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English Intelligibility Issues in Outsourcing of Marketing and Call Centers

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English Intelligibility Issues in Outsourcing of Marketing and Call Centers

by

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Abstract

Worldwide, most multinational companies have outsourced their call centers in India, the premiere outsourcing destination of services. However, some U.S. companies have brought back their outsourced services in response to U.S. customers' complaints of communication breakdowns in their phone interactions with Indian call agents.

This thesis researches English intelligibility issues of outsourced telemarketing and call centers in India. The observations made in the thesis extend to all call agents originally from the Outer Circle of English countries, part of the three Concentric Circles of World Englishness model developed by Kachru (1975). English in Outer circle countries serves as lingua franca, though still spoken as a second language.

This thesis primarily focuses on Indian call centers' interactions with customers. Essentially, it examines issues at the interface of English as lingua franca and business communication. It addresses the following research questions: 1) what are the intelligibility issues that consumers face when interacting over the phone with Indian accented English? 2) What are the specific features in the Indian accent that cause intelligibility issues for American callers? 3) What are outsourcing companies doing to meet these challenges?

The first question is regarding the types of intelligibility issues that consumers face when they interact with Indian English speakers over the phone. The second question examines the specific features in the Indian-accented English which cause intelligibility issues for American callers. The third question considers some specific training strategies, such as accent neutralization, that U.S. outsourcing multinationals have implemented to address issues of intelligibility as well as communication breakdowns.

Before tackling these questions, a brief background on outsourcing and call centers is presented. Next, economic ramifications of U.S. call centers in India as well as why some U.S. companies have brought back their call centers are examined. The main part of the thesis will focus on segmental issues that impede intelligibility. Confusion and phonological data will be presented and discussed.

Acknowledgments

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Chapter 1: Literature Review

A wealth of statistics show that the country of India is the main destination for multinational companies' marketing and call centers services. In fact, The Economist (2013) estimated that about 80% of functions such as customer service, banking by phone, and organizational activities that American and European banks and financial services could reasonably outsource had been offshored, mostly to India, as of 2008.

Outsourcing: Definition and Importance

People use the terms "outsourcing" and "offshoring" interchangeably, yet clear differences exist. *Offshoring* is the relocation of organizational activities to a wholly owned subsidiary or an independent service provider in another country. In contrast, Gaspar (2014) defines *outsourcing* as "the corporate practice of acquiring or producing quality goods or services abroad at a lower cost, thereby eliminating domestic production" (p.38). Outsourcing can also mean "the process of a company subcontracting a certain production function to a third party" (Gaspar, 2014, p. 270).

Thus, outsourcing can be done within a country whereas offshored can be done to another country. The functions in a company that are generally outsourced are: personal or virtual assistantship, bookkeeping, payroll services, data entry, administration roles, accounts payables and accounts receivables, social networking, search engine optimization, commonly abbreviated as SEO, data mining, and call centers roles (Optimal Outsourcing, 2015).

Altogether, offshoring is part of outsourcing. With outsourcing, the offshoring company can either shift its manufacturing or clerical operations to another company, or it can allow another company to take over some of its functions. In any case, the outsourcing company is the end receiver of the offshore company's organizational activities and functions.

Some organizations and individuals have criticized offshoring companies for outsourcing manufacturing and service operations. Those who are against outsourcing and offshoring have made the case that U.S. multinational companies have caused loss of jobs in the home country in hopes for cheaper labor abroad and to avoid tax liabilities in their home country.

Gaspar (2014) explains that outsourcing and offshoring practices have been polemical issues among U.S. workers because of the loss of U.S. jobs to other countries (pp. 270-271). He says that outsourcing by U.S. corporations is "here to stay" (p. 271) due to the increase of globalization, technology advances, and the pressure to offer lower prices to consumers. Klie predicted that by 2017, more than $28 billion dollars in market revenue would come from U.S. outsourcing companies (Klie, 2014, p. 23). According to Klie, the top outsourced industries are telecommunications, banking, and financing services, followed by the healthcare industry. Other industries that are outsourcing their customer service centers are technology, utilities, gaming, travel, and hospitality (Klie, 2014, p. 23). Oshri listed the top 10 global outsourcing vendors as of 2010 as being "Accenture, IBM, Infosys Technologies, Sodexo, Cap Gemini, Tata Consultancy Services, Wipro Technologies, Hewlett-Packard, Genpact, and Tech Mahindra" (Oshri, 2015, p. 50).

A Short History of Outsourcing

By the mid-20th century, companies had begun to gravitate away from the conventional model of autonomous self-reliance in favor of a more delegated approach due to the technological advances in the telecommunications industry and the Internet (Handfield, 2006). In 1989, the practice of outsourcing was officially recognized as a viable instrument for maintaining a lean and flexible business strategy. This strategy has allowed companies to focus their attention on commercial interests that protect their bottom line, while simultaneously alleviating the

burdens of unnecessary overhead and micromanagement they would normally face in their home countries. In the early 2000s, outsourced call center operations were basically clerical, and back-office customer service queries that were needed in the diverse industries areas such as banking, computers, credit cards, media consumption, travel, and so on (Bolton, 2013, p. 497). Companies have outsourced their basic customer service operations because the cost of labor is cheaper overseas than locally.

Nowadays, U.S. companies' outsourcing decisions are no longer related to the reduction of costs only. The decision to relocate business operations must do with access to "business flexibility, skilled talent, best-in-class technology, and better delivery locations and models" (Klie, 2014, p. 22). Now, companies are more strategic in how they outsource. They look for higher skilled labor. Companies that outsource their customer service call centers understand that to maintain a competitive edge, cost, location, and labor considerations will not be enough.

In a nutshell, customer service is still needed, but it has changed. Due to the wide access of technology in multiple forms worldwide, companies utilize multichannel resources to attract and keep customers. For instance, Klie (2014) reports that corporations' adoption of more technology-based services encompasses "automated customer care, analytics, cloud-based contact center apps, [and] managed services to reach customers via telephone, tablets, computers, and other customer preferred technology media" (p. 22).

Definition and Importance of Call Centers

Call centers are commonly outsourced in two main business categories: business process outsourcing, referred to as BPO, and information technology outsourcing, abbreviated as ITO. BPO is a term used to describe outsourcing of non-primary business activities which include call centers in third-party facilities or captive models that are overseas. BPOs encompass payroll,

human resources (HR), accounting, and customer/call center relations. An ITO, on the other hand, describes the process by which companies outsource either all or part of their IT functions to offshore facilities.

Oshri (2009) explains that the shortage of cheaper qualified labor in the West has prompted companies to adopt BPO and ITO (p. 240). Klie (2014) estimates that more than 500,000 U.S. call center jobs were outsourced to foreign countries such as India during a 5-year span from 2009 to 2014 (p. 23).

History

The Republic of India is not only the largest country of the South Asian subcontinent, but it also holds the second largest population in the world. Among the things Indians are the proudest of are their independence obtained in 1947 from former colonialist Great Britain, thanks to the efforts of legendary figures like Gandhi and freedom fighters like Rani Lakshmi Bai. Also, India is proud to be known for having the world's largest democracy. From having been under British colonial rule to becoming a modern independent nation, India, this developing country can now compete with developed countries. It holds its own with rapidly growing economies such as Brazil, Russia, and China. In fact, during the 2008 American recession, the BRIC (Brazil, Russia, India, and China) countries were the least impacted.

India has greatly adapted to Western culture. It has advantages over other countries as the premiere choice for outsourcing, in part because of its colonial history. Yet, it has retained its deeply ingrained traditional culture. In the following paragraphs, the history of India, its economy, and its cultural backgrounds are presented.

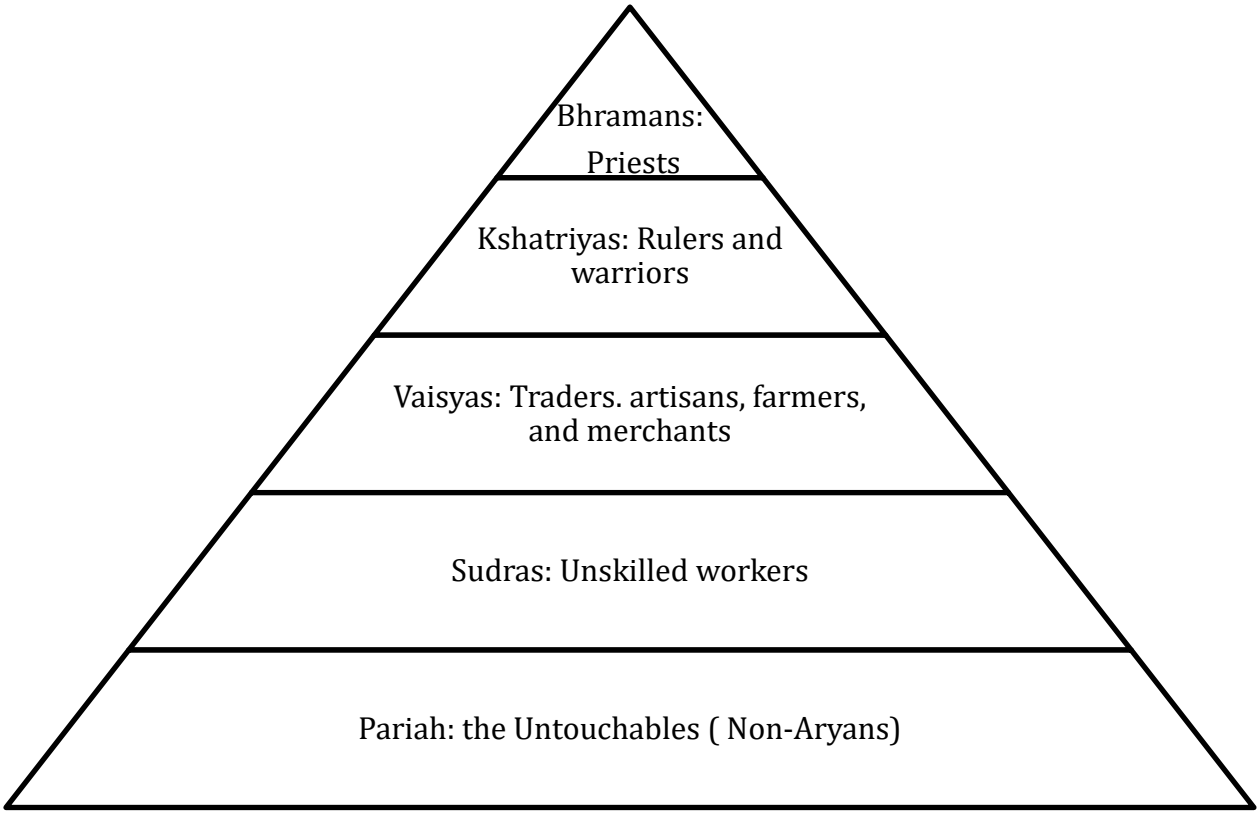

Figure 1.1 Caste System during the Aryan Civilization Period (1500 BCE -1800 BCE)

Britain has had a profound impact on current India's identity and national pride. India gained its independence from British rulership in 1947. Since then, India has adopted a flag of three horizontal layers: orange, white, and green. The orange layer, described as deep safran or kesari represents the strength and courage of India. Indians cherish the memory of Gandhi and Rani Lakshmi Bai, legendary freedom fighters who embodied this strength and courage. The white layer symbolizes peace and truth. In the center of the white layer is a navy-blue wheel called Dharma Chakra, a Buddhist term meaning "the wheel of the law." Finally, the green layer represents fertility of the land and growth.

As late as 1991, India was one of the world's poorest countries, still unable to pay its world debt following the end of World War II. However, through the process of globalization

and free market economy, India changed its protectionist economic system to a more liberal one. This economic strategy opened India's market to the world. Since the 2000s, India has become an attractive business destination for multinationals, thanks to factors such as "a large English-speaking population, its information technology services, its business outsourcing services, and software workers" (CIA.gov, 2015). Its labor force is composed of 31% in services, 20% in industry, and 49% in the agricultural sector (CIA.gov, 2015). The sector of services contributes largely to India's GDP with 53%, followed by industry (30%), and agriculture (17%) (CIA.gov, 2015).

An Overview of India's Economy

India's peaceful political stability contributes to its favorable status as a host country from which to select for multinational companies. According to the World Bank (2018), the GDP annual growth rate of India is 6.6% as of 2017. This strong GDP growth rate indicates that India has a healthy economy that is very attractive to companies from around the world.

India has multiple trade agreements with many of its neighboring countries. Examples include: the India-Nepal Trade Treaty and India-Sri Lanka Free Trade; trade agreements with Bangladesh, Bhutan, Sri Lanka, Maldives, China, and South Korea; the Comprehensive Economic Cooperation Agreement (CECA) with Singapore; framework agreements with the Association of Southeast Asian Nations ASEAN; preferential trade agreements with Afghanistan, Chile, and Mercosur; and involvement with the World Bank.

In 2013, India had a negative trade balance in which its imports exceeded its exports by $129 billion. Its GDP was $1.88 trillion and its GDP per capita was $5,400.00. India's main exports were refined petrol, packaged medicinal drugs, jewelry, rice, and cars. Its main imports were crude petroleum, gold, coal, petroleum gas, and diamonds. India's top import destinations

in 2013 were: China, Saudi Arabia, United Arab Emirates, Switzerland, and Iraq (Observatory of Economic Complexity, 2013).

Its top export destinations are the U.S., United Arab Emirates, China, Singapore, and the United Kingdom. In fact, India has become the top outsourcing destination of services for companies like GE, AT&T, IBM, American Express, American Online (AOL), British Airways, British Telecom, Cap Gemini, Citigroup, Swiss Air, Microsoft, and Dell. In 2008, India contributed $40 billion of revenue to the USA. This amount is 8 times higher than China's export revenues.

India is an attractive outsourcing destination because of a cheaper labor force that is also skilled. In addition, most U.K and U.S. multinational companies prefer to outsource their IT software and technology related services in telecommunications and in the banking sector to India, thanks to its increase of foreign investment, the nation's open market economy, its consistency in productivity, and its profits increase, especially in IT and software industries. Thanks to Prime Ministers Nehru and Rajvni's government push to grow technologically skilled labor starting in 1984, in 2008, India has attracted 65% of the information technology outsourcing market and 43% of the business processing market worldwide (Oshri, 2009, p. 30).

Despite the attractiveness of the Indian skilled labor market, the country's literacy rate remains low. In 2007, the adult literacy rate was 66%, according to the MDG-3 project report of women's employment in India: "the female literacy was 54.5% and the male 77.1%." (Klaveren, et al, 2010, p. 6). Between 2008 and 2012, UNICEF reported a total adult literacy rate of 62.8%, compared to 86.2% in the world (CIA.gov, 2015). The youth literacy rate for males was 88.4%, whereas the youth literacy rate for females between 15 and 24 years of age was 75.4%. Moreover, the MDG-3 project report shows that there is a large gender gap in school enrollment

rates because girls are lagging, and “drop-out rates are quite high” in primary education for boys and girls.

