Sociophonetic Investigation of Speech Perception among Students of Rivers State University, Unkpolu, Port Harcourt

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Abstract

This study was carried out to probe listeners' use of sociophonetic details in speech perception. The study was premised on the theory of model of social recognition. The population of the study was students of Rivers State University of Science and Technology. Spoken materials were used as instruments for data collection. Descriptive and interpretative tools were used for the analysis of data collected. It was found that the combination of linguistic and dialectical tokens exhibited by the speakers helped the listeners to identify the regional dialect of speakers. It was revealed also that speakers index their ethnic background using phonetic variables. Also, the study found that individuals' stereotypical attitudes affect their judgments when perceiving a speech. The study concludes that no natural human utterance offers linguistic information without simultaneously indexing some social factors.

Introduction

The aversion of much of sociolinguistics to perception has been, to some extent, more apparent than real. Many sociolinguistic studies, especially instrumental studies, have succeeded in divorcing speech production from speech perception. However, perception issues may play a hidden role in studies that ostensibly address production. Linguistic scholars have always recognised that language varies systematically (i.e. non-randomly) across speakers, regions, social groups and contexts of use (Foulkes, 1997, p.259). Studies of phonological development have nevertheless generally treated most forms of variation simply as an inconvenience that complicates the task of acquisition. According to Labov (1968, p.273), phonetic variation in speech production is now known to correlate with a number of factors, including social characteristics of the speaker and the formality of the situation. Research has proved that

speakers are not constant in the phonetic realization they produce but shift depending on the style they construct in giving context.

The background above helps to demonstrate how individuals have (not necessarily conscious) knowledge of sociolinguistic variables and that they can use this knowledge in perception of speech. While the majority of linguistic theories do not attempt to account for socially conditioned variation, socio-perceptual studies, together with sociolinguistic work in production, provide evidence that sociolinguistic variation is not systematically 'noise' that is flittered out during the processing and storing of speech events; the relationship between social and linguistic information must be stored in the mind in such a way that it can be accessed during speech perception. Thus, if linguistic theories aim to provide an accurate representation of linguistic variation, they must account for the richness of social theory, the gradience (change) of phonetic detail, and the probabilistic distribution of linguistic variables.

Furthermore, results from socio-perceptual studies also have implications for our understanding of sound change and of language-based prejudices: if both a listener's exceptions regarding a speaker and the object in the environment can affect how their speech is perceived by others, what does this say about sounds that are stored and associated in memory with the speaker. It is crucial that we understand the relationship between how sounds are perceived and what types of social judgements are made based on exposure to those sounds. Likewise, if we hope to understand how sound change occurs, we must explore the extent to which stored memories of sounds are affected by factors in the listener's environment as well as the cognitive processes underlying the perception of speech (Orager, p. 474).

Sociophonetic Variation: An Overview

In view of the diverse fields of reference of sociophonetics, it is pertinent to specify precisely what is meant by sociophonetic variation. According to Foulkes (1997, pp. 409-410), it refers to variable aspects of phonetic or phonological structure in which alternative forms correlate with social factors. These factors include most obviously those social categories which have been examined extensively by sociolinguists and dialectologists: speakers' gender, age, ethnicity, social class, group affiliations, geographical origin, and speaking style.

He further notes that, correlation may be with more than one social category simultaneously, and variation may be observable within the repertoire of an individual speaker or across groups of speakers. In case of sociophonetic variation, then, variable forms can be said to index some or other social categories. Wells (1982, p.35) notes that 'The relationship between linguistic form and social category is arbitrary, and sociophonetic variation represents a pattern of behavior learned by speakers through the experience of using language in social interaction".In other cases, though, indexicality may be of natural categories or phenomena and linguistic variation may be non-arbitrary. For example, it is usually possible to distinguish the

voices of adult males, adult females, and children through the gross and direct acoustic consequences of major differences in vocal tract dimensions.

