ARDU: Journal of Arts & Education
2020 VOL. 01, NO. 1, 25-33

Phonemes assimilation in Ed Sheeran's Songs

Atika Yuliana[1], Imran Hadi[1], Esteria Romauli Panjaitan[1]
[1]STBA JIA, Jawa Barat, Indonesia

ABSTRACT

Background: Within phonemes as English spoken by the native speakers, it sometimes undergoes simplication to ease the native speakers in expressing their feelings. That is why, it is common for them to speak English in high speed along with their emotion. As the result they make a 'shortcut' to get ease of their pronunciation.
Purpose: this research is meant to analyze phoneme assimilation in the three songs of Ed Sheeran..
Design and methods: This research uses qualitative method with the content of analyzing the phonemes assimilation in the songs
Results: The findings revealed 35 kinds phonemes assimilation in the three songs of Ed Sheeran in Divide album. There are 29 regressive assimilations and 6 progressive assimilation.

Keywords: phonemes, assimilation; songs

Introduction

A phoneme is the smallest unit of sound in a word that makes a difference in its pronunciation, as well as its meaning from another word. Phonemes are based on spoken language and may be recorded with special symbols. In transcription, linguist conventionally place symbols for phoneme between slash marks. For instance, the /s/ in 'soar' distinguishes it from /r/ in 'roar', as it becomes different from 'soar' in pronunciation as well as meaning. The written representation of a sound is placed in slashes, as in above example where /s/ and /r/ are placed in slashes on both sides.

Phoneme is divided into two. They are consonant and vowel. A consonant is speech sound that is articulated with complete or partial closure of the vocal tract. Whereas the vowel made with mouth fairly open without any obstruction. Furthermore, a phoneme doesn't have any inherent meaning by itself, but when you put phonemes together, they can make words. Phonemes carry distinct sounds that differentiate one word from another. In a given language if swapped with another phoneme, would change the meaning of the word. Sounds are made of different ways and variations, then readers learn pronouncing words correctly and comprehending their meanings through phonemes.

Within phonemes as English spoken by the native speakers, it sometimes undergoes simplication to ease the native speakers in expressing their feelings. That is why, it is common for them to speak English in high speed along with their emotion. As the result they make a 'shortcut' to get ease of their pronunciation. The native speakers often do some improvement in their speech to reach maximum transfer of messages with minimum efforts of articulation.

Occasionally in articulating the sound of the word, we find phenomenon that the sound changed to be more similar to other nearby sounds, this process what is called assimilation. It occurs in normal speech, and it becomes more common in more rapid speech. For an English example, "handbag" (canonically /ˈhændbæg/) is often pronounced /ˈhæmbæg/ in rapid speech. This is because the /m/ and /b/ sounds are both bilabial consonants and their place of articulation are similar; whereas the sequence [d] – [b] has different places but similar manner

CONTACT Atika Yuliana ✉ tikaktus.ay@gmail.com

of articulation (voiced stop) and is sometimes elided, causing the canonical /n/ sound to sometimes assimilate to /m/ before the /b/.

In assimilation, the phonological patterning of the language, discourse styles and accent are some of the factors contributing to changes observed. There are two types of assimilation in English, namely regressive and progressive assimilation. Both, however, refers to the change of phoneme, a basic unit of language's phonology. If a sound changes with reference to a following segment, it is called 'regressive assimilation. It is also known as right-to-left, leading, or anticipatory assimilation. Another one is progressive assimilation.

Progressive assimilation changes with reference to a preceding segment. It is the opposite of regressive which progressive assimilation also known as left-to-right, perseveratory, lagging, or lagged assimilation. It happens when the preceding sound influences the following sound is too dominant. Then the following sound affected based on the place or manner of its articulation. Studying assimilation can we find through song.

