 18]. In case of assimilation, Glaswasian /l/ will become more Glaswegian-like with smaller F2-F1 difference (darker /l/). However, if there is dissimilation, Glaswasian will develop clearer /l/ as compared to Indians, to contrast it from darker Glaswegian /l/. If there is no transfer, then Glaswasian /l/ will have similar F2-F1 difference as Indians.

GE /t/ has a denti-alveolar realization and in word-initial position shows aspiration, reflected in longer lag VOT [19]. On the other hand, /t/ in IE has a retroflex realization and is not aspirated; Hindi shows dental and retroflex stops, and a retroflex stop is usually used for English /t/. In both Hindi and IE, this stop has shorter VOT than GE [18, 20]. In case of assimilation, Glaswasians will develop Glaswegian-like longer VOT. In case of dissimilation, Glaswasians will develop even shorter VOT than Indians to contrast it from longer Glaswegian VOT. If there is no transfer, then Glaswasians will have similar VOT as Indians.

### 1.2. Is there an effect of AoE and amount of Indian Contact on this transfer?

For AoE, I predicted that early arrival in Glasgow (lower AoE) will be associated with higher transfer from GE. For Indian Contact, I predicted that less Indian Contact will be associated with higher transfer from GE. These predictions apply to both phone categories. Furthermore, with respect to the SLM, transfer could appear as assimilation or dissimilation.

### 1.3. Does IE (as compared to Hindi) receive more transfer from GE on the account that they are both dialects of the same language?

Previous research has suggested that in cases of language contact, mutually intelligible dialects influence each other [8, 21]. Based on this, it is predicted that as they are dialects of the same language, IE will receive more transfer from GE than Hindi, which is a different language altogether.

## 2. METHODOLOGY

Three groups of speakers were recruited: two controls groups (Glaswegians and Indians) and one experimental group (Glaswasians). Glaswegians ( $n = 31$ ) comprise native speakers of GE who reside in Glasgow. Indians ( $n = 31$ ) comprise native speakers of Hindi and IE who reside in India and have never had any contact with GE. Finally, Glaswasians ( $n = 41$ ) comprise first-generation Indian immigrants in Glasgow. They are native bilinguals in Hindi and IE and have been residing in Glasgow for at least 3 years. The three groups were recorded reading sentence lists in English and Hindi (only in English for ‘Glaswegians’). There were 10 words per target sound and the target word was embedded in the carrier frame of *Say \_\_\_ again.* in English and *kəha: \_ a:pne?* (direct translation: Said \_\_\_ you?) in Hindi.

Using a questionnaire, data was collected on AoE and amount of Indian Contact only from Glaswasians. AoE is the age (in years) at which the Glaswasian participant arrived in Glasgow (*min.* = 12, *max.* 36, *mean* = 26.19, *SD* = 6.38). Indian Contact represents the amount of contact with the participants’ own ethnic group (Indian). There was a total of 11 questions such as “How often do you spend free time with your close Indian friends?”. Participants responded on a scale ranging from ‘never’ (1) to ‘almost always’ (5). A higher value represents higher contact with Indians (*min.* = 20, *max.* 50, *mean* = 37.16, *SD* = 7.35; score out of 57).

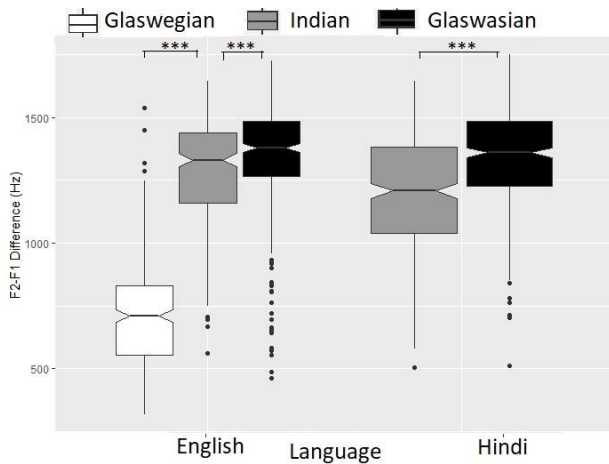
The data is analysed in two steps using the lme4 package (version 1.1.29) [22] in R (version 3.6.3) [23]. First, the speech data is acoustically analysed and compared across the three groups separately for each phonetic feature. Second, if backward transfer is found for any phonetic feature,

it is then analysed as a function of AoE and Indian Contact.