Acoustic differences according to (Layer, 80; Layer & Trudgill, 79) can therefore be used to index the natural biological categories of age and sex. Layer & Trudgill believe that, physical variation between speakers may yield phonetic differences that index individuals. There may, however, be no clear dividing line between learned and non-leaned behaviour or between arbitrary and non-arbitrary phonetic variation (79). Foulkes (1997, p.411)supports this by saying that, the socially-constructed category of gender overlaps considerably with the biological category of sex, and the phonetic cues for gender (such as relatively high Fo which is the lowest frequency at which a medium will freely oscillate) may be parasitic on phonetic differences derived from biological differences. There is evidence that male-female differences emerge in children's speech will before the onset of puberty produce large differences in vocal tract (Gunzburger& Keurs,1987, p. 87).

The phonetic variants observed in the speech of an individual are reflected in the way an individual perceives sounds. For example, an individual's regional origin can predict not only how they pronounce sounds but also how they perceive them (Ladefoged and Broadbent, 1957,p.57; Willis, 1972, p.72; Fridland and Okamoto,2009,p.9). However, the link between an individual's production and perception is not straightforward. Some research suggests that, speech perception may not always be affected when there is a change in production, even when the change in production is a potentially long-term shift (Evans and Iverson,2007,p. 7). Some groups of listeners appear to use phonetic cues during perception that they do not use in their own production but that are used by other groups (Thomas,1992,p. 2). Thomas also found out that, listeners of different ethnicities or social groups and from different regions used some of the same phonetic cues in the preceding diphthong to identify whether a consonant was voiced or voiceless (as in *tide* and *tight*). This provides evidence that individuals can have the ability to use phonetic cues during perception even if they do not use those cues in production.

Perception Studies

Phonetic variation in speech production is now known to correlate with a number of factors, including social characteristics of the speakers and the formality of the situation (Labov, 1968, p.72). Although studies of perception are still largely assigned to the realms of experimental phonetics or psychology, sociolinguists have been recognizing the importance of perception, Erik, (2002, p.115). Several lines of experimental inquiry has been studied far less by sociolinguists than has speech production. One reason according to Erik(2002, p.15), is that, speech perception is daunting at first. Examining it requires careful attention to experimental design, a considerable amount to preparation and in many cases, use of a speech synthesizer. Even so, research on speech perception can be highly productive.

Speech perception is the process by which the sounds of language are heard, interpreted and understood. The study of speech perception is closely linked to the fields of phonology and phonetics in cognitive psychology and perceptive in psychology. Research in speech perception seeks to understand how listeners recognize sound and use this information to understand spoken language. Speech perception has application in building computer system that can recognize speech, in improving speech recognition for hearing and language-impaired listeners, and in foreign language teaching.

The process of perceiving speech begins at the level of the sound signal and the process of audition. The speech sound signals always have a number of acoustic cues that are used in speech perception for social category. The cues differentiate speech sounds belonging to different phonetic categories, but it is not easy to identify what acoustic cues listeners are sensitive to when perceiving a particular speech sound.

Production, Perception and Exposure

The phonetic variants observed in the speech of an individual are reflected in the way that the individuals perceived sounds. Individuals' regional origin can predict not only how they pronounce sounds but also how they perceive them (Ladefoged and Broadbent, 1957, p.97; Willis, 1972, p.247; Fridland and Okamoto, 2009, p.9). However, the link between an individual and their perception is not entirely straightforward. Some research suggests that speech perception may not always be affected when there is a change in production, even when the change in production is a potentially long-term shift (Evans and Iverson,2007, p. 3820). According to Drager qtd. in Thomas. In regard to the effect of diphthong qualities according to Thomas (1992, p.20), the responses during the perception experiment were similar despite only one of the subject groups in the production demonstrating much stronger patterns relating the phonetic cues of the diphthong to the voicing on the constant. This provides evidence that individuals can have the ability to use phonetic cues during perception even if they do not use those cues in production.