A song is a piece of music which contains words intended to be vocally performed by the human voice. This is often done at distinct and fixed pitches as melody using patterns of sound. It also contains various forms, such as those including the repetition and variation of sections. Understanding of the functional relationships between song and linguistic system within consonant and vowels of the words supports learners in English learning especially how to pronounce effectively like what the native actually say in the song.

A song has a sound pattern of human voice. There some phenomenon in pronouncing of the lyric that made by the singer. Song and language learning based on sung sequences sounds interesting to analyze. Especially in the first learning phase may largely benefit of the many listener love song and apply song for articulating their English. The effect of harmonic on phoneme monitoring seems to suggest that interactive processing of phonology and song occurs.

The reason why the writer takes this topic are, first, how important learning phonology concern about study of what types assimilation that occurs in the songs. Second, it is important to learn phonology, the study of how to pronounce the words that is also related to speaking ability and know a symbol or phonemic for English student in the university. In fact, there is no much amount of research about assimilation in library. However, phonology is also a part of linguistic and assimilation is a part of phonology which must be learnt by formal student in the university. Example of assimilation in linking sound: **"**I have to go".

The linking sound of sound /hævtə/ is consists phoneme /v/ which the ending sound of word have met phoneme /t/, the beginning sound of the word to. Actually the sound /v/ was assimilated and changed into the sound or phoneme /f/ so it is pronounced /hæftə/. It caused by the neighboring sound /t/ is voiceless so the phoneme /v/ which voiced assimilated into the phoneme /f/which also voiceless. The phoneme assimilation is /f/, is voicless sound. The phoneme /f/ is labiodentals which formed with the upper teeth and the bottom lip. Thus /f/ can be characterized as (-voice, +labiodental, +fricative).

The English song as a representative in learning English. Nowadays, listening the song is the favorite things to do. In this Era Ed Sheeran is famous with his songs. Some of his songs are Shape of You, Save Myself and Castle on the Hill are a few which popular. Again, one sample of the above data taken from Shape of You song by Ed Sheeran: "magnet do".

The linking sound of /mægnɪtduː/ is consisting phoneme /t/ which voiceless as the ending sound of word 'magnet' met phoneme /d/, the beginning sound of the word 'do'. What actually it pronounced in the linking sound or in connected speech? is the sound /t/ was assimilated and changed into the sound or phoneme /d/ so it is pronounced /mægnɪddu:/? Actually, that is a phenomenon that occurs in our daily life without realizing it.

Based on the background above, this research is meant to analyze phoneme assimilation in the three songs of Ed Sheeran. The main problem of this research is asking how phoneme assimilation occurs in English songs. So that, it could be represented by questions as follows. What are phonemes which create kinds of assimilation in the three songs of Ed Sheeran? How do regressive and progressive assimilations describe in song? And, what are kinds of assimilation that mostly exist?

Method

This research uses qualitative method with the content of analyzing the phonemes assimilation in the songs. The data in this research is a spoken word that requires comprehension, description, and in-depth interpretation. Taylor, Bogdan, and DeVault (2016) mentioned that qualitative methodology can be used for the data which produces descriptive data such as people's own written or spoken words and observable behavior.

The research does the following procedures, find the songs, find the phonemes assimilation inside the songs by making phonological transcription, marking the phonemes assimilation especially type of phonemes assimilation by coarticulation effect, analyzed by the theory that was found, and the last is taking the data and presenting them in data display.

After the data had been collected from the data source, in order to obtain accurate data is relevant enough to the object being analyzed, the research used some basic technique. The following are steps to analyze the data: make phonological transcription, collecting data, identifying phonemes assimilation, classifying, and result.

Source data of assimilation are in considerable amount, consequently in accordance with Cruttendan's book (2014). For instance, in rapid speech 'good news' there are phoneme /d/ as the ending sound of word 'good' met phoneme /n/ as the beginning sound of the word 'news'. Then, It pronounced /gun'nju:z/. It caused by the /d/ sound assimilated to phoneme /n/ which its neighboring sound. Both phonemes have same place of articulation, that is alveolar. The writer collected multiple data phonemes assimilation through songs which the sounds change happen in rapid speech commonly.