### 3. RESULTS

#### 3.1 Acoustic analysis across groups

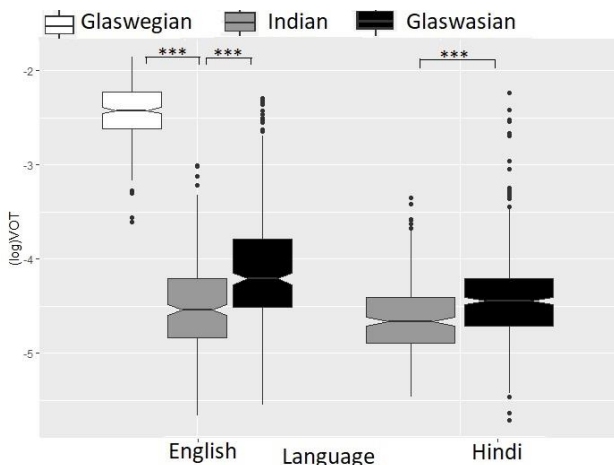
##### 3.1.1 Word-initial /l/: F2-F1 difference



**Figure 1:** F2-F1 difference across Group and Language

Linear mixed modelling revealed that, consistent with previous research, Glaswegians had smaller F2-F1 difference (darker /l/) than Indians who had larger F2-F1 difference (clearer /l/) in English ( $\beta = -568.97$ ,  $t(604) = -39.11$ ,  $p < .001$ ) (Figure 1). Subsequent analysis indicated that in English, Glaswasians had higher F2-F1 difference (clearer /l/) than Indians, who had smaller F2-F1 difference (darker /l/) ( $\beta = 52.25$ ,  $t(1341) = 3.33$ ,  $p < .001$ ). This is consistent with the pattern of dissimilation, where Glaswasians are exaggerating the native F2-F1 difference to maintain a contrast with the smaller F2-F1 difference in GE. Furthermore, the difference between Indians and Glaswasians in Hindi was larger than in English ( $\beta = 86.34$ ,  $t(1341) = 4.01$ ,  $p < .001$ ). This indicates that Hindi has undergone more dissimilation than English.

##### 3.1.2 Word-initial /t/: log VOT



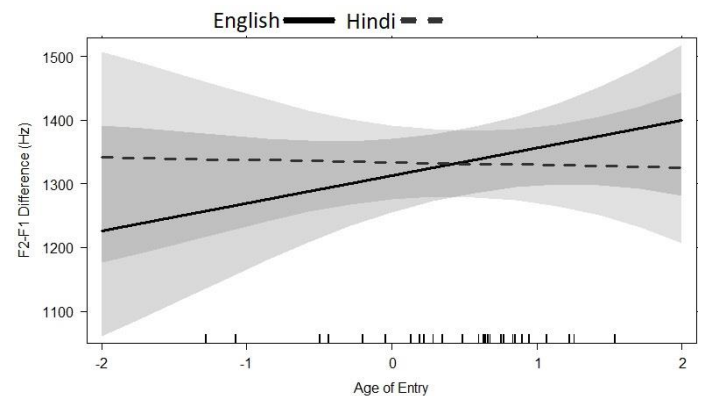
**Figure 2:** log VOT across Group and Language

Linear mixed modelling revealed that Glaswegians had longer VOT than Indians in English ( $\beta = 2.05$ ,  $t(589) = 76.31$ ,  $p < .001$ ) (Figure 2). Further analysis showed that Glaswasians had longer VOT than Indians ( $\beta = 0.35$ ,  $t(1272) = 9.58$ ,  $p < .001$ ) in English. This is indicative of assimilation, where Glaswasian VOT has become longer, that is, more Glaswegian-like. Additionally, the difference between Glaswasians and Indians was much bigger in English than in Hindi ( $\beta = -0.18$ ,  $t(1272) = -3.57$ ,  $p < .001$ ). That is, English underwent more assimilation than Hindi for VOT.

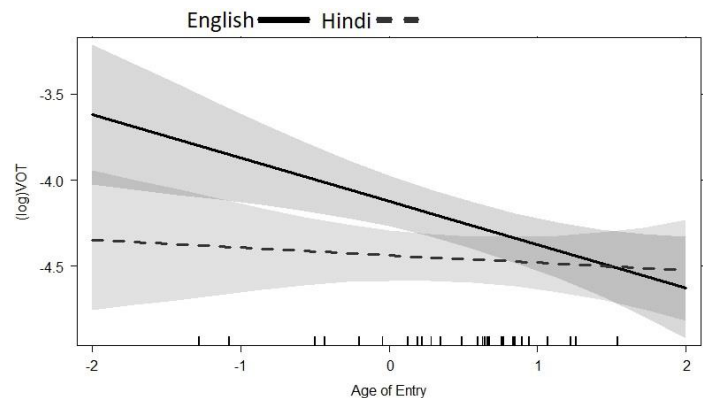
#### 3.2 Analysing the effect of AoE and amount of Indian Contact on transfer

As transfer was found in both /l/ and /t/, I examined whether AoE and Indian Contact affected the degree of transfer across languages and accounted for the variability in the data (Figures 1 and 2).