Even with the technological innovations and advancements in the telecom, IT and software industries that are notably reflected in the Southern Indian Silicon Valley, most of the population have not reaped the benefits. The causes are due in part to corruption and casteism. In fact, International Transparency gives India a score of 38% for its corruption perception index (Transparency International, 2015).

Cultural Profile

The Indian Constitution names English and Hindi as official languages and recognizes about 21 additional major languages, out of the 1652 languages and dialects that are known to exist in India (Kachru, 1976, p. 2). Scholars like Sailaja contend that the British colonial language, English, has served as a unifying factor for the multilingual nation of India (Sailaja, 2009, p. 5). Sailaja (2009) states that “English is the language of communication at the level of trade and commerce” (p. 5). Hindi and English are the most popular languages used in registered newspapers and published books (Pandita, 2014, pp. 309-314). Hindi was the first with 24,927 publications. The second largest registered newspapers with 9,064 newspapers were in English (Sailaja, 2009, p. 4). At home and in public places, most Indians speak Indian English or Butler English, a variety of English that is not considered a proper register in the education and academic systems. Indians who have received better education mark themselves by speaking more prestigious varieties of British English or American English (Sailaja, 2009, p. 14).

Sailaja (2009) notes that English has a neutralizing effect that blurs regional differences (p. 10). Also noteworthy is that English language in movies serves as a social status market to differentiate the well-educated from the poorly educated. For instance, Bollywood movies,

popular Hindi films made in Bombay/Mumbai, use Indian English in its dialogues for the urban elite (Sailaja, 2009).

Current Issues and Human Resources

Although India still faces include brain drain, illiteracy, and language conflicts, it has attracted U.S. vendors and global clients in the ITO and the BPO markets for reasons other than its low-cost destination.

Today, Indian outsourcing suppliers have a wealth of expertise and experience with their U.S. customers' business relationships. Oshri (2015) claims that Indian suppliers offer a high-quality workforce who speak a better variety of English than its competitor China (p. 17). In 2008, India attracted 65% of the ITO and 43% of the BPO in the world.

Relationships between Indian suppliers and U.S. vendors', along with clear practical advantages (such as low tax, advanced technology, and English educated workforce) have advanced to the degree that strategic decisions to outsource to India are no longer made solely for using India's cheap labor to reduce costs. India's location is also attractive for outsourcers who want to maintain a 24-hour relationship with the customer thanks to an advantageous time zone difference.

Overall, the 2017 A.T Kearney Global Services Location Index still rates India as number one for outsourcing in terms of financial attractiveness, people and skills availability, and business environment, with a total score of 7. China and Malaysia come second and third, with scores of 6.31 and 6.11, as it is shown in the figure below (Kearney, Sethi, & Gott, 2017, p. 10).

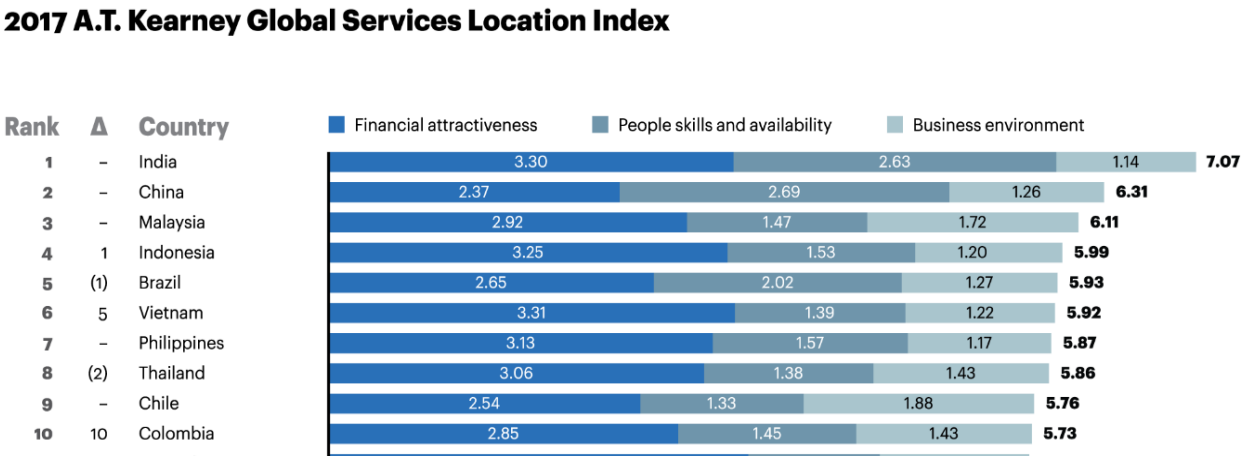

Figure 1.2 2017 A.T. Kearney Global Services Location Index Top 10 Countries

After looking at the background of outsourcing, call centers, and India, the ensuing section discusses economic benefits and challenges of choosing India as an outsourcing destination for MNEs.

Indian Call Centers and Companies' Profits

As previously stated, the reasons why India has become the premiere outsourcing destination for U.S. call centers include 1) the increase of foreign investment in India thanks to its open market economy, 2) an increase in productivity, and 3) profits, especially in IT and software industries. Furthermore, with a population of 1.3 billion, the country has a vast pool of highly skilled English-speaking workers.

In 2008, around 700,000 people were employed in the BPO and call center services sector (U.S. International Trade Commission, 2010, p. 29). U.S. and U.K. multinationals outsource mainly their IT software, technology related services in telecommunications, and the financial sector (banking, capital markets, insurance, etc…) to India because of its high research capabilities and developed industry.

For instance, Shastri (2004) provides the example of GE Capital, a large multinational company that set up call center operations in the 1990s to simply delegate non-critical business functions such customer care and collection calls. Six years later, GE changed its business strategy by thoroughly investing in a full-fledged subsidiary outsourcing model in India. The high outsourcing expenditures became justified when, in 2003, GE reported higher revenues (Shastri, 2004, p. 58).

GE and many U.S. companies continue to evolve their business models to offer better quality services and productivity to beat the fast-growing competition from other emerging Indian call centers (p. 59). Still, despite the effectiveness of these business ventures, some companies are bringing their call centers back to the U.S. The next section will explain why.

Relocation from India-Based to U.S.-Based Call Centers

U.S. companies are now making strategic decisions on whether to outsource their call centers. Some companies have decided to bring their outsourced customer service contact centers back home to the U.S. For example, in 2010, Delta Airlines closed its call centers in India and relocated back to the U.S. because of customer service complaints due to language barriers (U.S. international trade commission, 2010, p. 18). In addition, some companies are bringing back their outsourced call centers home because they seek more than the benefit of a cheaper rate when they decide to outsource their business operations to other countries. As Klie explains, "labor rates are no longer the main concern as companies consider outsourcing their contact centers" (Klie, 2014, p. 20).

Traditional outsourcing. Traditional outsourcing (routine software, and application development and maintenance) has reached its saturation point. In the past, companies would outsource their business operations, such as order line call centers, out of the USA, due to

economic pressures and because of the cheaper labor rate available overseas. However, it is now known that most business decision makers have realized that this strategy has not saved on costs. For instance, Dell Company has offered a premium technical support option based in the U.S. to improve customer satisfaction for U.S. customers who prefer to listen to "U.S. based customer call reps" at the other end of the line (U.S. International Trade Commission, 2010, p. 18).

Klie relates the story of a global U.S. pharmaceutical company that lost 1 percent of its customers in just forty-five days after outsourcing its call centers to India. In addition, the company had to respond to unusually high volumes of complaints and calls were much longer (Klie, 2014, pp. 20-21). Therefore, the company decided to relocate its contact centers back to the U.S. One of the company's employees attributed this failure of outsourcing to the negligence of ignoring important aspects of doing business abroad, like the cultural profile of the chosen country, and customers' reactions.

Communication breakdowns. Bolton reports how in the U.K. media, call centers have aggravated consumers due to "prolonged delays, difficulties contacting retailers or service providers, and service provided by Indian call centers related to language issues" (Bolton, 2013, p. 495).

Granered explains that communication breakdowns occur when a sender's message is not correctly decoded "in the receiving end of the message" (Granered, 2005, p. 25). He also adds that the problem of communication breakdowns is stronger in phone interactions than in face-to-face interactions because "a large amount of context is missing, when we interact over the phone" (p. 54).

Furthermore, the strategy of outsourcing to other countries like India has not been cost-effective because companies have overlooked "communication breakdowns" between U.S. and

Indian cultures (Klie, 2014, p. 21). Walker and Hartley (2012) observe several communication breakdown issues in the outsourcing business. These include high employee burnout rate due to the radical time zone difference between U.S and India, expectations on the local workforce to speak like Westerners when they have never been to a native country where English is the native language, scripted responses that lack customer service soft skills, and customer complaints of Indian call representatives' thick accents.

Technological advances. The competitive climate that the Internet has fostered may also have resulted in less demand for outsourcing of call centers in India and to less communication breakdown between call representatives and customers. Customer interactions over routine questions on the phone have decreased as advance technology and the Internet have replaced jobs previously completed by humans (Gaspar, 2014, p. 266). The need for outsourced call centers may become less essential to companies. Customers can look for answers themselves through Google, or through the company's website, or via customer service direct chat or email, or even before calling businesses for solutions. Although economic consideration in language policy discourse are generally about legal, cultural, and educational perspectives, Walker and Hartley (2012) observe, that from a business perspective, American multinational companies should also consider cultural and language differences between the Indian call workforce and American listeners.

Language economics. Language economics considerations enable multinational businesses to decide whether to extend their businesses in other countries where English is not the first language. Grin (2006) supports the claim that economics is becoming relevant to language consideration for two main reasons: first, language matters have always existed in economics, even if language experts have rarely talked about this interest; and secondly,

language specialists are realizing that language issues have economic implications. In addition, Grin explains that language is a form of capital that can influence earnings and economic variables in one of the main stages of "language economics" (p. 81).

Thus, multinationals must train Indian workers not only on technical and product knowledge, but they must also focus on language intelligibility to reduce costs and liabilities. In fact, Granered (2005) confirms that "there are tangible consequences for not considering cultural variables at every stage of outsourcing and offshoring call center functions" (p. 24). Granered asks rhetorically, "How often have you received a telephone solicitation from someone who can't pronounce your name, has an accent that is so strong that you can barely understand what he is saying, and possesses a conversational protocol that is completely alien to you? It clearly does not produce results" (Granered, 2005, p. 55).

Accent neutralization. Granered advises that "when customer complaints arise, the most effective strategy is to deal with them immediately" (p. 305). Yet, multinational companies are elusive on what their expectations are of the ideal accented English. Cowie (2007) brings this out in her ethnographic research on accent training agencies in Bangalore, South India (p. 322). Most U.S. and British multinational companies delegate employee training responsibilities to local external accent training companies. From the beginning, call centers clients demanded accents close to the inner circle variety of English. In the last two decades, some companies have switched their preferred outsourcing destination from India to the Philippines, as the English accent in the Philippines is said to be closer to the American accent (Diola, 2014).

Philippine vs. Indian neutral accents. India's ranking position as being the premier outsourcing destination is at risk. It could be altered by the Philippines and Latin America, or even by U.S. home-based agents (Klie, 2014, p. 23). CIA.gov (2015) has reported India's

"inadequate quality of basic and higher education, rising macroeconomics imbalances in India's economic leaders, and improving economic conditions in the western countries" as well as in developing countries such as the Philippines. These countries are challenging India's position as the most attractive outsourcing place (CIA.gov, 2015). Diola (2014) specifies that multinational companies are starting to make the decision to relocate 70% of their BPO call center services worth "$30 billion in foreign exchange earnings" to the Philippines because "Filipino people have a more neutral accent" (Diola, 2014). According to Diola, the spoken English of Filipino call center agents sounds similar to standard American English.

Increasingly, U.S. and British call centers clients require a more neutral accent or "a regionless international variety of English" to diminish customer complaints of "fake British or American accents" (Cowie, 2007, pp. 316, 322). Hence, multinational companies expect accent training agencies to develop an ideal neutral accent for Indian call representatives. Davies, an experienced outsourcing consultant, defines neutral accent as accent "that taps into the ideal of a nationless English which is neither British nor American, nor Indian" (Cowie, 2007, p. 322). Yet, according to Kachru's (1976) three Concentric Circles of World Englishes model, India is a nation that is part of the Outer Circle of World Englishness based on its British past colonial history. Figure 1.3 delineates the three varieties of World Englishes.

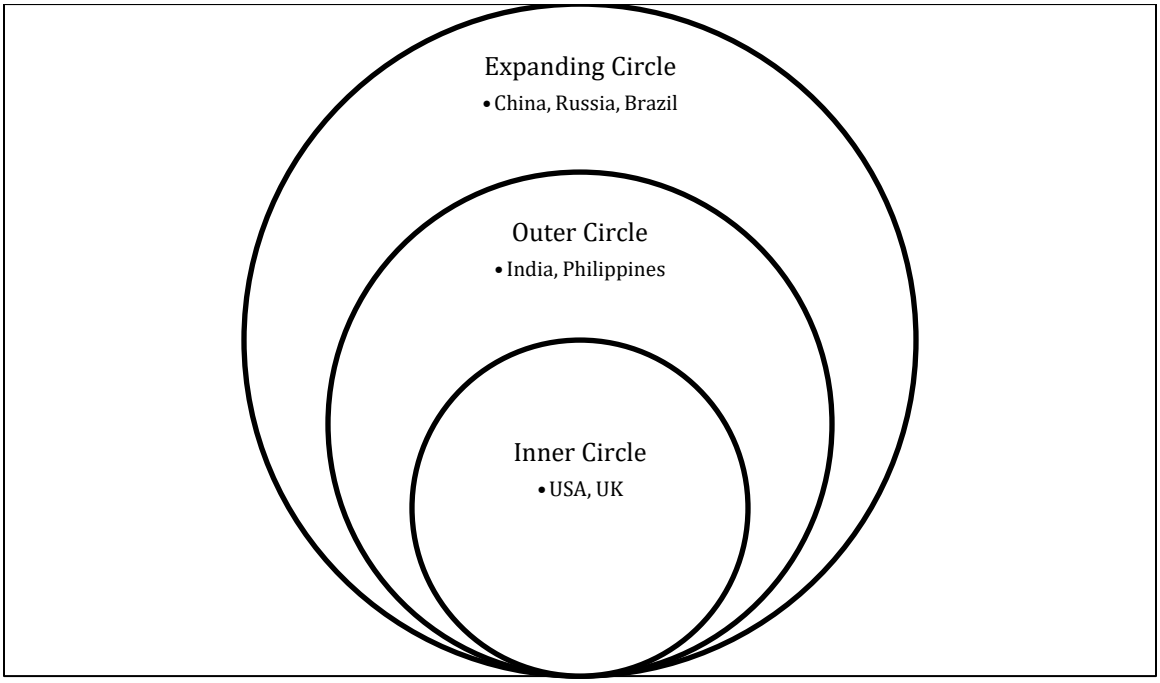

Figure 1.3 Kachru's (1976) Three Concentric Circles of World Englishness Model

In Outer Circle countries, English serves as lingua franca between existing native languages. For instance, both the Philippines and India are part of the Outer Circle of English model due to their past colonial history with respectively U.S. and U.K. Thus, English, a widely spoken language across these nations, serves as an integral institutional language in India or in the Philippines in the Outer Circle nations' 1) economy, 2) commercial, 3) business, and 4) educational arenas. Kachru (1976) classified Outer Circle English as "norm developing" which follows the model of the "norm providing" English spoken in the Inner Circle countries, especially U.S. and U.K.