Findings & Discussion

Result

The three songs of Ed Sheeran in Divide album found 35 kind of phonemes assimilation that contain 29 regressive assimilations and 6 progressive assimilation. The interpretations of the data are formed in the following table shown below.

Table 1 Data Findings of Phonemes Assimilation

Kind of Assimilation	Kind of Assimilation Phonemes	Case	Percentage
Regressive	/n → m/	14	40%
	/t → d/	4	11.4%
	/n → l/	2	5.7%
	/n → ŋ/	3	8.5%
	/d → b/	1	2.8%
	/d → t/	3	8.5%
	/v → f/	1	2.8%
	/z → s/	1	2.8%
Progressive	/ð → n/	5	14.2%
	/t → l/	1	2.8%
Total		35	100%

From the analysis of 35 kinds phonemes assimilation in the three songs of Ed Sheeran in Divide album, there are 29 regressive assimilations and 6 progressive assimilation. The kind of phonemes regressive assimilation /n → m/ there are 14 words, phoneme /t →d/ there are 4 words, phoneme /n →l/ are 2 words, phoneme /n → ŋ/ there are 3 words, phoneme /d → b/ there is 1 word, phoneme /d → t/ there are 3 words, phoneme /v → f/ there is 1 word, and phoneme /z → s/ there is 1 word. The kind of phonemes progressive assimilation /ð → n/ there are 5 words, and phoneme /t → l/ there is just 1 word. There are 35 words which contains kind of phonemes assimilation, 10 kinds of phonemes assimilation which both regressive and progressive assimilation, and 35 phonemes assimilation happen in the data.

In this paper, the writer get percentage the regressive assimilation about 82.86% and progressive assimilation 17.14 %. Also found kind of phonemes assimilation /n → m/ about 40%, phoneme /t → d/ about 11.4%, phoneme /n → l/ about 5.7%, phoneme /n → ŋ/ about 8.5%, phoneme /d → b/ about 2.8%, phoneme /d → t/ about 8.5%, phoneme /v → f/ about 2.8%, phoneme /z → s/ about 2.8%, phoneme /ð → n/ about 14.2%, and phoneme /t → l/ about 2.8%.

Discussion

The central concept in phonology is the phoneme, which is a distinctive category of sounds that all the native speakers of a language or dialect perceive as more or less the same. As Hayward (2017) claimed that phonemes is a grouping of sounds which are treated as the variants of one another within the system of a particular language.

Lancaster (2007) mentioned, the 'phonemes' of the language in the meaning of a word are the smallest units. As the smallest units those phonemes can be interchanged or combined with each other to signal a change. So within phonemes, it can replace each other to create different words. For example, in English the vowels 'ah' and 'ee' and consonants 'k' and 't' can replace each other to create different words. Changing the vowel results in these different word pairs: *car* vs *key, tar* vs *tea, ark* vs *eek* and *art* vs *eat*. The consonant changes result in different meaning in these pairs: *car* vs *tar, key* vs *tea, art* vs *ark* and *eek* vs *eat.* Furthermore, phonemes are an abstract unit. One way to think about phonemes is analogous to the way letters are written in rapid handwriting. (p. 28)

Delahunty (2010) said that the sounds used to distinguish words from each other in a language are called phonemes: [p]and [b] distinguish *pat* and *bat* so they are English phonemes. But phonemes are pronounced differently in different contexts. If you listen carefully, you will notice that the [p] of *pat* differs from the [p] of *spat*. The former [p] is considerably breathier than the latter. The different pronunciations of a phoneme are its allophones. The pronunciation differences among the allophones of aphoneme do not distinguish among words in a language. For instance, there is no pair of separate English words which are identical except that where one member of the pair has breathy [p] where the other has non breathy [p]. (pp.81-82)