##### 3.2.1 AoE



**Figure 3:** Interaction effect of AoE and Language on F2-F1 difference

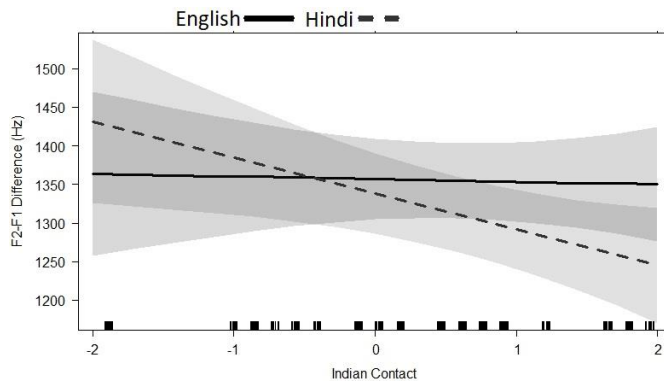


**Figure 4:** Interaction effect of AoE and Language on log VOT

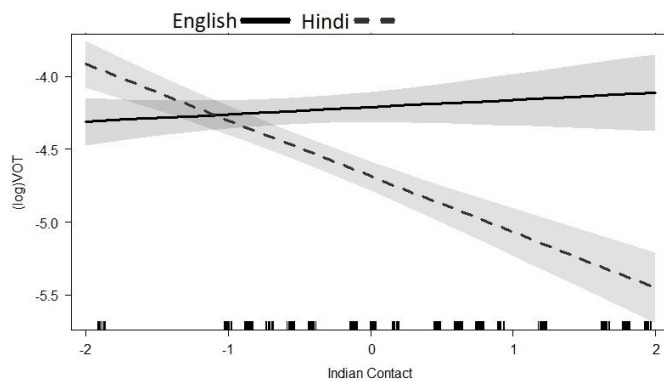
F2-F1 difference and log VOT were analysed in separate linear mixed models and significant

interactions between Language and AoE were found for both (see Figures 3 and 4). For F2-F1 difference, higher AoE had no effect on Hindi, whereas it increased dissimilation in English ( $\beta = -47.31$ ,  $t(565) = -2.74$ ,  $p = .006$ ). For VOT, as the AoE increased, log VOT in English became shorter, whereas it was unaffected for Hindi. In other words, there was decreasing assimilation in English as the AoE increased, but no change in Hindi.

### 3.2.2 Indian Contact



**Figure 5:** Interaction effect of Indian Contact and Language on F2-F1 difference



**Figure 6:** Interaction effect of Indian Contact and Language on log VOT

In separate linear mixed models, F2-F1 difference and log VOT were analysed, and significant interactions effects were found between Language and Indian Contact for both (see Figures 5 and 6). For F2-F1 difference, an increase in Indian Contact had no effect in English, whereas it was associated with a decrease in F2-F1 difference (lesser dissimilation) in Hindi ( $\beta = -43.13$ ,  $t(424) = -2.23$ ,  $p = .026$ ). For VOT, an increase in Indian Contact had no effect on log VOT in English, whereas it led to a steeper decrease in log VOT (lower assimilation) in Hindi ( $\beta = 0.21$ ,  $t(546) = 4.67$ ,  $p < .001$ ).

## 4. DISCUSSION AND CONCLUSION

This study investigated phonological backward transfer in first-generation immigrant Indians in Glasgow. Specifically, it asked three questions: (1) Is there phonological backward transfer from GE to Hindi and IE, and if yes, does that appear as assimilation or dissimilation, (2) Is there an effect of AoE and Indian Contact on transfer, and (3) Whether IE will receive more transfer from GE on account that both are dialects of the same language.

With respect to the first research question, I found backward transfer of GE on both Hindi and IE /l/ [7] and /t/ [11]. It manifested as dissimilation in /l/ (higher dissimilation in Hindi than in English) and assimilation in /t/ (higher assimilation in English than in Hindi). It may be possible that formant patterns are more vulnerable to dissimilation, whereas VOT is more susceptible to assimilation. However, more research is required to make such a claim.

With respect to the second question, the results on the effect of AoE and Indian Contact on transfer support previous research [12 – 15], but also add to our knowledge of how it might be different across languages and dialects. In relation to the effect of AoE, two points can be concluded. First, English was more vulnerable to AoE effects. This was found for both /l/ and /t/. Second, as AoE increased, the values became more Indian-like (exaggeratedly so in case of /l/). Contrary to this, those who arrived early in Glasgow had Glaswegian-like darker /l/ and longer VOT in English. Two such similar conclusions can also be drawn for the effect of Indian Contact. First, Hindi was more vulnerable to the effects of Indian Contact in /l/ as well as /t/, whereas there was no effect of it in English. Second, as the amount of Indian Contact increased, the values became more Indian-like. This is even argued for /l/ as the range of Glaswasian F2-F1 difference is similar to that of Indians, not Glaswegians.

Finally, in relation to the third question, it is not clear if IE is more susceptible to transfer from GE. This is because Hindi underwent more transfer for F2-F1 difference, but English underwent more transfer for VOT. However, this much is clear that English was more vulnerable to AoE effects, and Hindi to the effects of Indian Contact. This may be because AoE represents influence from the host language (GE), whereas Indian Contact represents influence from the heritage language (Hindi). In this light, it makes sense that AoE affected Indian English more than Hindi but Indian Contact affected Hindi more than Indian English.



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