The next chapter introduces sociolinguistic profile of India to explain salient characteristics of Indian English phonology. The terminology of neutral accent will be discussed in later sections.

Chapter 2: Sociolinguistic Profile of India

The Ethnologue (2017) presents the most recent information of the numerous languages in India as follows: there are 462 languages, of which 448 are living and 14 are extinct. Of the 448 living languages, 420 are indigenous languages and 28 are non-indigenous; there are 64 institutional languages, 126 developing languages, 190 vigorous languages, 55 endangered languages, and finally, 13 dying languages.

Institutional languages are languages that are taught in schools and used beyond the home and the community as professional languages in businesses. The principal institutionalized languages of India are English and Hindi. Hindi, the principal language of India is spoken by 378,000,000 of the population.

How have the native languages in India influenced spoken English language? How have official languages in India influenced English language attractiveness?

Varieties of English in India

Kachru (2005) notes that "India is a major English-using country along with the U.S. and the U.K.", with 333 million Indians who are proficient in it (p. 15). Clearly, a nation with such great linguistic diversity needs a lingua franca.

As Kachru (1975) reports, the Constitution of India recognizes 23 major languages, of which:

1) Sixteen correspond to the Indo-Aryan language family (Assamese, Bengali, Dogri, Gujarati, Hindi, Kashmiri, Konkani, Maithili, Marathi, Nepali, Odia, Punjabi, Sanskrit, Sindhi, and Urdu);
2) Four correspond to the Dravidian language family (Kannada, Malayalam, Tamil, Telugu);

3) Two correspond to the Tibeto-Burman family (Bodo, Manipuri);

4) One language corresponds to the Munda family (Santali).

English has served as a unifying factor in this multilingual nation. Yet, there is a diglossic situation in India where English is the high variety. It is used as a tool for communication and capital. Research indicates that there are three registers of spoken English in India which correspond to three classes: upper, middle, and lower, as shown in Figure 2.1. There is also a dialect of English known as "Babu English" spoken by the educated class. Babu English is one type of a high variety English that is used in administrative settings.

The Pan-Indian features of English are more obviously seen in the low variety of English. Kachru (2005) refers to this low register as the Butler English. It is also known as Kitchen English, or again, Bearer English, which is used for casual conversations. As Kachru (2005) illustrates, the Dravidian influence is included in Butler English on the pronunciation of [ye] as <yexit> for [e] in the word <exit> and [wo] as <wonly> for [o] in the word <only> (p. 42).

Babu English and Butler English are two registers that are not likely to be available in call centers, as the former, spoken by upper class individuals, may be heard in higher business settings, whereas individuals who can only speak the latter (Butler English) are not likely to be hired in most call centers. So, the register of English used by call center employees most often corresponds to Educated Indian English, to the dialect used by the middle class.

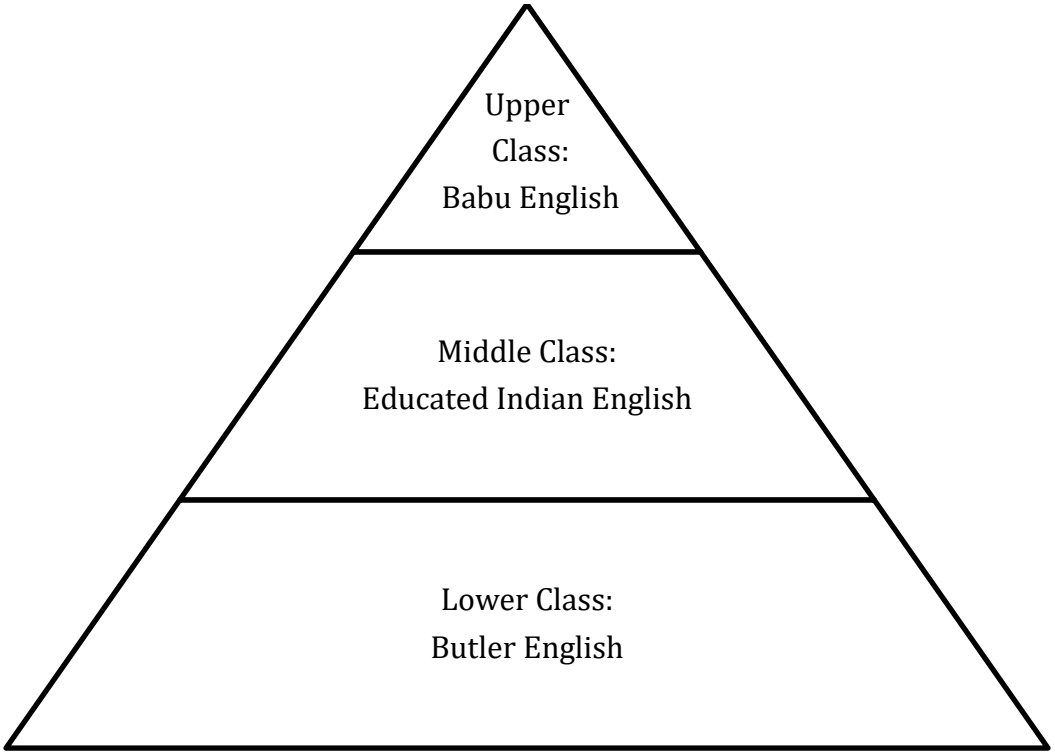

Figure 2.1 The Three Registers of Indian English

Sailaja (2009) describes some features regarding spoken Educated Indian English. He labels Indian English as "a standard variety [in which accent is] marked by regional variations". Sailaja notes that although "Received Pronunciation or RP of British English is taught in Indian schools, British English accent has never been achieved" (p. 17). Yet, it is a variety of English close to RP that is recognized as the Educated Indian Pronunciation (Sailaja, 2009).

In summary, English and Hindi are the major institutional languages spoken in India. Native languages, Hindi particularly, have contributed pan-Indian features to the English spoken in India. Indian English is the focus of this paper because call centers use it as its institutional language.

The Prestige of English in India

Masani (2012) reports that "India claims to be the world's largest English speaking country". Kachru (2005) sees the functions of English language in India as contradictory (p. 64). On the one hand, English serves as a demarcating trait for the higher levels of the caste system; on the other hand, it serves as the unifying factor that resolves language conflicts. Therefore, most Indians are competent in at least two languages. In a nutshell, India is a multi-linguistic society where students learn English and Hindi as school requirements. Hence, the influence of the diverse native languages, especially Hindi in English is obvious particularly in its sound system. (Kachru, 1976, p. 2).

A Linguistic Overview of Hindi

Hindi is the major language that impacts the variety of English used in call centers. On September 14, 1949, Hindi became the official language of the Federal government in India. Pandita (2014) reports that Hindi is spoken by 41% of the population (Pandita, 2014, p. 310).

Hindi has its roots in Sanskrit. It is classified as Indo-European, Indo-Iranian, Indo-Aryan, western Hindi, and Hindustani (Ethnologue, 2016). During the 1960s, the formal variety of Hindi language, called *Shuddha,* was standardized and became the Indian union's national language. *Shuddha* is considered a high register of the language. It is used in newspapers, in government, and in academic literature. The low register of Hindi, called *Hindustani,* contains loanwords from English, Persian, and Arabic. *Hindustani* is commonly used in everyday interactions, in the media, and in entertainment (Bollywood movies, songs, and TV shows).

Furthermore, Hindi is spoken by 545 million people, and 77% of whom are native speakers. It is used in the northern states of India, including Rajasthan, Dehli, Haryana, Uttarakhand, Uttar Pradesh, Madhya Pradesh, Chhattisgarth, Himachal Pradesh, Jharkhand, and

Bihar; in Central India; and in various other parts of India. Hindi is understood in neighboring countries such as Nepal, Bangladesh, Pakistan, and more distant countries: South Africa, Mauritius, Fiji, Suriname, Guyana, Trinidad and Tobago (Omniglot, 2016).

Inventory of Hindi Phonemes

This section presents Hindi consonants and vowels sounds. It does not address suprasegmentals; rather, it focuses only on obvious contrasting features between Hindi and English segments, which are consonant and vowel sounds, in order to determine segments of Indian English that are the most problematic for native speakers of American English.

Phonemes are the smallest sound units of a language that distinguish one word from another. Ladefoged and Disner (2012) indicate that phonemes are "often thought [of] as different sounds that can change the meaning of a word" (p. 194). They play a major role in communication, as the substitution of one phoneme for another would contribute to breakdowns in comprehension. On the other hand, allophones are sounds that are perceptibly different but do not carry meaning. Thus, substitution of one allophonic sound for another by the speaker would be perceived as accented speech by the listener. Phonemes and allophones are language-specific in the sense that each language determines which distinct sounds carry meaning. For instance, Celce-Murcia, et al. (2010) illustrate how phonemes and allophones are language-specific with Hindi and English: /p/ and / p^h/ are phonemes in Hindi, whereas they are allophones in English (p. 51).

Hindi can be described as a non-tonal language that has at least 40 phonemes: 30 consonant sounds and 10 vowel sounds. Compared to Hindi, English has at least 44 phonemes: 25 consonant sounds and 20 vowel phonemes. Dow and Baer (2011) notes that: "the fact that there are 200 ways to spell the 44 phonemes in English creates confusion" (p. 22). Hindi

speakers who are learning English will encounter some confusion in learning the sounds of English phonemes, as English spelling does not equate with its sound.

Hindi consonants. Fairbanks and Misra (1966) report that "Hindi has voiced aspirated consonants that do not exist in English: /b^h, d^h, D^h, j^h, g^h/" (pp. xviii-ix). Bansal (1969) specifies characteristics of Hindi consonants that are not found in English, such as voiced bilabials and velar aspirated stops, dental and retroflex consonants, voiced and voiceless palatal affricates, and palatal nasals. The plosives /t, d/ are dental in Hindi, whereas in English the place of articulation of /t, d/ are alveolar (Fairbanks & Misra, 1966, pp. xviii-ix). Kachru (2005) says that when speaking English, some Hindi speakers replace "the alveolar plosives /t, d/ by their retroflex counterparts /ʈ, ɖ/. which are pronounced with the tongue-tip curled up towards the hard palate" (p. 44); the interdental fricatives /θ, ð/ are replaced by dental plosives /t^h, d, d^h/. Table 2.1 lists the place and manner of articulation of Hindi consonants.

Table 2.1

Hindi Phonemic Distribution of Consonants

		Place of articulation									
		Bilabial	Labiodental	Dental	Alveolar	Post-Alveolar	Retroflex	Palatal	Velar	Uvular	Glottal
Manner of articulation	Plosive								k kʰ	q	
	Voiceless	p pʰ		t tʰ			ʈ ʈʰ		g gʰ		
	Voiced	b bʰ		d dʰ			ɖ ɖʰ				
	Nasal										
	Voiced	m			n		ɳ				
	Tap or Flap										
	Voiced				ɾ				x		h
	Fricative								ɣ		
	Voiceless		F		s	ʃ					
	Voiced				z			tʃ tʃʰ			
	Affricate							dʒ dʒʰ			
	Voiceless										
	Voiced							j			
	Approximant										
	Voiced										
	Lateral Approximant										
	Voiced				l						

General American English consonants. General American English (GAE) consonants are generally classified by seven distinct places of articulation:

1) bilabial
2) labiodental
3) interdental
4) alveolar
5) palatal

6) velar

7) glottal

English also has five manners of articulation that are listed in the table below:

Table 2.2

General American English Manner of Articulation with Descriptions

Manner of articulation	**Segments**	**Description**
Stops	/p, b, t, d, k, g/	"Air coming from the lungs is blocked before it is abruptly released" (Koffi, 2014, p.46)
Fricatives	/f, v, θ, ð, s, z, ʃ, ʒ, h/	Air flows freely with a certain amount of friction when producing these consonants.
Affricates	/t ʃ, d ʒ/	Found in words such as <*ch*ocolate> and <*j*ob>, affricates are a mixture of stops and fricatives.
Nasals	/m, n /	Air comes out through the nose.
Approximants	/w, j, r, l/	"Consonantal sounds produced with a relatively unimpeded flow of air through the mouth" (Maddieson, 2009, p.91).

Table 2.3, adapted from Fromkin, et al. (2014), summarizes General American English phonemic distribution of consonants:

Table 2.3

American English Phonemic Distribution of Consonants

		Place of articulation						
		Bilabial	Labiodental	Interdental	Alveolar	Palatal	Velar	Glottal
Manner of articulation	Stop/Plosive							
	Voiceless	p			t		k	
	Voiced	b			d		g	
	Nasal							
	Voiced	m			n		ŋ	
	Fricative							
	Voiceless		f	θ	s	ʃ		h
	Voiced		v	ð	z	ʒ		
	Affricate							
	Voiceless							
	Voiced							
	Glide							
	Voiced	w						
	Liquid							
	Central				r			
	Lateral				l			

Contrary to English, which does not make a lexical distinction between the initial voiceless plosive /p/ and aspirated initial voiceless plosive /p^h/, Hindi uses /p/ and /p^h/ as contrastive minimal pairs. For instance, the Hindi sounds [pal] and [p^h al] mean “moment” and “fruit”, respectively (Sailaja, 2009).

In addition, Sailaja notes that Indian English does not have a rhotic /r/. Therefore, most Indian English speakers do not pronounce words that have a final /r/. For instance, the word <car> is pronounced as <ca> (p. 19). He says that in India, “an r-less accent is a prestige marker” (Sailaja, 2009, p. 19).