Vasquez, Gruhn, and Minker (2012) explain "phonemes are realized as individual sounds (phones) i.e., phones are instances of phonemes. Each phoneme is characterized by a prototype which mainly describes the way phones are produced (articulation). Phones that belong to the same phoneme are called allophones and they share in general the same articulatory attributes" (p. 62). Furthermore, Hayes (2012), conveyed that the sounds of a language are intrinsically meaningless. Their only purpose is to form the building blocks of which words are made. The minimal units that serve are to distinguish words from each other. The only real purpose of a speech sound is to sound different from the other sounds of the language.

As Rogers (2014) stated that phoneme is a sound as unit of language that has no meaning. Eventhough it is in combination in a word, an individual phoneme has no meaning. For example, the individual phonemes /b/, /u/, /k/, and /s/ have no meaning by themselves although in combination /bʊks/ does have a meaning. In fact, the word books /bʊks/ can be divided into two parts, each with meaning: /bʊk/ is a 'bound piece of writing', and /s/ indicates 'plural'. These meaningful parts are called morphemes. Note that the sound /s/ happens to be both a meaningless phoneme and a meaningful morpheme. Meanwhile an individual phoneme has no meaning, but it can change the meaning of a word by its position. (p. 47)

Ladefoged & Disner (2012) expressed that sounds within a language that change the meaning of a word can be called phonemes, although a phoneme is more precisely defined as a group of sounds. The members of the group of sounds forming a phoneme always occur in different places before a vowel, between vowels, before and, or in some other phonetic context. The distinctive sounds the phonemes of a language can theoretically be described in terms of a universal set of features that applies to all languages. But nobody can give a full account of this set of features because languages are, and always have been, constantly changing. (p. 199)

According to Skandera and Burleigh (2005), it is important to remember that phonemes are abstract, ideal sounds that are never spoken and never heard. Real and concrete words are phoneme realities by each speaker, and if we determine what themes are in the sound system, we need to find pairs of words that are different in meaning and only in one voice, if we want to define what is phonemic system or phoneme inventory, we need to find pairs of words that are different in meaning and only in one voice. For example, when the record previously unknown languages. Two contrasting sounds in a minimal pair like that are different phonemes. It has shown, then, that the final sound is a theme because the two pairs of words are minimum. Last vote and is the minimum pair, that Weeks and weak spelling, on the otherhand, differ only in one letter, but not the minimum pair. (pp.19-20)

Roach (1997) added, "Phoneme is an abstract sets of unit as the basis of our speech" (p. 38). An abstract unit was called because the alphabet which represents the phoneme that can not you see or touch. In order to explain some important general principles, just focuses on the sounds of speech. There are slightly different ways in which we makes the sounds that represent phonemes, just as there are many ways in which we may make a mark on a piece of paper to represent a particular abstract letter of the alphabet.

In connected speech, English words exhibit variations of accentual pattern and changes of a phonemic or phonetic kind, involving assimilation. Assimilations at boundaries, like those within words, may be merely of an allophonic kind; or they may be of such an extent that a change of phoneme is involved, when comparing the pronunciation of a word in isolation with its pronunciation in a particular context.

Yule (2010:47) the process when two sound segments occur in sequence and some aspect of one segment is taken or "copied" by the other. assimilation process occurs in a variety of different contexts. By itself, the word can may be pronounced as [kæn], but, when we say I can go, the influence of the following velar [g] will almost certainly make the preceding nasal sound come out as [ŋ] (the velar nasal) rather than [n] (the alveolar nasal). The most commonly observed conversational version of the phrase is [aɪkəŋgoʊ].