Similarly, in perception study, sounds undergo a merger (Janson and Schulman, 1983, p. 334). They further stressed that listeners who maintain a distinction were not always accurate at identifying tokens, even when they were produced by someone who also maintained a distinction. Hay et al. (2006, p.459) conducted an experiment in New Zealand which also investigated the perception of sounds that were involved in an ongoing merger. In contrast to Janson and Schulman's 1983 results, Hay et al. (2006, p.20) found that listeners were highly accurate at identifying distinct tokens, even if they did not maintain a distinction in their own speech.

According to Drager (2010,p.475), exposure to other dialect affects both speech processing and ability of listener to identify social characteristics of the speaker. Clopper and Pisoni (4) found that, previous exposure of a dialect affects accuracy at identifying the regional origin of the speaker. In phoneme and word identification tasks, even relatively small amounts of

exposure to speech can cause listeners to adjust their categorization (Norris, 2003,p. 231). However, listeners only appear to be affected by such exposure if the variable is interpretable as an idiolectal (speaker-specific) feature rather than a dialectal (generalizable) feature (Kraljic et al., 2008, p.58). While differing degrees of exposure to other dialects can affect how sounds are perceived, previous exposure affects perception differently for different types of task depending on whether they require short-term or long-term storage (Summer and Samuel,2009, p. 489).

Attachment of Social Information of a Speaker in Speech Recognition and Perception

There is ample research which provides evidence that social information (both personality trait as well as broad social categories) can be extracted from auditory input in fairly consistent (though not necessarily accurate) ways. Researchers have investigated the degree to which listeners can identify a speaker`s ethnicity (Buck 1968, p.28); (Tuckers and Lambert, 1969,p. 469), (Purnell et al., 1999, p. 20), gender and sexuality (Munson and Babel, 2017), regional dialect origin (Bush, 67; Preston, 99; Williams regional dialect origin (Lambert et al. 69, (Addington, 1968, p. 498), Preston 99; (Bayard, 2000, p. 220). in an experiment examining listeners' perception of the speakers of the speakers origin, Clopper and Pisoni, 20) found that although listeners were not especially accurate when identifying the actual regional origin of the speaker, they responded in ways consistent with one another and appeared to be using a small set of phonetic cues when assigning a region. In speech perception experiment where listeners were asked to identify the speaker's ethnicity, accuracy was inversely proportional to the number of 'atypical' variants: variants considered atypical for speakers of that ethnicity.

Foulkes (1997, p.10) conducted an experiment in Tyneside where they played tokens of children's speech to adults. They found that when identifying the sex of a child, listeners appeared to use a number of different acoustic cues, including whether or not the child produced a laryngealised voiceless stop, a variant associated with males in the region. When listeners from other regions were asked to complete the same task, they did not display the same sensitivity to the realisation of the stops. This provides evidence that individuals are sensitive to socially conditioned variation when perceiving speech. The ability to associate some perceived characteristic of the speaker with the phonetic variants that speaker tends to produce appears to be highly productive. There is some evidence that even a small amount of exposure to phonetic patterns distributed over novel, previously unencountered groups can affect listener's categorization of a speaker into one of the groups (Docherty *et al*,2008, p. 8).

More experiments along these lines are necessary; particularly needed are ones which control the patterning of phonetic variables. While the design of such an experiment becomes increasingly complex as the number of variables increases, such investigations are promising ways to shed light on how a listener's perception of another's persona is formed.

Social Information and Speech Perception

The relationship between phonetic and social information during speech perception is not unidirectional; the phonetic variants perceived can affect what characteristics are attributed to a speaker, and the characteristics attributed to the speaker can influence how sounds are perceived. Research has it that, within the speech of a single individual, the focus of a periodic energy of the alveolar fricative /s/ is higher than for the patatal fricative /S/. The acoustic boundary between /S/ and /s/ according to Drager (2010, p.476) depends in part on vocal size and therefore tends to be higher for females than males. What this mean is that, it is possible for a token of /S/ produced by a male to have its turbulence focused in a similar frequency range as a female's token of /s/.