Another noteworthy difference between Hindi and English consonants mentioned by Sailaja (2009) is that Hindi speakers replace the English voiced palatal fricative [ʒ] by the voiced

alveolar fricative [z]. Also, Hindi lacks the semi-vowel /w/. Instead, it has the voiced approximant labiodental / ʋ/ which sounds like [v]. For instance, <we will wait> sounds like <vi vill vait> to an American ear. The consequences of this will be discussed in Chapter 4 on intelligibility.

Hindi vowels. Hindi has ten oral vowels which can be nasalized. Per UCLA (1999), nasalization of Hindi vowels is phonemic. Figure 2.2 (adapted from Maddieson and Disner, 2009) shows Hindi oral vowels only since English vowels are not phonemic (p. 270).

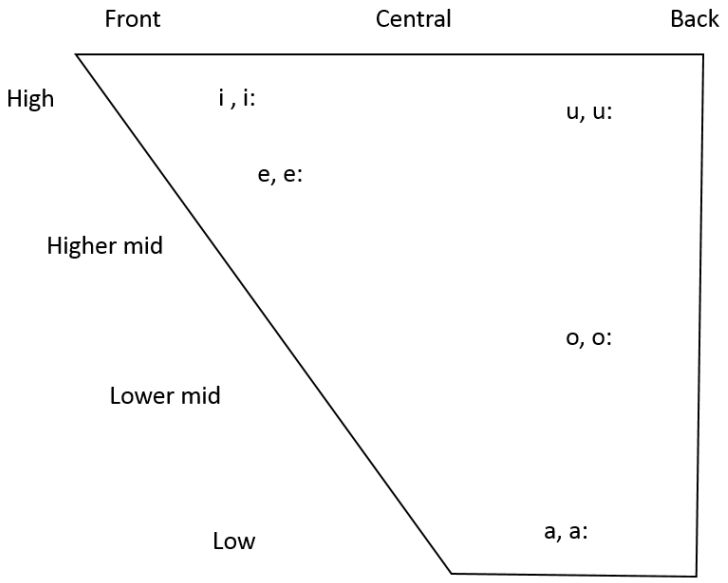

Figure 2.2 Hindi Vowel Chart (Adapted from Maddieson, & Disner, 2009, p. 270)

Hindi vowels have predictable sound features that can cause rule overgeneralization when transferred in English. For instance, an important feature of Hindi vowels is that none of them is reduced at the difference of English. Instead, there are short and long vowels (Kachru (2005) as shown in Figure 2.1).

Yet, Wells (1982) cautions that "length distinctions are not always consistently made" (p. 626), and so forth, in Indian English, there is no distinction between tense and lax vowels (Kachru, 2005, p. 45). For example, Wells (1982) shows that the distinction between the lax vowels /ʌ / versus /ə/, and /ɒ/ versus /ɔ/, which are phonemic in English pronunciation, is "dubious or variable" (p. 626). He adds that Indian English speakers generally do have control of the difference between /ɛ/ and /æ/; however, the two phonemes are frequently substituted for each other, since in Hindi there is no phonemic distinction between these two lax vowels (Wells, 1982). A further example of variable phonemic distinction lies between the tense vowel /a/ and the lax vowel /ɔ/. Wells gives evidence that /a/ versus / ɔ/ confusion is particularly apparent "in cases where words are spelt with *a* (thus /a/ in words such as *want, sausage, all, caught, saw*)" (Wells, 1982, p. 627).

Some varieties of vowels pronunciations depend on the speaker's regional background. For instance, some Indian speakers with a Dravidian language background would add glides such /w/ and /j/ before words that start with high vowels (Sailaja, 2008, p. 24). Punjabi English speakers tend to blur the distinction between lax vowels. Telugu speakers do not use diphthongs. Telugu speakers and other south Indian speakers' vowel / ɒ/ is usually changed to /a/ (p. 25).

English vowels. According to Fromkin, et al. (2014), English has 11 monophthongs (Figure 2.2). English vowels may be tense, meaning they are slightly longer in duration and slightly higher than their counterparts, lax vowels. The tense vowels are /i, e, u, o, ɔ, a/, and the lax vowels are / ɪ, ɛ, ʊ, ʌ, æ, ə/ (p. 211). Vowels are classified according to how the mouth opens and closes and how the tongue moves forward, moves inward, or remains in the central position

of the mouth when forming the vowels. Thus, /i, ɪ, ɛ, æ/ are considered front vowels, /u, ʊ, o, ɔ, a/ are considered back vowels, and / ə, ʌ/ are central vowels.

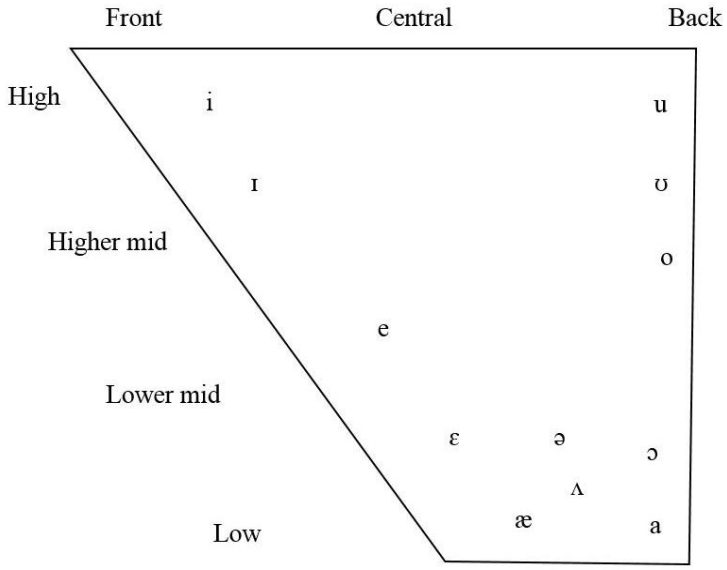

Figure 2.3 General American English Vowel Chart (Adapted from Fromkin, Rodman, & Hyams, 2014)

Pronunciation experts including Koffi (2014) and Celce-Murcia, et al. (2010) agree that English vowels are difficult for phoneticians, teachers, and students to master. Furthermore, vowels are problematic because they display more dialectal variation among native speakers in the U.S. (Celce-Murcia, et al., p. 159).

Thus, this discussion focuses on one variety of English from the Inner Circle of World Englishes as presented in Kachru's (1976) model. The chosen standard used for the overview of English vowels is General American English, (GAE), often labeled as an American accent without marked regional characteristics, although it is not a uniform accent (Wells, 1982, p.

470). Wells (1982) affirms that GAE is the most acceptable variety of English used on television networks throughout the U.S. (p.470). He defines GAE speech as (Figure 2.4):

> the majority of American accents which do not show marked eastern or southern characteristics, including those deriving basically from the northern speech of the Hudson Valley and upstate New York and those deriving from the midland speech of Pennsylvania. (Wells, 1982, p. 470)

Figure 2.4 General American English Area in the U.S. (Based on Wells 1982, p. 471)

The differences in the segmental inventory between Hindi and English are likely to cause intelligibility problems for General American English hearers. These will be explored further in the next chapter.

Chapter 3: Segmental Intelligibility

Intelligibility and Unintelligibility

Importance of intelligibility. Derwing (2010) places intelligibility among the nine effective characteristics of pronunciation training (p. 29). Munro and Derwing (2008) qualify intelligibility as "the single most important aspect of all communication" (p. 13). Munro and Derwing (2008) and other scholars declare that intelligibility is the most basic element needed for understanding oral speech without effort on the listeners' end of the communication channel. Bansal gives details on what a person must do to be perceived as intelligible:

> To be intelligible, the speaker must articulate his sounds and words clearly, so that the hearer does not have to stop to think what word was meant. The vowels should be pronounced *with the right quality* and the consonants should be sharp and clear in their articulation. (Bansal, 1969, p. 15)

Explanation of intelligibility definition. In the above definition, Bansal specifies that speakers are intelligible when they pronounce their vowels "with the right quality" and their consonants are "sharp and clear in their articulation". Right quality can be described as a clear and a discernible articulation, whether loud or soft, that is achieved despite external background noise.

How unintelligibility occurs. Unintelligibility, on the other hand, occurs when sounds from one language are negatively transferred into another confusion research studies explain how unintelligibility occurs. The negative impact of foreign sounds on intelligibility is unavoidable (Nelson, 2011, p. 32). It can be attributed to background noise or "psychological noise" (Koffi, 2014, p. 20). As Koffi explains, "psychological predispositions and attitudes of native speakers can hinder the intelligibility of spoken English by second language speakers" (p. 21).

Consequently, during phone interactions, some American customers who may already be in a state of mind that can be compared to psychological noise may become frustrated when they detect accented English spoken on the other end of the line.

These definitions of intelligibility and unintelligibility are applicable in face-to-face communications and during phone interactions.

Importance of intelligibility in call centers. The call center employee in India is multilingual and the consonants and vowels of his/her native language may be transferred negatively into English. Therefore, listeners who speak only English may have difficulties perceiving Indian-accented English. As has been noted in previous sections, Indians who work in IT, call centers, and other outsourced services speak various varieties of Indian English. Some varieties appear to be unintelligible to some native speakers of American English. Their accent may be described as "heavy". Fromkin, Rodman, and Hyams (2014) explain that knowing a language means knowing "what sounds are in that language and what sounds are not" (p. 2). She gives the example of French speaking people who often may pronounce words like <this> as [zis], because the English consonant sound [ð] is not in the French sound system (Fromkin, 2014, p. 2).

To summarize, intelligibility is integral to communication, especially in phone interactions where nonverbal cues are limited to oral sounds and to the voice tone (Munro & Derwing, 2008, p. 13).

Working toward Intelligibility Solutions

American listeners tend to become distrustful when they hear an accented English voice on the other end of the line (Lockwood, 2010). For this reason, some U.S. companies in India

have hired accent reduction training companies to reduce the accented English spoken by local call representatives in India.

As was mentioned in an earlier section, Cowie (2007) has researched whether the term "neutral accent" can be interpreted as closer to British or to American English.

She volunteered in a training agency whose call centers' clients are global companies mainly from the U.S., and also from the U.K, Australia, and Canada to provide curriculum of English Language Teaching improvements for a six-month period. Some of these clients choose to delegate to Indian call centers and accent reduction training agencies the role of identifying neutral accented English hired call center agents should acquire. Thus, the older generation of trainers above thirty years interviewed by Cowie in the observed training agency, responded that accented English should sound more British, while the younger generation of trainers opted for a more neutral accent that should sound more American.

To put it another way, Cowie (2007) explains that adherents of British accented English claim that a neutral accent sounds like the English used by "BBC Asia newspaper readers on Indian channels", also referred to as educated English, or as Received Pronunciation Indian English (p. 323). The younger generation of accent trainers, on the other hand, refer to neutral accent as the English spoken by generally wealthier non-resident Indians (NRI) who were born, grew up, and studied in the U.S. (p. 325).

However, despite the differing perceptions of neutral accents, the accent reduction trainers in the accent reduction agency's main target is to reduce the mother tongue influence of the trainees 'spoken English. Cowie collected trainees' responses to the expectations of the agency and future employers to find out what they believe a neutral accent means.

In a 3-week training period, the trainees were expected to produce satisfactory results of neutral accents. They were required to read passages and to participate in private interviews with their trainers. They were also assessed in evaluation sessions that were recorded through mock telephone calls. Responding to the question of how neutral accent should sound, opinions of the trainees diverged. Some of them modified their English to sound more American, whereas others preferred to sound more British while reading telephone script passages.

The results of trainee mock telephone calls showed that some accommodated their English with American accents, while the recorded English of other trainees sounded neither British nor American. Rather, the recordings of the latter group showed characteristics of Indian phonological rules in their spoken English. During the training of the call representatives who were trained to speak to American customers, Cowie selected two trainees out of a batch of eighteen observed trainees as her case studies to exemplify their sample used phonological features that were not "supposed to be typical of the most educated end of the Indian English spectrum" while being trained by the accent reduction agency (p. 325).

Problem segments. Cowie (2007) identifies several segments that cause intelligibility issues for Indian speakers for English based on her case studies at the agency (p. 325), such as:

1) / ʋ /, the labiodental approximant is transferred for words that required an American consonantal sound /v/ or a /w/ sound;

2) /v/ and /w/, at least half of the time, the distinction between /v/ and /w/ were made, and

3) /p/, /t/, and /k/, aspirated /p/, /t/, and /k/ pronunciations vary greatly.

Typical Indian English speakers had problems with these phonological processes:

4) rhoticity

5) aspiration

6) L-velarization

In contrast to aspiration and l-velarization, rhoticity is not generally present in Indian English (Cowie, 2007, p. 325). For instance, Rahul, one of the trainees, does not pronounce /r/ in <apartment>. Vishal, another trainee, produces the trilled /r/ instead of the American rhotic / ɹ/. He uses his / ɹ/ more consistently in reading passages and in mock interviews, but not in free speech (Cowie, 2007, p. 326).

Addressing problem segments. To address this problem, Vishal's trainers encouraged him to use more American lexical items and more American pronunciations for high frequency words like <address>. He was also encouraged to use more word fillers that sound American such as <alright> or <uhm>.

Towards her conclusion, Cowie (2007) observes that most agents accommodate to adjust to their American audience, similarly to Vishal, by adopting quick fix solutions such as increasing their American high frequency words in a more American sounding voice (p. 327). The problem with this recommendation, as Cowie (2007) points out, is the American customer perception of fake American accent used by call center employees.

Nevertheless, heavily accented speech can be intelligible. Munro and Derwing (1995) have found that there is no correlation between "heavy accent" and "low intelligibility. Actually, Celce-Murcia, et al. (2010) determine that "there is general consensus that intelligibility and comprehensibility are more important than accentedness for purposes of communication" (p. 33). Some reports of intelligibility issues are related to mispronunciation of English words, along with a faster diction. Sailaja (2009) notes that Indians tend to stress unimportant words. This makes the perception of English words more confusing for American listeners (Lockwood,

2013). However, Munro and Derwing (1995) have not found relevant evidence to prove that nonnative speakers who have attempted to reduce their accents have been successful in becoming more intelligible (Munro & Derwing, 1995, p. 287).

They suggest that second language teachers should not focus on reducing accents, but on "aspects of the learner's speech that appear to interfere with listeners' understanding." They raise two issues that currently prevent teachers from focusing on these important pedagogical suggestions. First, it is not known precisely "which particular aspects of foreign-accented speech are most detrimental to comprehensibility and intelligibility", because of the lack of exhaustive empirical research. Secondly, it is difficult to know exactly where problems of pronunciation are because of variabilities such as individual differences in native listeners' perceptions.