Delahunty (2010) defined assimilation as a rule in make a segment and its neighbour more alike. Assimilation can be so thorough going that two sounds can merge into one (pp. 114-115). Similar statement also conveyed by some experts. Such as Rogers (2014) stated that assimilation is a process whereby one sound becomes more like another (p. 300). Then Roach (1997) also said that assimilation is the way that sounds belonging to one word can

cause changes in sounds belonging to neighbouring words. (p. 124). For more Gut (2014) shortly said that it is a process when two neighboring sounds becoming more similar. (p. 35)

Ladefoged & Disner (2006), "When one sound is changed into another because of the influence of a neighboring sound" (p. 109). Ashby (2011) also mentioned that assimilation is the sounds becoming more like some feature in their immediate environment (p. 122) . Similar with Ladefoged and Ashby, Lancaster (2007) claimed assimilation is a consonant is influenced by another consonant in the word where one sound influences another in a word so they become the same or similar (p. 41).

Skandera and Burleigh (2005) mentioned that the articulation of one sound is influenced by the articulation of a neighboring sound in that a speech organ either prolongs a distinctive feature of a preceding sound or anticipates a distinctive feature of a following sound (p. 89). In addition, Hayward et al (2017) added it is well known that word-final alveolar consonants may assimilate in place of articulation to the initial consonants of following words, particularly in rapid or casual styles; for example bad boy may be pronounced as ba[b] boy or ten girls as te[ŋ] girls. In a more phonological treatment, it would be said that the features relating to place of articulation spread from one consonant to the other. (p. 471)

Boyer & Zsiga (2014) expressed assimilation as two sounds that are different become more alike. adjacent sounds become more similar. the assimilations have been partial: adjacent sounds became similar but not identical. Nasals take on the place of the following consonant, but remain nasal; or obstruent take on the voicing or nasality of the following consonant, but retain their underlying place. Complete assimilation occurs when two adjacent sounds become identical. One well known example involving complete assimilation of /l/ comes from Modern Standard Arabic (p. 235).

Gordon (2016) explained assimilation involves a sound becoming more like a nearby sound with respect to one or more properties. Assimilation is typically motivated by considerations of articulatory ease, although directionality asymmetries in assimilatory patterns appear to reflect perceptual considerations. Sharing one or more articulatory properties minimizes transitions required of the speech articulators. For example, assimilating the place of a nasal to that of a following oral stop allows the same constriction to be maintained for both consonants. Assimilation may apply between consonants, between vowels, or between a consonant and a vowel. (pp. 123 - 124)

According to Cruttenden (2014), an extent that a change of phoneme is involved, when comparing the pronunciation of a word in isolation with its pronunciation in a particular context. Influence at word and morpheme boundaries functions predominantly in a regressive or anticipatory direction, i.e. features of one sound are anticipated in the articulation of the preceding sound; less frequently it is progressive or perseverative, i.e. one sound influences the following sound, or it is coalescent, i.e. a fusion of forms takes place. (p. 297)

Cruttenden (2014) stated, assimilations occur in all styles of speech. But unassimilated forms generally occur more often than assimilated forms which tend to increase in frequency in the more casual style of speech, regardless of rate of utterance. The fact that rate of utterance has no direct effect on the use of assimilation may be illustrated by examples taken from the conversation of one speaker who had /dʒʌʃˈʃʌtɪŋ / for just shutting (also exhibiting elision of /t/) when speaking at a medium pace in a comparatively formal situation, but /ˈhɔːsˈʃəʊ/ for 'horse show' when speaking very rapidly in a casual situation.