There is evidence that the perception of phonetic variables can also be affected by other social characteristics attributed to the speaker, including dialect area, ethnicity, socio-economic status, etc. (Drager, 2010, p.11). Using photographs to manipulate the perceived socio-economic status and age of speakers in a perception experiment, Hay et al (6) found that participants' accuracy at identifying distract tokens of the diphthongs depended on the social characteristics of the person in the photograph.

In addition to effects from social information attributed to the speaker, there is evidence that the dialect of an experimenter can affect performance on perception tasks (Hay *et al,*2006,p.6). In a study on the perception of tones of the speaker, Brunelle and Jannedy, (2007,p.7) found an interaction between the dialect of the experimenter, the dialect of the participant, and the tone. Similarly, Hay *et al* (2006,p.6) reported an interaction between the dialect of the experimenter and the participant's degree of merger. The work discussed above helps exemplify just how malleable speech perception can be. Depending on what information is present at the time of perception, listeners can shift in how they perceive sounds. While any model of speech perception is bound to be incomplete, that social information can affect how sounds are perceived suggests that it should ideally be included.

Theoretical Framework

This work adopts the Exemplar-based model of social recognition. This theory assumes that knowledge of linguistic structure is built up by representing memory the totality of linguistic experiences that an individual has. This theory was propounded by Robert Nofofsky in 1986. The theory is a proposal concerning the way humans categorize objects and ideas in psychology. It argues that individuals make category judgments by comparing new stimuli with instances already stored in memory. The instance stored in memory is the "exemplar". The new stimulus is assigned to a category based on the greatest number of similarities it holds with exemplars in that category. For example, the model proposes that people create the "bird" category by maintaining in their memory a collection of all the birds they have experienced: sparrows, robins, ostriches, penguins, etc. If a new stimulus is similar enough to some of these stored examples, the person categorizes the stimulus in the "bird" category. Various versions of the exemplar theory have led to a simplification of thought concerning concept learning, because they suggest that people use already-encountered memories to determine categorization, rather than creating an additional

abstract summary of social recognition. This recognition may therefore include a potentially vast set of detailed sociophonetic traces based upon the tokens an individual has heard, and a parallel set of traces bearing articulatory information about tokens that the individual has uttered. It will be apparent from the foregoing that sociophonetic data have been collected to address a wide range of theoretical issues, reflecting the range of disciplines that have contributed to the development of sociophonetic as a field of linguistics.

Methodology

The methods used in speech perception research can be roughly divided into three groups: behavioural, computational, and more recently, neuro-physiological methods. The researcher has adopted the behavioural method to simulate how speech may be processed by the participant to produce the behaviours that are observed. The method experiments are based on an active role of the participants, i.e. subjects are presented with stimuli and asked to make conscious decisions about them. This type of experiment helps to provide a basic description of how listeners perceive and categorize speech sound. With the aid of technological assisted recording tools, there were collected a combination of spoken materials (speeches) to reflect the natural repertoire on how the elements use language to construct their social categories. Based on the data collected, the descriptive and interpretative technique to analyse the data. The data collected were analyzed using careful auditory analysis in relation to the research questions, to determine how linguistic variants can index social meaning.

Data Presentation and Analysis

Having looked at the different manifestations and interpretations of speech perception within the scope of sociophonetics, this section deals with the presentation and analysis of data collected.

Listeners Identify Regional Dialect of the Speaker using his Speech

Within this category, the researcher introduced an event in which recordings of speakers of different dialects are played to the listeners/subjects in which listeners were asked to identify the dialect of voices speaking English, as to whether the speaker was of Ekpeye, Ikwerre or Ogoni ethnic nationality. The stimuli, which included nonsense words, real words, and sentences were played either in original form, low-pass filtered, high-pass filtered, or center-clipped. The filtering provided some indication about whether listeners could base their identifications on prosodic factors. As it turned out, listeners were generally able to identify the dialect of the filtered stimuli 95% or more of the time.