On the other hand, Bansal (1969) has emphasized that the Standard English referred to as the Educated Indian pronunciation or Received Pronunciation (RP) was an attempt to attain the goals established by the Government of India in 1958. These goals were to satisfy the criterion of intelligibility (p. i). In his study, Bansal measured the intelligibility of Educated Indian English within the Outer English Circle versus the Inner circle (see Figure 1.3) and Globish circle English speakers through impressionistic methodology. One of his goals was "to discover features in Indian English that hamper intelligibility" (p. i). The results show that U.K. listeners and American listeners gave an average intelligibility score of 77% to Hindi English connected speech, whereas Indian listeners gave a score 87% to the Hindi speaker's connected speech (Bansal, 1969, p. 66).

Relative Functional Load of English Consonants and Mispronounced Segments

Employers do not disclose recordings that contain actual customer voices to protect customers' confidential information. Therefore, this researcher was not able to obtain call center data to analyze. Instead, other means are used to measure the intelligibility of Indian-accented English. One of the means used is the Relative Functional Load (RFL) data.

Celce-Murcia, et al. (2010) further explain "students' first languages color their perception and production of English in many ways. As discussed in the literature review, contrastive differences cause learners to transfer sounds and patterns from their first language to their second language, creating a particular accent in that language. (Celce-Murcia, et al, 2010, p. 279). Some phonemes are more likely to be confused than others because of how 'close' one phoneme is to another. Koffi (2014) contends that for hearers with little linguistic knowledge, the confusion is more acute.

Koffi (2014) cites confusion studies such as Miller's Auditory-Perceptual Theory and Byrd and Mintz's Cohort model to clarify the definition of RFL. The concept of RFL looks at the phoneme level of the word and responds to the question of precisely what phoneme in the problematic target spoken word drove to confusion. It asks whether the confusion resulted because the competitive phoneme was perceptually distant from the target word (Koffi, 2014, p. 18).

Table 3.1 displays the correlation between Relative Functional Load and Intelligibility ratings. This table is based on Catford's intelligibility studies (Celce-Murcia et al., 2010, p. 471; Koffi, 2014, p. 257, 2015) (Appendix C).

Table 3.1

Correlation between Relative Functional Load and Intelligibility

Levels	**Percentage**	**Unintelligibility**
1	80-100	Severe
2	60-79	High
3	40-59	Moderate
4	20-39	Low
5	1-19	Slight

In the next chapter, we examine with the relative functional load and intelligibility ratings of some mispronounced segments of Hindi speakers whose reading recordings are found in the Georges Mason University Speech Accent Archive. The Speech Accent Archive "uniformly presents a large set of speech samples from a variety of language backgrounds. Native and non-native speakers of English read the same paragraph and are carefully transcribed. The archive is used by people who wish to compare and analyze the accents of different English speakers" (Weinberger, 2015).

Chapter 4: Confusion

Introduction

It was noted in the previous section that real call center data is not accessible because of confidentiality issues. Instead, data produced by Hindi speakers of English found in the Speech Accent Archive (Weinberger, 2015) is used to gauge the intelligibility issues between call center employees and American hearers. The "participants" in this study are 10 Hindi speakers who recorded their speech for the Speech Accent Archive. Their English speech was compared with a GAE speaker from Minnesota for the methodology (Appendix A and B). Table 4.1 presents biometric information about the participants:

Table 4.1

Participants' Biometric Information (Adapted from the George Mason Speech Accent Archive)

Speaker	Age	Gender	Age of English onset	English Learning method	English Residence	Length of English Residence
MN 143	42	Male	0	Naturalistic	U.S., U.K.	42
Hindi 1	27	Male	2	Academic	U.K., U.S.	3.5
Hindi 2	31	Male	3	Academic	U.S., Canada	8
Hindi 3	42	Male	5	Academic	U.S.	25
Hindi 4	28	Female	14	Academic	U.S.	2
Hindi 5	64	Female	10	Academic	U.S.	40
Hindi 6	27	Female	4	Academic	U.S.	1
Hindi 7	60	Female	5	Academic	U.S.	30
Hindi 8	19	Male	8	Academic	U.S.	0.75
Hindi 9	31	Male	4	Academic	U.S.	8
Hindi 10	19	Female	10.5	Naturalistic	U.S.	8

To determine which segments may cause unintelligibility, the segmental data collected from the participants was arranged in confusion tables to show which segments are prone to unintelligibility and which are produced intelligibly. Table 4.2 focuses on consonants, while Table 4.3 is devoted to vowels.

The confusion matrix tables (Table 4.2 and Table 4.3) show the total phonemes produced by participants as “spoken stimuli”, whereas “perceived stimuli” represent what native speakers actually heard. The bold numbers refer to instances of no intelligibility issues. Percentages of positive transfer are also shown under the tables.

Consonants. Consonants are classified and analyzed according to their manner of articulation, namely:

1) 300 stops
2) 379 fricatives and affricates
3) 180 nasals
4) 260 approximants

The confusion matrix table show the instances of positive and negative transfer of consonants featuring:

1) stops
2) fricatives
3) nasals
4) approximants

Table 4.2

Consonant Confusion Matrix

		Perceived stimuli by GAE listener																					
		Stops						**Fricatives and Affricates**								**Nasals**			**Approximants**				
		[p]	**[b]**	**[t]**	**[d]**	[k]	[g]	[s]	[z]	[f]	**[v]**	[θ]	[ð]	[ʃ]	[ʧ]	[m]	[n]	[ŋ]	[l]	[r]	[w]	Total	Percent of positive transfer
Spoken stimuli by Hindi Speaker	**[p]**	**48**	**2**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	96%
	[b]	**1**	**49**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	98%
	[t]	0	0	**50**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	100%
	[d]	0	0	4	**46**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	92%
	[k]	0	0	1	0	**49**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	98%
	[g]	0	0	0	0	3	**47**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	94%
	[s]	0	0	0	0	0	0	**49**	0	0	0	0	0	1	0	0	0	0	0	0	0	50	98%
	[z]	0	0	0	0	0	0	39	**61**	0	0	0	0	0	0	0	0	0	0	0	0	100	61%
	[f]	0	0	0	0	0	0	0	0	**60**	0	0	0	0	0	0	0	0	0	0	0	60	100%
	[v]	0	0	0	0	0	0	0	0	11	**18**	0	0	0	0	0	0	0	0	0	0	29	62%
	[θ]	0	0	33	0	0	0	1	0	0	0	**15**	1	0	0	0	0	0	0	0	0	50	30%
	[ð]	0	0	2	26	0	0	0	0	0	0	0	**31**	0	0	0	1	0	0	0	0	60	52%
	[ʃ]	0	0	0	0	0	0	1	0	0	0	0	0	**19**	0	0	0	0	0	0	0	20	95%
	[ʧ]	0	0	0	0	0	0	0	0	0	0	0	0	0	**10**	0	0	0	0	0	0	10	100%
	[m]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**40**	0	0	0	0	0	40	100%
	[n]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**110**	0	0	0	0	110	100%
	[ŋ]	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	**29**	0	0	0	30	97%
	[l]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**90**	0	0	90	100%
	[r]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**120**	0	120	100%
	[w]	0	0	0	0	0	0	0	0	0	28	0	0	0	0	0	0	0	0	0	**22**	50	44%
Total	20	300						379								180			260			**963**	1119	86%

Vowels. Vowels are classified as lax and tense vowels. A total of 420 produced vowels were namely collected:

1) 210 tense vowels

2) 300 lax vowels

Table 4.3

Vowel Confusion Matrix

	Perceived stimuli by GAE listener												
	Vowel Segments	Tense Vowels				Lax Vowels							
		[i]	[e]/[ei]	[o]/[oʊ]	[u]	[ɪ]	[ɛ]	**[æ]**	[ɔ]/[ɑ]	[ə]/[ʌ]	[ʊ]	Total	Percent
Spoken Stimuli by Hindi Speaker	[i]	**80**	0	0	0	0	0	0	0	0	0	80	100%
	[e]/[ei]	0	**43**	0	0	0	0	7	0	0	0	50	86%
	[o]/[oʊ]	0	0	**48**	0	0	0	0	1	1	0	50	96%
	[u]	0	0	0	**29**	0	0	0	0	0	1	30	96%
	[ɪ]	2	0	0	0	**68**	0	0	0	0	0	70	97%
	[ɛ]	0	0	0	0	1	**29**	0	0	0	0	30	96%
	[æ]	0	0	0	0	0	2	**50**	7	1	0	60	83%
	[ɔ]/[ɑ]	0	0	2	0	0	0	0	**57**	0	1	60	95%
	[ə]/[ʌ]	0	0	0	0	0	5	10	11	**54**	0	80	68%
	[ʊ]	0	0	0	0	0	0	0	0	0	0	0	0%
Total	10	210				300						**458** 510	90%

Participants tended to transfer phonological processes such as rhoticity, nasalization, allophones such as flaps, or at times, the segments were omitted in producing English consonants and vowels. Still, as mentioned in previous chapters, only substitution of opposite phonemes were the ones that were accounted for the tabulation of negative transfer. After providing the number and percentage of positive and negative transfers, the following parts assess the consequences of negative transfers by referring to the relative functional load of the segments involved.

The next section is about mispronounced consonant that are likely to cause intelligibility issues.

Confusion Data of Consonants

Based on the research findings, consequences of negative transfer are assessed, first in general, and then by segment type, with implications. The most mispronounced consonants were /θ, w, ð, z, d/, as it is represented in the pie chart below:

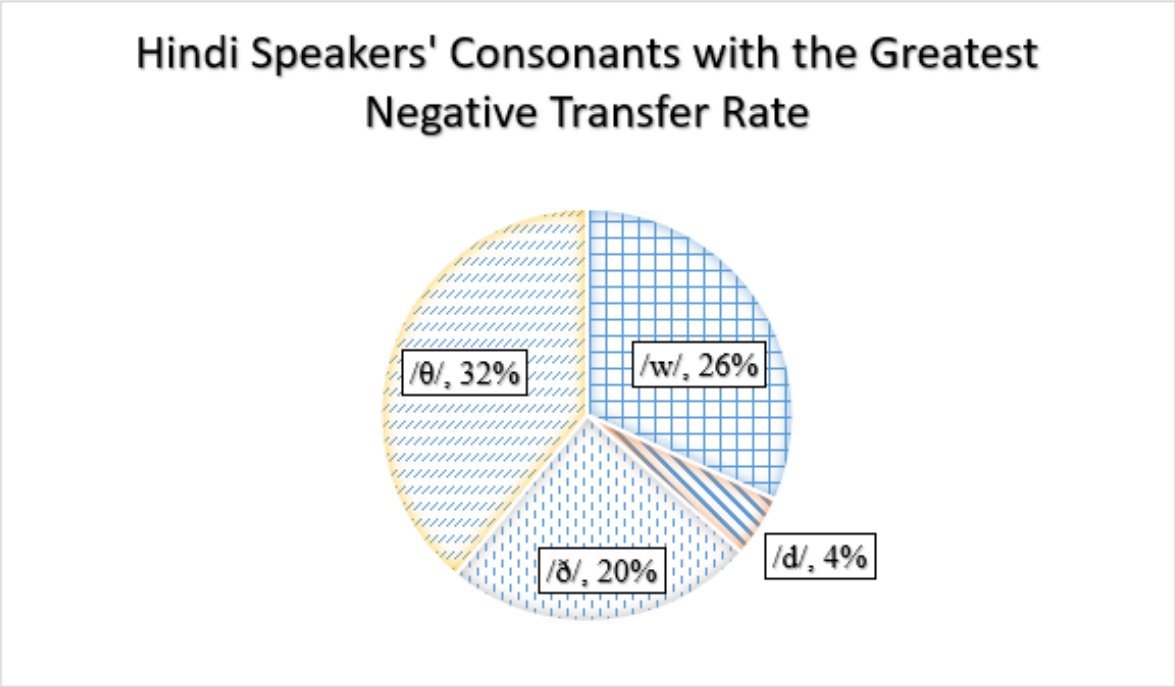

Figure 4.1 Hindi Speakers' Consonants with the Greatest Negative Transfer Rate

Discussion. This thesis uses impressionistic assessment from the George Mason University Speech Archive (Weinberger, 2015) to present specific features in the Indian accent that cause intelligibility issues for customers.

For instance, according to Catford Systematic Description of English Phonology (Koffi, 2015), the Relative Functional Load of the following features: interdental fricatives / θ, ð/ and dental plosives /t, d/ are below 20%. Thus, there is only slight intelligibility for English listeners

when Hindi speakers replace English words such as <thin, this> that contain the interdental fricatives /θ, ð/ with the dental plosives (t^h, d, d^h).

Fairbanks and Misra (1966) also notes that Hindi has semi-consonants (j, r, l, w). Sailaja (2009) explains that /w/ and /v/ are not distinguished by Hindi speakers, /v/ is an allophone of /w/ (p.20). The relative functional load percentage of the minimal pairs v/w is 22%. In other terms, the intelligibility rating is low. Sailaja (2009) gives as an example a Hindi movie "advertisement that said: 'villager, visionary, winner' to serve as an alliterative play on words" (p. 20). Likewise, the dark and clear varieties of /l/ have no distinction in Hindi.

Stops.

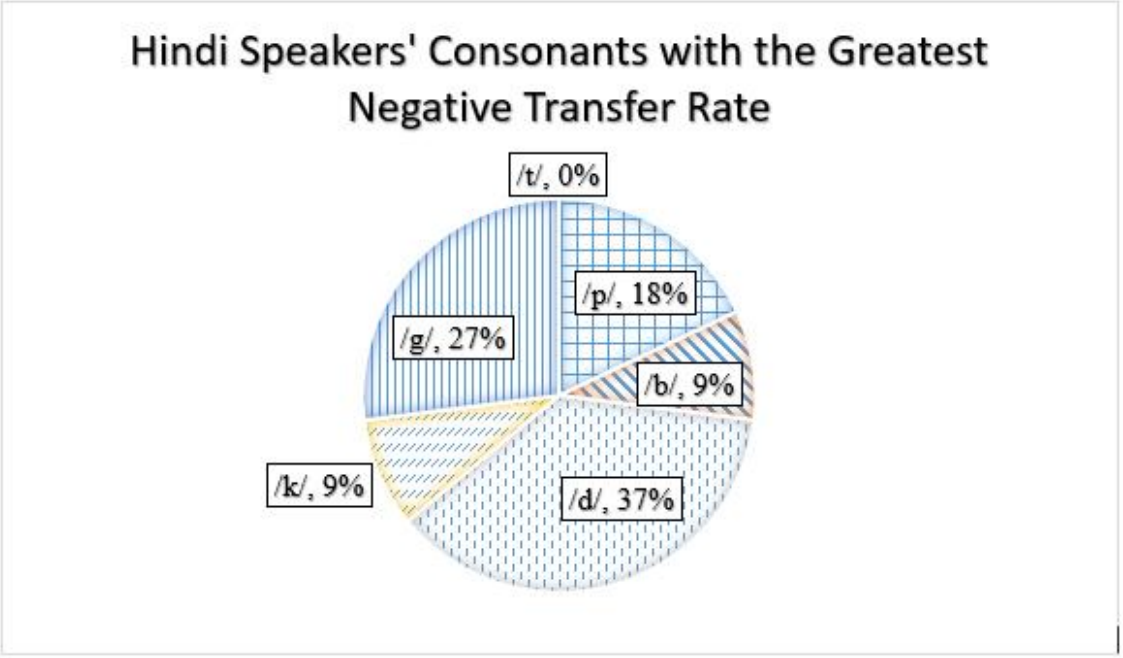

Figure 4.2 Hindi Speakers' Total Negative Transfer Rate of Stops

The participants produced a total of 50 voiceless stops [p]. Of these, 48 were perceived accurately, yielding an accuracy rate of 96%. In two instances [p] was confused with [b] (4%);

the confusion rate is negligible. Even so, the RFL between [p] and [b] in word initial position is 98%. This means that whenever these two segments are confused, unintelligibility is high.