In general, although all types of anticipatory de-alveolar assimilation do occur, speakers use palato-alveolar assimilations (of the kind /ˈspeɪʃʃʌtl/ for space shuttle) and bilabial assimilations (of the kind /ðæp ˈpɜːsn/ for that person) far less commonly than they use velar assimilations (of the kind /ʃ ɔː kˈkʌt/ for short cut). Such velar assimilation is also more

common than coalescent assimilations (such as /d/ + /j/ → /dʒ/ as in /nəʊtɪ'dʒətsmən/ for *noted yachtsman* or /z/ + /j/ → /ʒ/ as in /bɪkəʒu;/ for because you). However, coalescence is frequent in common phrases such as the auxiliary verbs + pronouns of *did you, can't you* etc. /'didʒu;, 'kantʃu;/ and may occur even in very formal conversation , for instance*, Would you like a cup of tea?* /'wʊdʒu: ə kʌp əv ti:/. (p. 310)

Cruttenden (2014) expressed phonemic assimilations involving nasality (anticipation or continuation of the lowered soft palate position) would be likely to show /b/ (or /v/) → /m/, /d/ (or /z/ or / ð) → /n/, /g/→/ŋ/, such changes being based on roughly homorganic mouth articulations; A preceding voiced consonant, most commonly a plosive, becomes a nasal (and at the same time the final /t/ may be elided). These changes are characteristic only of rapid speech:

/d/ → /n/ - *He wouldn't do it* /hi 'wunn(t) 'du:ɪt/, *good news* /'gun 'nju:z/
/d/ → /g/ → /ŋ/ - *He couldn't go* /hi 'kuŋŋ(k) 'gəʊ
/d/ → /b/ → /m/ - *Good morning* /gum 'mɔ:nɪŋ/
/v/ → /m/ - *You can have mine* /ju kŋ ham 'maɪn/
/z/ → /n/- *He doesn 't know* /hi 'dʌnn(t) 'nəʊ/
/ð/ → /n/ - *He wasn 't there* /hi 'wɔnn9t) 'ne:/
(p. 311).

Recasens (2014) claimed assimilations occur whenever a given phonetic segment (the target) adapts completely in place and/or manner of articulation to another (the trigger). They may involve phonetic segments produced with overlapping articulators (e.g., front lingual /n/ and labial /p/ in the sequence /np/ may be realized as [mp], [um ˈpam] for /un pam/), or phonetic segments produced with the same or a neighboring articulator and differing in degree of articulatory constraint. (p. 11)

Recasens (2014) said that the relative prominence of the regressive and progressive direction of the C-to-V assimilatory and dissimilatory changes will be inferred from a comparison between the frequency of occurrence of the contextual consonants located immediately after and before the target unstressed vowel. (p. 70)

Gussenhoven and Jacobs (2011) mentioned transfer a specific feature or group of features from one segment to a neighboring segment. To express the assimilation, it shows either an association towards the left – regressive assimilation – or one towards the right – progressive assimilation. (p. 185)

Vasquez, Gruhn, and Minker (2013) stated that assimilation describes the way some phones copy some articulatory attributes of the neighboring phones. Assimilation is a phonological process by which the prototypical articulation of a phoneme is modified depending on a particular context. Thus, a phoneme have multiple realizations (allophones) in different contexts. Assimilation can be classified in perseverative and anticipatory. (p. 69)

Recasens (2018) Assimilation may be said to apply whenever a consonant (the target) is overlapped completely by another consonant (the trigger) such that the two phonetic segments end up sharing the same closure or constriction location, manner of articulation and/or voicing status. In principle, a requirement for an articulatory adaptation process to be assimilatory is that it ought to apply systematically to all tokens of all lexical items in a given language much independently of speech rate.

Assimilations arise through the phonologization of coarticulatory effects, and by extension are regressive or progressive depending on whether they are associated with prominent anticipatory or carryover coarticulatory effects, respectively. By far and large assimilations in consonant sequences are regressive in the world's languages, as for place assimilation in the sequences /np/ ([mp]) and /nk/ ([ŋk]) where the closure location for C2 is prone to be anticipated during the alveolar nasal. An example of a progressive assimilatory

process, which clearly arises from a carryover effect, is the palatalization of /s/ after a palatal consonant, where /s/ may be realized as [ʃ] systematically.