Another experiment involving identification of the dialect of speakers was carried out in a more compound manner. The researcher played to listeners four variants of /ɔ/, as in caught, uttered by speakers of different dialects. The researcher asked the listeners to rate the variants on

scale of most – to – least Ikwerre-sounding and most-to-least Ogoni-sounding and then to guess where each speaker came from. The aim was to test reactions to the raised monophthongal variant /ɔ/ that occurs around the diatectal sound, and the result showed that it ranked high on the Ikwerreness scale and low on the Ogoniness scale.

Listeners use Speakers' Utterance to Ascertain Ethnicity

Perception experiments testing the ability of listeners to identify the ethnicity of speakers have involved playing recordings of different ethnic groups in the study area, generally either field recording or tapes of speakers reading a story, to subjects who were asked to identify the speakers' ethnicity. Using this method, it was found that, listeners could identify the ethnicity of speakers much of the time or even nearly all the time.

The researcher conducted another investigation on whether the speakers' intonation could serve as an element for ethnic identification. Four corps members' belongings to the two regions submitted their speeches in a way to initiate conversational speech. Listeners were therefore asked to focus attention on intonation. The results showed that sentences with more diagnostic into national cues were identified more accurately than those with fewer cues.

Taken together, these studies have shown that, under certain circumstances, listeners are capable of accessing a wide variety of cues to determine whether a speaker speaking or the speaker whose voice was heard belonged to a certain ethnic nationality. While all these studies have demonstrated that listeners can often identify the ethnicity of a speaker, the researcher`s major limitation is that he could not determine what features listeners rely on to make the identifications. Nevertheless, it is not yet clear which ones listeners use in real-life situations or which ones are most needed or important.

Stereotypical Attitudes of the Listeners Influence the Perception of Sounds

This question examined how stereotypes can affect listeners' perception of speech. In examining this, the researcher arranged the listeners in away to hear the speech/sound and watch a video of a speaker altering a different sound tend to perceive the sound that they "lip-read" from the video, and not necessarily the sound they hear. The results showed that listeners altered their perception of a speaker's speech when there exists any sign of stereotypes. In another development, listeners simultaneously watched a video of a male or a female uttering /s/ /S/ vowel sounds. The results showed that listeners altered their perception of the fricative depending on the sex of the speaker that they saw altering such sounds, shifting the /s/-/S/ boundary to lower frequencies for male faces and to higher frequencies for female faces. The results of this exercise showed that speech perception is always influenced not just by the physical attributes of sounds but also by gender stereotypes.

Discussion of Findings

The result of the dialectal tokens in the speech stream of the speaker indexing his social category shows that the combination of linguistic and dialectal tokens exhibits by the speakers helps the listeners to identify the ethnicity of speakers much of the time or even nearly all the time. This finding agrees with the work of Drager (2007, p. 11) which states that, there is evidence that the perception of phonetic variables can also be affected by other social characteristics- attributed by the speaker, including dialect area, ethnicity, socio-economic status etc.

The result on whether the speech of the speakers shows the possible ethnic nationality to which they belong reveals that speakers index their ethnic background using phonetic variables as a reflection of both of their personal character traits and their origination with a particular ethnic nationality. This finding agrees with the work of Foulkes (1997, p.10) which states that individuals are sensitive to socially conditioned variation when perceiving speech.

The result shows that judgments of the listeners about speakers when perceiving their speech depend on the individuals stereotypical attitudes or beliefs about the speakers since listeners also map phonological patterning not only against the meaning of the word in question but also against other dimensions of that particular tokens such as the region and the dialect of the speakers. This finding agrees with Labov (1968,p.473) which found that phonetic variation in speech is now known to correlate with a number of factors, including social characteristics of the speaker and the formality of the situation.

Conclusion

In sum, speech perception experiments provide a means of investigating research questions concerned with language change, linguistic variation, and the storage of linguistic variables in memory, questions that could not be addressed as completely by focusing solely on speech production. The better we understand how sounds are stored in memory and the more we uncover about the nature of the indexation between the mental representations of linguistic variations and social information, the better we will be able to interpret sociolinguistic patterns in speech production and the more complete our understanding of sounds change and stereotype formation will be.

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