The sound /d/ was confused with /t/ at a rate of 8%. The relative load of /t/ and /d/ confusion is 73%. Thus, severe unintelligibility occurs when /t/ and /d/ are confused, even though the confusion rate is only 8%. The velar voiceless stop /k/ has a positive transfer rate of 98%: there was just 1 out of 50 instances of negative transfer where /k/ was produced as /t/. The relative functional load between /k/ and /t/ is 81% in initial words and 65% in word final position. This leads to severe unintelligibility for word initial and high for word final. Finally, /g/ was confused with /k/ in 3 out of 50 instances. The confusion rate is 6%. Since the RFL is 29%, unintelligibility is low (see Table 3.1).

Fricatives.

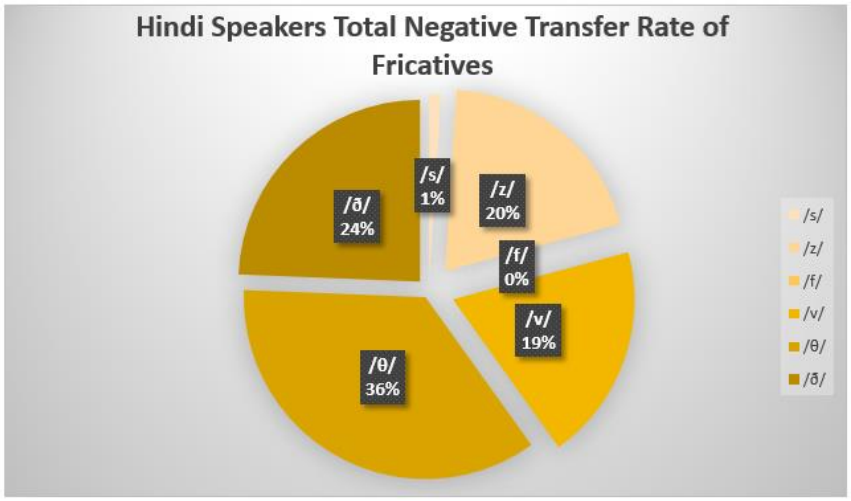

Figure 4.3 Hindi Speakers' Total Negative Transfer Rate of Fricatives

One noteworthy negative transfer was the production of the voiced interdental fricative /z/ as its voiceless counterpart /s/ in 39 out of 100 instances. Although the instances of /z/ and /s/

confusion are many, the RFL is only 6%. Thus, such confusion rarely results in problems with intelligibility.

Nasals. There was no instance of confusion among nasals or between nasals and any other segments. Thus, there are no intelligibility issues regarding these segments. In fact, nasalization is one of the main characteristics in Hindi; thus, Hindi speakers have no issues transferring these segments in English.

Approximants. The approximant /w/ was very problematic. It was confused with /v/ in 28 out of 50 occurrences. This result confirms with Sailaja (2009) observations on Indian English. The confusion rate is 44%. Even though, the RFL of /w/ versus /v/ is only 22%, this confusion is perceptually salient and stigmatized.

Confusion Data of Vowels

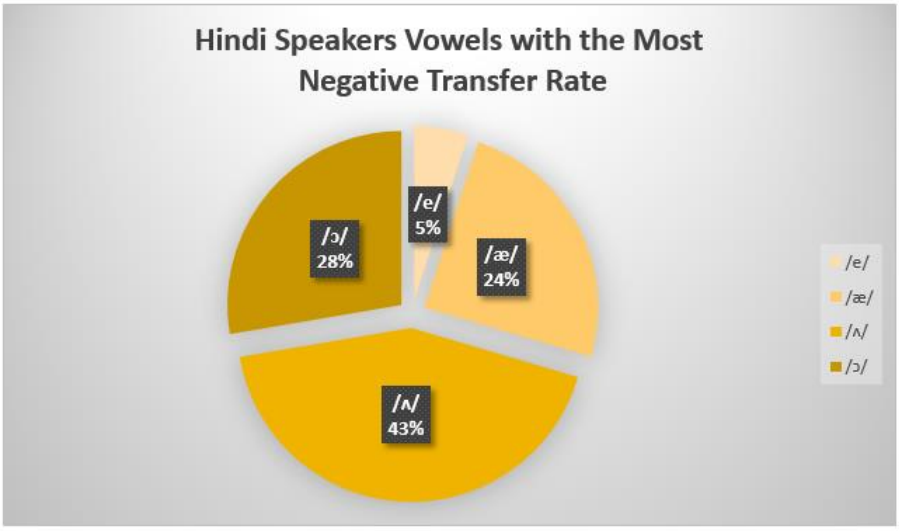

Figure 4.4 Hindi Speakers' Vowels with the Greatest Negative Transfer Rate

Figure 4.4, above, shows that the vowel segment [e] is produced as [æ] in 7 out of 50 instances. The error rate is 14%, and the RFL per Catford is 35%. This suggests a low unintelligibility rating. The most noteworthy vowel confusions are related to the vowel sound

[æ], found in <hat>, which is replaced by [ʌ], [ɑ], and [ɛ]. The confusion rate is 18%. Koffi (2015) indicates that [æ] is the third most frequent vowel in English. Consequently, this substitution is likely to be noticeable. It is also very likely to create serious intelligibility issues, as the RFL of / ʌ / versus /æ/ is 68%, and / æ/ and /ɔ/ has an RFL of 76%.

According to the confusion matrix of vowels (Table 2.3), the Hindi participants confused / æ/ as in <cat> with / ɔ/ as in <caught> in 7 out of 60 instances, or 11%. The data shows that 13% of Hindi English speakers confused / ʌ/ as in <cut> with / æ/ as in <cat>.

Chapter 5: Pedagogical Implications and Recommendations

Pedagogical Implications

In Indian schools, English language learning priorities are the following:

1) Vocabulary

2) Grammar

3) Fluency

Listening and pronunciation skills are not a priority. Teachers in public schools teach English sounds by associating them with local language sounds through charts. For instance, a Tamil learns English though a spelling chart in which the learner reads and memorizes the spellings in the local language. As a result, the student's global English pronunciation acquisition is neglected. However, Maskara (2013) found that the need for good, intelligible English is real if India is to remain an IT outsourcing destination. It is also a necessity for Indian students who study abroad in the U.S., the U.K., Australia, and New Zealand. Indian professionals like doctors or engineers traveling or working abroad need to be intelligible. Thus, pronunciation has become a critical issue.

English Received Pronunciation International Phonetic Alphabet

Maskara (2013) proposes a pilot design as one solution for the teaching of Standard English Phonetics to Indian students. Some concerns about the Standard English Phonetics that Maskara addresses in a proposed pilot study consider: "how to teach international accent to the student, at what level, who should teach, what should be the phonetics syllabus". Another consideration is "whether teaching English pronunciation may affect other aspects of English learning" (Maskara, 2013).

For the proposed pilot study, English Received Pronunciation International Phonetic Alphabet (IPA-RP) is chosen as the baseline because Indian English is closer to the Standard British English. Next, Maskara advises comparing the prominent language of each state with RP to find problems associated with each state of India. The three prominent languages that Maskara focuses on are Hindi, Tamil, and Bengali.

The third recommendation that Maskara gives is to "prioritize the problem and design the phonetics curriculum according to the priority order". For instance, it was found in Chapter 4 of this study that [p] and [b] segments have a high RFL, which translates to severe unintelligibility. This is a severe intelligibility issue because an American customer may likely misunderstand the Indian English call agent when words containing the stop [p] are produced as the stop [b]. Consequently, if Maskara's third recommendation is followed, addressing the confusion between [p] and [b] should be at the highest priority in the phonetics curriculum.

Implementation Guidelines

Guidelines for Indian Education System. Maskara (2013) recommends that students should first become aware of phonetics; following that, the common problems across all the states of India should be addressed. Finally, attention should be given to the state-specific pronunciation issues.

Maskara (2013) proposes a scope and sequence curriculum. He proposes that IPA -RP be taught from kindergarten to high school grades. For instance, "in the kindergarten, the teachers should start teaching correct pronunciation by using native speakers' rhymes, story, audio, and video to motivate children to imitate the native speakers' pronunciation" (Maskara, 2013, p. 6). From 8th grade, Maskara proposes the introduction of the IPA-RT chart at that level and that "some grade should be awarded based on pronunciation through assessments such as oral

repetition activities, multiple-choice hearing identification, reading aloud, simple dialogues, and simple narrations" (Maskara, 2013, p. 6).

Guidelines for outsourced call center training agencies. According to Statista (2018), India was still the global leading country for offshore business services in 2017, thanks to "its financial attractiveness, the skills and availability of its people and the appropriateness of its business environment for business process outsourcing and information technology outsourcing. Revenues from outsourcing were $24.6 billion from business and 64.3 billion from information technology (Statista, 2018).

Kumar Aquino, and Anderson (2007) indicate that potential language and communication barriers between customers and India-based agents are the highest priority problem area to consider when outsourcing to India (p. 338). Granered (2005) quotes a company spokesperson who said: "They may be cheaper but I can certainly tell the difference when I am being served by someone overseas" (p. 23). He advises callers and call center employees to adopt "a more neutral outlook when handling calls in cross-cultural phone situations to reduce misinterpretations of voice positions by the person on the other end of the line" (p. 55). He also notes that call center employees should be trained to pay attention to their non-verbal cues in their cadence and intonation to "carry a positive nature across wires and across cultures" (p. 55).

Furthermore, Kumar et al emphasize that "both guest satisfaction and profits are key elements for outsourcing" (p. 337). Thus, they recommend that companies who want to outsource to India "would first need to address potential language and communication breakdowns perhaps, by investing more in training" (Kumar et al., 2007, p. 339).

Teachers in training agencies should be required to have command of a "highly intelligible global or World English variety of pronunciation to serve as models" for their

trainees (Celce-Murcia et al., 2010, pp. 8-9). Thus, intense, comprehensive, and practical traditional techniques such as the direct method's "listen and imitate" could be practical ongoing training activities for new call agent trainees (Lockwood, 2013, p. 271). In addition, Celce-Murcia et al. (2010) recommend that pronunciation teachers need to do diagnostic work and be selective in what they include in a pronunciation syllabus (p. 33). For instance, they refer to Jenkins's lingua franca core curriculum that prioritizes the teaching of tense and lax vowels and eliminates the teaching of /θ, ð/ and [ɬ] (Celce-Murcia et al., 2010, p. 283), since /θ, ð/ can be substituted with /t, d/, and [ɬ] can be replaced by a clear /l/ with no intelligibility issues. Jenkins' tense-lax vowels distinction curriculum is an important recommendation, as it was determined in this thesis that lax vowel /æ/ is confused with not only tense vowel /e/ but also with lax vowels / ʌ/ and / ɔ/. In fact, Wells (1982) indicated that Indian English speakers know the pronunciation of lax and tense vowels, but those whose command of English is not strong may lack phonemic awareness of English lax vowels, since this is absent in their first language (p. 626).

In conclusion, Celce-Murcia et al. (2010) 's reference to Jenkins's lingua franca core curriculum can be applied to outsourced call centers in India. Furthermore, Maskara's recommendations to "prioritize the problem and design the phonetics' curriculum according to the priority order" would be more beneficial to teachers in training agencies than instructing them to teach accent neutralization. The priority should be to teach articulation of /p/ versus. /b/, /v/ versus. /w/, and to raise the phonemic awareness of the distinction between English lax vowels, particularly / æ/ versus / ʌ, ɔ/.

This thesis addressed issues on the segmental level. The goal is not to neutralize accent. Exhaustive training should continue in order to facilitate better communication between American callers and Indian call agents.

Communication breakdowns are inevitable and will continue to occur. Therefore, the goal of this thesis is not to provide a guide on how to prevent intelligibility issues, but to bypass segmental intelligibility issues through the identification of problematic segments. The reader can become more understanding of the varieties of English. Finally, the writer of this thesis hopes that, thanks to the identification of intelligibility issues at the segmental level, less psychological noise will occur between non-Indian English callers and Indian English call agents in outsourced marketing and telemarketing call center interactions.

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Appendix A: Consonant System

MN 143 M is chosen as the "model" native speaker of English, as his English is considered a variety of General American English. The following charts show the speech of 10 English as Second Language speakers with Hindi as their first language. The data was collected from the Speech Accent Archive (Weinberger, 2015). The data shows some phonological processes as perceived by English listeners. The consonant tables are grouped under manner of articulation. The use of tables were made by the researcher to identify the positive and negative instances when Hindi speakers realize the observed phonological segment in relation to MN 143 M.