Complete regressive (C1-to-C2) or progressive (C2-to-C1) assimilation is achieved once the two successive consonants come to agree not only in place but also in manner of articulation. Thus, for example, the dental oral stop /t/ may become a bilabial nasal before /m/ and thus change its place and manner attributes in Catalan sequences like [sɛm ˈmɔrs] set morts "seven dead". (p. 12)

Conclusion

From the research done, in phonemes assimilation analysis, it has been concluded that there are 29 regressive assimilation and 6 progressive assimilation findings in three songs of Ed Sheeran in *Divide* album. Then, from the analysis can be taken the implicit conclusion, are:

1. In rapid pronunciation, either regressive or progressive assimilation takes place due to the similarity of the consonant sound classification which are grouped into place of articulation, manner of articulation, and voicing.
2. Phonemes assimilation happen within a word level or within words boundaries or linking sounds.
3. The nasal sound more influence the phonemes assimilation than others.
4. Furthermore, assimilation occurs because of the development of language, and under the effects of the surrounding sound.
5. Regressive assimilation more happened than progressive assimilation.
6. One of the reasons why this smallest unit language processes happened some influences is the nearness.
7. The rapidity of linking practice in singing is required to add the beauty of art language.

From all kinds of phonemes assimilation were found, there are many kinds of regressive assimilation that occurs in the data. For instance, the phonemes assimilation /n → m/. In word 'handmade' consists phoneme /d/ which voiced as the ending sound of word 'hand' met phoneme /m/, the beginning sound of the word 'made'. Actually the sound /d/ was elided so the ending sound of word 'hand' is phoneme /n/. Then, the /n/ was assimilated and changed into the sound or phoneme /m/ so it is pronounced /hæmmeɪd/.

In this paper, the writer got progressive assimilation. She found it about 17.14%. It is so difficult to search progressive assimilation because it less general in pronouncing and also there are not words or word boundaries contains the progressive assimilation more.

Reference

Boyer, O. T., & Zsiga, E. C. (2014). Language and education policy in Botswana: The case of Sebirwa. *Languages in Africa*, 92.

Cruttenden, A. (2014). *Gimson's pronunciation of English*. Routledge.

Delahunty, G. P. (2010). *The English Language*. Parlor Press www. parlorpress. com West Lafayette, Indiana.

Gordon, M. K. (2016). *Phonological typology* (Vol. 1). Oxford University Press.

Hayes, L. (2012). Imposing a networked vibrotactile communication system for improvisational suggestion. *Organised Sound*, *17*(1), 36-44.

Hayward, D. V., Annable, C. D., Fung, J. E., Williamson, R. D., Lovell-Johnston, M. A., & Phillips, L. M. (2017). Beyond the total score: A preliminary investigation into the types of phonological awareness errors made by first graders. *Early Childhood Education Journal*, *45*(6), 809-820.

Ladefoged, P., & Disner, S. F. (2012). *Vowels and consonants*. John Wiley & Sons.

Lancaster, G. (2007). *Developing Speech and Language Skills: Phoneme Factory*. Routledge.

Recasens, D. (2014). Gradient phonetic implementation of regressive voicing assimilation in Catalan heterosyllabic two-and three-consonant clusters. *Phonetica*, *71*(2), 128-156.

Roach, P. (1997). English Phonetics.

Rogers, H. (2014). *The sounds of language: An introduction to phonetics*. Routledge.

Skandera, P., & Burleigh, P. (2005). *A manual of English phonetics and phonology: twelve lessons with an integrated course in phonetic transcription*. Gunter Narr Verlag.

Taylor, S. J., Bogdan, R., & DeVault, M. L. (2016). *Introduction to qualitative research methods*. Hoboken, NJ: John Wiley & Sons.

Vasquez, D., Gruhn, R., & Minker, W. (2012). *Hierarchical neural network structures for phoneme recognition*. Springer Science & Business Media.

Yule, G. (2010). *The study of language*. Cambridge University Press.