Stops

Table A.1 [p]

Words	please	spoons	peas	plastic	scoop	Total
MN 143M	[p^h]	[p]	[p^h]	[p^h]	[p]	[p]
Hindi 1M	p	p	p	p	b	1/5
Hindi 2M	p^h	p	p	p	p̄	5/5
Hindi 3M	p	p	p	p	p	5/5
Hindi 4F	p	p	p^h	p^h	p̄	5/5
Hindi 5F	p	p	p	p	b	5/5
Hindi 6F	p	p	p	p	p	5/5
Hindi 7F	p	p	p	p	p	5/5
Hindi 8M	p	p	p	p	b	5/5
Hindi 9M	p	p	p	p	p	5/5
Hindi 10F	p^h	p	p	p	p˺	5/5
Total	10	10	10	10	8	48/50

Table A.2 [b]

Words	bring	slabs	blue	maybe	brother	Bob	Bob	big	bag	Total
MN 143M	[b]	[b]	[b]	[b]	[b]	[b]	[b̥]	[b]	[b]	[b]
Hindi 1M	b	b	b	b	b	b	b	b	b	9/9
Hindi 2M	b	b	b	b	b	b	b̥	b	b	9/9
Hindi 3M	b	b	b	b	b	b	b̥	b	b	9/9
Hindi 4F	b	b̥	b	b	b	b	b̥	b	b	9/9
Hindi 5F	b	b̥	b	b	b	b	b	b	b	9/9
Hindi 6F	b	b	b	b	b	b	b	b	b	9/9
Hindi 7F	b	b	b	b	b	b	b̥	b	b	9/9
Hindi 8M	b	b	b	b	b	b	b	b	b	9/9
Hindi 9M	b	p	b	b	b	b	b̥	b	b	8/9
Hindi 10F	b	b	b	b	b	b	b̥	b	b	9/9
Total	10	9	10	10	10	10	10	10	10	89/90

Table A.3 [t]

Words	Stella	to	store	plastic	toy	into	meet	at	train	station	Total
MN 143M	[t]	[t]	[t]	[t]	[tʰ]	[t]	[t]	[t]	[tʰ]	[t]	[t]
Hindi 1M	t	ʈ	t	t	ʈ	ʈ	ʈ	ʈ	t	t	10/10
Hindi 2M	t	ɾ	t	t	tʰ	t	ɾ	t	t	t	10/10
Hindi 3M	t	t	t	t	tʰ	t	t	t	t	t	10/10
Hindi 4F	t	t	t	t	tʰ	t	t	t	t	t	10/10
Hindi 5F	t	ʈ	t	t	ʈ	ʈ	t	ʈ	t	t	10/10
Hindi 6F	t	ʈ	t	t	ʈ	t	tʰ	ʈ̚	t	t	10/10
Hindi 7F	t	ʈ	t	t	tʰ	ʈ	t	t	t	t	10/10
Hindi 8M	t	t	t	--	ʈ	t	t	t̚	t	t	10/10
Hindi 9M	t	ɾ	t	t	ʈ	t	t	t̚	t	t	10/10
Hindi 10F	t	ɾ	t	t	tʰ	t	t	t	t	t	10/10
Total	10	10	10	10	10	10	10	10	10	10	100

Table A.4 [d]

Words	and	need	and	Kids	red	and	Wednesday	Wednesday	Total
MN 143M	[--]	[d]	[--]	[d]	[d]	[--]	[--]	[d]	[d]
Hindi 1M	--	ɾ	d	d	d̚	--	--	d	8/8
Hindi 2M	d	d	d	t	d̥	--	--	d	7/8
Hindi 3M	d	ɾ	--	d	d̥̚	--	--	d	8/8
Hindi 4F	--	d	--	d̥	d̚	--	--	d	8/8
Hindi 5F	--	d	d	d̥	--	d	--	d	8/8
Hindi 6F	--	ɾ	--	d̥	d	--	--	d	8/8
Hindi 7F	--	d	--	d̥	d	--	--	t	7/8
Hindi 8M	--	d	--	d̥	d	--	--	t	7/8
Hindi 9M	--	d	--	t	d̚	--	--	d	7/8
Hindi 10F	--	ɾ	--	d	d̚	--	--	d	8/8
Total	10	10	10	8	10	10	10	8	76/80

Note: [--] denotes a deleted segment.

Table A.5 [k]

Words	Call	ask	six	Thick	snack	plastic	snake	kids	can	scoop	Total
MN 143	[kʰ]	[k]	[ks]	[k]	[k]	[k]	[k]	[kʰ]	[kʰ]	[k]	[k]
Hindi 1M	k	k	ks	k	k	k	k	k	k	k	10/10
Hindi 2M	kʰ	k	ks	t̂	k	k	k	k	k	k	9/10
Hindi 3M	k	k	ks	k	k	k	k	k	k	k	10/10
Hindi 4F	kʰ	k̚	ks	k̚	k̚	k	k	kʰ	k	k	10/10
Hindi 5F	k	k	ks	k	k	k	kʰ	k	k	k	10/10
Hindi 6F	k	k	ks	k	k	k	k	k	k	k	10/10
Hindi 7F	k	k	ks	k	ʔ	k	k	k	k	k	10/10
Hindi 8M	k	k	ks	k	k	k	k	k	k	k	10/10
Hindi 9M	k	k	ks	k	k	k	k	k	k	k	10/10
Hindi 10F	kʰ	k	ks	k	k	k	k	k	k	k	10/10
Total	10	10	10	10	10	10	10	10	10	10	99/100

Table A.6 [g]

Words	big	frog	bags	Go	Total
MN 143M	[g˺]	[g˺]	[g]	[g]	[g]
Hindi 1M	ɡ	ɡ	g	g	4/4
Hindi 2M	g	g	g	g	4/4
Hindi 3M	g̻	g	g	g	4/4
Hindi 4F	g	g	g	g	4/4
Hindi 5F	g̻	g	g	g	4/4
Hindi 6F	k	g	g	g	3/4
Hindi 7F	ɡ	g	g	g	4/4
Hindi 8M	ɡ	ɡ	k	g	3/4
Hindi 9M	k	g	g	g	3/4
Hindi 10F	g̻	g̻	g	g	4/4
Total	8	10	9	10	37/40

Fricatives/Affricates

Table A.7 [s]

Words	Stella	ask	six	spoons	snow	slabs	snack	small	plastic	snake	scoop	station	Total
MN 143M	[s]	[s]	[s]	[s]	[s]	[s]	[s]	[s]	[s]	[s]	[s]	[s]	[s]
Hindi 1M	s	s	s	s	s	s	s	s	s	s	s	s	10/10
Hindi 2M	s	s	s	s	s	s	s	s	s	s	s	s	10/10
Hindi 3M	s	s	s	s	s	s	s	s	s	s	s	s	10/10
Hindi 4F	s	s	s	s	s	s	s	s	s	s	s	s	10/10
Hindi 5F	s	s	s	s	s	s	s	s	s	s	s	s	10/10
Hindi 6F	s	s	s	s	s	s	s	s	s	s	s	s	10/10
Hindi 7F	s	s	s	s	s	s	s	s	s	s	s	s	10/10
Hindi 8M	s	s	s	s	s	s	s	s	s	s	s	s	10/10
Hindi 9M	s	s	s	s	ʃ	s	s	s	s	s	s	s	9/10
Hindi 10F	s	s	s	s	s	s	s	s	s	s	s	s	10/10
Total	10	10	10	10	9	10	10	10	10	10	10	10	119

Table A.8 [z]

Words	please	these	things	spoons	slabs	kids	these	things	bags	Wednesday	Total
MN 143M	[z]	[z]	[z]	[z]	[z]	[z]	[z]	[z]	[z]	[z]	[z]
Hindi 1M	s	z	s	z	z	z̪	z̪	z	z̪	z	9/10
Hindi 2M	s	z	z	z̪	z	s	s	s	s	s	4/10
Hindi 3M	s	s	s	z	z	z	s	s	z̪	s	4/10
Hindi 4F	s	z̪	z̪	z	s	s	z̪	z̪	s	z	6/10
Hindi 5F	z	z	s	s	s	z̪	s	z	z	z	6/10
Hindi 6F	z̪	z	z	z	z	s	z	z	z	z	9/10
Hindi 7F	z̪	z	z	z	z̪	s	z	z	s	s	7/10
Hindi 8M	z	s	z̪	z	z	z̪	s	s	s	s	5/10
Hindi 9M	s	z	s	s	s	s	z	s	s	z	3/10
Hindi 10F	s	z̪	z̪	z̪	z̪	z̪	z̪	z̪	z̪	z̪	9/10
Total	4/10	8/10	6/10	8/10	7/10	5/10	6/10	6/10	5/10	6/10	61/100

Table A.9 [f]

Words	from	fresh	five	for	frog	for	Total
MN 143M	[f]	[f]	[f]	[f]	[f]	[f]	[f]
Hindi 1M	f	f	f	f	f	f	6/6
Hindi 2M	f	f	f	f	f	f	6/6
Hindi 3M	f	f	f	f	f	f	6/6
Hindi 4F	f	f	f	f	f	f	6/6
Hindi 5F	f	f	f	f	f	f	6/6
Hindi 6F	f	f	f	f	f	f	6/6
Hindi 7F	f	f	f	f	f	f	6/6
Hindi 8M	f	f	f	f	f	f	6/6
Hindi 9M	f	f	f	f	f	f	6/6
Hindi 10F	f	f	f	f	f	f	6/6
Total	10/10	10/10	10/10	10/10	10/10	10/10	60/60

Table A.10 [v]

Words	of	five	of	Total
MN 143M	[f]	[v]	[v]	[v]
Hindi 1M	f	f	v	2/3
Hindi 2M	f	v̥	v	3/3
Hindi 3M	f	v̥	v	3/3
Hindi 4F	v	v̥	v	3/3
Hindi 5F	f	v	v	3/3
Hindi 6F	v	v	v	3/3
Hindi 7F	f	f	v	2/3
Hindi 8M	f	--	v̥	2/3
Hindi 9M	f	v̥	f	2/3
Hindi 10F	f	v	v	3/3
Total	8/10	7/10	9/10	24/30

Table A.11 [θ]

Words	things	with	thick	things	three	Total
MN 143M	[θ]	[θ]	[θ]	[θ]	[θ]	[θ]
Hindi 1M	t	t	θ	t̪	t̪	1/5
Hindi 2M	θ	t̪	t̪	s̪	t̪	1/5
Hindi 3M	θ	θ	θ	t̪	θ	4/5
Hindi 4F	t̪	θ	θ	t̪	t̪	2/5
Hindi 5F	t̪	t̪	t	t̪	t	0/5
Hindi 6F	θ	t̪	t̪	θ	t	2/5
Hindi 7F	t̪	t̪	t̪	t̪	t	0/5
Hindi 8M	t̪	t	t̪	t̪	t̪	0/5
Hindi 9M	t	θ	t̪	t̪	t̪	1/5
Hindi 10F	θ	ð	θ	θ	θ	4/5
Total	4/10	3/10	4/10	2/10	2/10	19/50

Table A.12 [ð]

Words	these	the	brother	the	these	the	Total
MN 143M	[n]	[ð]	[ð]	[ð]	[ð]	[ð]	[ð]
Hindi 1M	d	ð	ð	ð	d	ʈ	3/6
Hindi 2M	d̪	n̪	ð	ð	d̪	d̪	4/6
Hindi 3M	d̪	ð	ð	ð	d̪	d̪	3/6
Hindi 4F	ð	d̪	ð	ð	d̪	ð	2/6
Hindi 5F	d̪	d	ð	d̪	d̪	ɖ	5/6
Hindi 6F	ð	ð	ð	ð	ð	ð	6/6
Hindi 7F	d̪	d̪	ð	d̪	d̪	ð	4/6
Hindi 8M	t̪	d̪	ð	ð	d̪	d̪	2/6
Hindi 9M	d	ð	ð	d̪	d̪	d̪	3/6
Hindi 10F	ð	ð	ð	ð	ð	ð	6/6
Total	3/10	5/10	10/10	7/10	2/10	4/10	29/60

Affricates

Table A.13 [ʃ]

Words	fresh	station	Total
MN 143M	[ʃ]	[ʃ]	[ʃ]
Hindi 1M	ʃ	ʃ	2/2
Hindi 2M	s	ʃ	1/2
Hindi 3M	ʃ	ʃ	2/2
Hindi 4F	ʃ	ʃ	2/2
Hindi 5F	ʃ	ʃ	2/2
Hindi 6F	ʃ	ʃ	2/2
Hindi 7F	ʃ	ʃ	2/2
Hindi 8M	ʃ	ʃ	2/2
Hindi 9M	ʃ	ʃ	2/2
Hindi 10F	ʃ	ʃ	2/2
Total	10	10	20/20

Table A.14 [tʃ]

Words	cheese	Total
MN 143M	[tʃ]	[tʃ]
Hindi 1M	tʃ	10/10
Hindi 2M	tʃ	10/10
Hindi 3M	tʃ	10/10
Hindi 4F	tʃ	10/10
Hindi 5F	tʃ	10/10
Hindi 6F	tʃ	10/10
Hindi 7F	tʃ	10/10
Hindi 8M	tʃ	10/10
Hindi 9M	tʃ	10/10
Hindi 10F	tʃ	10/10
Total	10	10/10

Nasals

Table A.15 [m]

Words	from	maybe	small	meet	Total
MN 143M	[m]	[m]	[m]	[m]	[m]
Hindi 1M	m	m	m	m	4/4
Hindi 2M	m	m	m	m	4/4
Hindi 3M	m	m	m	m	4/4
Hindi 4F	m	m	m	m	4/4
Hindi 5F	m	m	m	m	4/4
Hindi 6F	m	m	m	m	4/4
Hindi 7F	m	m	m	m	4/4
Hindi 8M	m	m	m	m	4/4
Hindi 9M	m	m	m	m	4/4
Hindi 10F	m	m	m	m	4/4
Total	10	10	10	10	40

Table A.16 [n]

Words	snow	and	snack	need	snake	can	into	and	Wednesday	train	station	Total
MN 143M	[n]	[n]	[n]	[n]	[n]	[n]	[n]	[n]	[n]	[n]	[n]	[n]
Hindi 1M	n	n	n	n	n	n	n	n	n	n	n	11/11
Hindi 2M	n	n	n	n	n	n	n	n	n	n	n	11/11
Hindi 3M	n	n	n	n	n	n	n	n	n	n	n	11/11
Hindi 4F	n	n	n	n	n	n	n	n	n	n	n	11/11
Hindi 5F	n	n	n	n	n	n	n	n	n	n	n	11/11
Hindi 6F	n	n	n	n	n	n	n	n	n	n	n	11/11
Hindi 7F	n	n	n	n	n	n	n	n	n	n	n	11/11
Hindi 8M	n	n	n	n	n	n	n	n	n	n	n	11/11
Hindi 9M	n	n	n	n	n	n	n	--	n	n	n	11/11
Hindi 10F	n	n	n	n	n	n	n	n	n	n	n	11/11
Total	10	10	10	10	10	10	10	10	10	10	10	110

Table A.17 [ŋ]

Words	bring	things	things	Total
MN 143M	[ŋ]	[ŋ]	[ŋ]	[ŋ]
Hindi 1M	ŋ	ŋ	ŋ	3/3
Hindi 2M	ŋ	ŋ	ŋ	3/3
Hindi 3M	ŋ	ŋ	ŋ	3/3
Hindi 4F	ŋ	ŋ	ŋ	3/3
Hindi 5F	ŋ	k	ŋ	2/3
Hindi 6F	ŋ	ŋ	ŋ	3/3
Hindi 7F	ŋ	ŋ	ŋ	3/3
Hindi 8M	ŋ	ŋ	ŋ	3/3
Hindi 9M	ŋ	ŋ	ŋ	3/3
Hindi 10F	ŋ	ŋ	ŋ	3/3
Total	10	10	10	/30

Approximants

Table A.18 [l]

Words	please	call	Stella	slabs	blue	also	small	plastic	will	Total
MN 143M	[l]	[lʸ]	[l]	[l]	[l]	[lʸ]	[lʸ]	[p]	[lʸ]	[l]
Hindi 1M	l	l	l	l̥	l	l	l	l	l	90/90
Hindi 2M	l	l	l	l	l	l	l	l	l	90/90
Hindi 3M	l	l	l	l	l	l	l	l	l	90/90
Hindi 4F	l	l	l	l	l	l	l	l	l	90/90
Hindi 5F	l	l	l	l	l	l	l	l	l	90/90
Hindi 6F	l	l	l	l	l	l	l	l	l	90/90
Hindi 7F	l	l	l	l	l	l	l	l	l	90/90
Hindi 8M	l	l	l	l	l	l	l	l	l	90/90
Hindi 9M	l	l	l	l	l	l	l	l	l	90/90
Hindi 10F	l	l	l	l	l	l	l	l	l	90/90
Total	10	10	10	10	10	10	10	10	10	90/90

Table A.19 [ɹ]/ [r]

Words	her	her	from	store	fresh	for	frog	brother	three	red	her	train	Total
MN 143M	[ɚ]	[ɚ]	[ɹ]	[ɹ]	[ɹ]	[ɔ˞]	[ɹ]	[ɚ]	[ɹ]	[ɹ]	[ɚ]	[ɹ]	[ɹ]/[r]
Hindi 1M	--	ɚ	ɹ	ɹ	r	r	ɹ	r	r	r	r	ɹ	13/13
Hindi 2M	ɚ	ɹ	ɹ	ɹ	ɹ	ɹ	ɹ	ɹ	ɹ	ɹ	ɹ	ɹ	13/13
Hindi 3M	ɚ	ɚ	ɹ	ɹ	r	ɚ	ɹ	ɹ	r	r	ɚ	ɹ	13/13
Hindi 4F	--	ɝ	ɹ	ɹ	ɹ	ɹ	ɹ	ɹ	ɹ	ɹ	ɝ	ɹ	13/13
Hindi 5F	ɽ	ɽ	ɽ	r	r	r	ɽ	r	r	ɽ	ɽ	r	13/13
Hindi 6F	--	ɹ	ɹ	ɹ	r	ɹ	ɹ	ɹ	r	ɽ	ɹ	ɹ	13/13
Hindi 7F	ɹ	ɹ	ɹ	ɹ	r	ɹ	ɹ	ɹ	r	ɽ	ɽ	ɹ	13/13
Hindi 8M	ɹ	ɹ	ɹ	ɹ	ɹ	--	ɹ	ɹ	ɹ	ɹ	ɹ	ɹ	13/13
Hindi 9M	--	--	ɹ	ɹ	ɹ	--	ɹ	ɹ	ɹ	ɹ	ɚ	ɹ	13/13
Hindi 10F	ɹ	ɚ	r	ɹ	r	ɹ	ɹ	ɹ	ɹ	ɹ	ɹ	ɹ	
Total	10/10	10/10	10/10	10/10	10/10	10/10	10/10	10/10	10/10	10/10	10/10	10/10	130/130

Table A.20 [w]

Words	with	we	we	will	Wednesday	Total
MN 143M	[w]	[w]	[w]	[w]	[w]	[w]
Hindi 1M	v	v	v	v	v	0/5
Hindi 2M	w	w	--	w	v	1/5
Hindi 3M	v	v	v	v	v	0/5
Hindi 4F	w	w	w	w	v	1/5
Hindi 5F	v	v	v	v	v	0/5
Hindi 6F	v	v	v	v	v	0/5
Hindi 7F	v	v	v	v	v	0/5
Hindi 8M	w	w	w	w	w	5/5
Hindi 9M	w	w	w	w	w	5/5
Hindi 10F	w	w	w	w	w	5/5
Total	5/10	5/10	5/10	5/10	3/10	23/50

Appendix B: Vowel System

MN 143 M is chosen as the "model" native speaker of English, as his English is considered a variety of General American English. The following charts show the speech of 10 English as Second Language speakers with Hindi as their first language. The data was collected from the Speech Accent Archive (Weinberger, 2015). The data shows some phonological processes as perceived by English listeners. The vowels are classified as either tense vowels and lax vowels. However, the analysis does not include the length of time participants took to produce each segment. Only a negative transfer of two opposite phonemes was counted.

Tense Vowels

Table B.1 Vowel [i]

Words	please	these	peas	cheese	we	need	meet	three	Total
MN 143M	[i]	[i]	[i]	[i]	[i]	[i]	[i]	[i]	[i]
Hindi 1M	i	i	i	i	i	i	i	i	8/8
Hindi 2M	i	i	i:	i:	i	i:	i:	i	8/8
Hindi 3M	i	i	i:	i:	i	i	i:	i:	8/8
Hindi 4F	i:	i:	i:	i:	i	i:	i	i	8/8
Hindi 5F	i	i:	i:	i:	i	i:	i	i:	8/8
Hindi 6F	i:	i	i	i:	i	i	i	i	8/8
Hindi 7F	i	i:	i:	i:	i	i	i	i:	8/8
Hindi 8M	i:	i:	i:	i:	i	i	i	i	8/8
Hindi 9M	i	i	i	i	i	i	i	i	8/8
Hindi 10F	i	i	i:	i	i	i	i	i	8/8
Total	10/10	10/10	10/10	10/10	10/10	10/10	10/10	10/10	80/80

Table B.2 Vowel [e]/ [eɪ]

Words	maybe	snake	Wednesday	train	station	Total
MN 143M	[eɪ]	[eɪ]	[eɪ]	[eɪ]	[eɪ]	[e]/ [eɪ]
Hindi 1M	eɪ	æ	eɪ	eɪ	eɪ	4/5
Hindi 2M	eɪ	æ	eɪ	eɪ	eɪ	4/5
Hindi 3M	eɪ	eɪ	eɪ	eɪ	eɪ	5/5
Hindi 4F	eɪ	æ	eɪ	eĩ	eɪ	4/5
Hindi 5F	eɪ	æ	eɪ	ẽɪ	eɪ	4/5
Hindi 6F	eɪ	æ	eɪ	ẽɪ	eɪ	4/5
Hindi 7F	eɪ	eɪ	e	ẽɪ	eɪ	5/5
Hindi 8M	eɪ	æ	eɪ	ẽɪ	eɪ	4/5
Hindi 9M	eɪ	eɪ	eɪ	eĩ	eɪ	5/5
Hindi 10F	eɪ	æ	eɪ	eɪ	eɪ	4/5
Total	10/10	3/10	10/10	10/10	10/10	47/50

Table B.3 Vowel [o]/ [oʊ]

Words	snow	also	go	Total
MN 143M	[oʊ]	[o]	[oʊ]	[o]/ [oʊ]
Hindi 1M	o	ŏ	o	3/3
Hindi 2M	o	o	o	3/3
Hindi 3M	o	o	oʊ	3/3
Hindi 4F	oʊ	ɔ	oʊ	3/3
Hindi 5F	oʊ	o	o	3/3
Hindi 6F	o	ə	oʊ	3/3
Hindi 7F	o	o	oʊ	3/3
Hindi 8M	oʊ	o	o	3/3
Hindi 9M	o	o	o	3/3
Hindi 10F	oʊ	o	oʊ	3/3
Total	10/10	10/10	10/10	30/30

Table B.4 Vowel [u]

Words	spoons	blue	scoop	Total
MN 143M	[u]	[u]	[u]	[u]
Hindi 1M	u	u	u	3/3
Hindi 2M	ũ	u	u̟	3/3
Hindi 3M	ũ	u	u	3/3
Hindi 4F	ũ	u	u	3/3
Hindi 5F	ʊ	u	u	2/3
Hindi 6F	ũ	u	u	3/3
Hindi 7F	ũ	u	u	3/3
Hindi 8M	ũ	u	u:	3/3
Hindi 9M	ũ	u	u	3/3
Hindi 10F	ũ	u	u	3/3
Total	9/10	10/10	10/10	29/30

Lax Vowels

Table B.5 Vowel [ɪ]

Words	with	six	thick	plastic	kids	big	will	Total
MN 143M	[ɪ]	[ɪ]	[ɪ]	[ɪ]	[ɪ]	[ɪ]	[ɪ]	[ɪ]
Hindi 1M	ɪ	ɪ	ɪ	ɪ	ɪ	ɪ	ɪ	7/7
Hindi 2M	ɪ	ɪ	ɪ	ɪ	ɪ	ɪ	ɪ:	7/7
Hindi 3M	ɪ	ɪ	ɪ	ɪ	ɪ	ɪ	ɪ	7/7
Hindi 4F	ɪ	ɪ	ɪ	ɪ	ɪ	ɪ	ɪ	7/7
Hindi 5F	ɪ	ɪ	i	ɪ	ɪ	ɪ	ɪ	6/7
Hindi 6F	ɪ	ɪ	ɪ	ɪ	ɪ	ɪ	ɪ	7/7
Hindi 7F	ɪ	ɪ	ɪ	ɪ	ɪ:	ɪ	ɪ	7/7
Hindi 8M	ɪ	ɪ	ɪ	ɪ	ɪ	ɪ	ɪ	7/7
Hindi 9M	ɪ	ɪ	ɪ	i	ɪ	ɪ	ɪ	6/7
Hindi 10F	ɪ	ɪ	ɪ	ɪ	ɪ	ɪ	ĭ	7/7
Total	10/10	10/10	9/10	9/10	10/10	10/10	10/10	68/70

Table B.6 Vowel [ɛ]

Words	fresh	red	Stella	Total
MN 143M	[ɛ]	[ɛ]	[ɛ]	[ɛ]
Hindi 1M	ɛ	ɛ	ɛ	3/3
Hindi 2M	ɛ	ɛ	ɛ	3/3
Hindi 3M	ɛ	ɛ	ɛ	3/3
Hindi 4F	ɛ	ɛ	ɛ	3/3
Hindi 5F	ɛ	e	e	2/3
Hindi 6F	ɛ	ɛ	ɛ	3/3
Hindi 7F	ɛ	ɛ	ɛ	3/3
Hindi 8M	ɛ	ɛ	ɛ	3/3
Hindi 9M	ɛ	ɪ	ɛ	2/3
Hindi 10F	ɛ	ɛ	ɛ	3/3
Total	10/10	8/10	9/10	27/30

Table B.7 Vowel [æ]

Words	ask	slabs	snack	plastic	bags	at	Total
MN 143M	[æ]	[æ]	[æ]	[æ]	[æ]	[ə]	[æ]
Hindi 1M	a	æ	æ	a	æ	æ	4/6
Hindi 2M	æ	æ	æ	æ	æ	æ	6/6
Hindi 3M	æ	æ	æ	æ	æ	æ	6/6
Hindi 4F	a	æ	æ	ʌ	æ	æ	4/6
Hindi 5F	æ	æ	æ	æ	æ	æ	6/6
Hindi 6F	a	æ	æ	ɑ	æː	æ	4/6
Hindi 7F	aː	æ	ɛ	æ	ɛ	a̯e̯	3/6
Hindi 8M	æ	æː	æ	æ	æː	æ	6/6
Hindi 9M	a	æ	æ	a	æː	æ	4/6
Hindi 10F	æ	æ	æ	æ	æ	ă̯e̯	6/6
Total	5/10	10/10	9/10	6/10	9/10	10/10	49/60

Table B.8 Vowel [ɔ]/[ɑ]

Words	call	store	small	Bob	also	frog	Total
MN 143M	[ɔ]	[ɔ]	[ɔ]	[ɑ]	[ɑ]	[ɑ]	[ɔ]/ [ɑ]
Hindi 1M	ɑ	ɔ	ɑ	ɔ	ŏ	ɑ	6/6
Hindi 2M	ɔ	ɔ	ɔ	ɑ	ɔ	ɔ	6/6
Hindi 3M	ɑ	ɔ	ɑ	ɑ	ɑ	ɑ	6/6
Hindi 4F	o̤	ɔ	ɔ	ɑ	ɔ	ɔː	6/6
Hindi 5F	ɔ	ɔː	ɔ	ɔ	ɔ	ɔ	6/6
Hindi 6F	ɔː	ɔː	ɔ	o	ɔː	ɔː	5/6
Hindi 7F	ɔ	ɔ	ɔ	ɑː	ɔ	ɔ	6/6
Hindi 8M	ɔ	ɔː	ɔ	ɑː	ɔ	ɔː	6/6
Hindi 9M	aŏ	ɔ	ɑ	ɑ	ɑ	ɔ	5/6
Hindi 10F	ɑ	ɔː	ɑ	aː	ɑ	ɑ	5/6
Total	9/10	10/10	10/10	9/10	9/10	10/10	57/60

Table B.9 Vowel [ə]/[ʌ]

Words	her	from	of	a	for	can	the	and	Total
MN 143M	[ɚ]	[ʌ]	[ə]	[ə]	[ə]	[ə]	[ə]	[ə]	[ə]/[ʌ]
Hindi 1M	ɜ	ʌ	ɔ	ə	ɔ	æ	ə	æ	3/8
Hindi 2M	ɚ	ʌ	ʌ	ə	ɔ	ə̃	ə	ɛ̃	6/8
Hindi 3M	ɚ	ʌ	ə	ə	ɚ	ə̃	ə	æ̃	7/8
Hindi 4F	ɜ	ʌ̃	ʌ	ɛ	ɔ	ɛ̃	ə	æ̃	3/8
Hindi 5F	ə	ʌ̃	ə	ə	ə	æ̃	ə	æ̃	6/8
Hindi 6F	ə	ʌ̃	ə	ə	ə	ə̃	ə	æ̃	7/8
Hindi 7F	ə	ʌ̃	ɔ	ə	ɔ	æ̃	ə	ɛ̃	4/8
Hindi 8M	ə	ʌ̃	ɔ	ə	ɔ	ə̃	ə	æ̃	5/8
Hindi 9M	ə	ɔ̃	ɔ	ə	ɔ	ə̃	ə	æ̃	4/8
Hindi 10F	ə	ʌ̃	ə	ə	ə	ə̃	ə	ə	7/8
Total	8/10	9/10	6/10	9/10	4/10	6/10	10/10	1/10	53/80

Appendix C: Relative Functional Load

This adapted Catford's Relative Functional Load table with the percentages that provide intelligibility ratings was taken from Koffi (2015)

Table C.1 Relative Functional Load

Levels	**Percentage**	**Unintelligibility**
1	80-100	Severe
2	60-79	High
3	40-59	Moderate
4	20-39	Low
5	1-19	Slight