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Mandarin L1 speakers' difficulty with phonetic perception in English as an L2

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Abstract

The study focuses on three research questions. The first question addresses whether it is possible to improve phonetic perception in English as an L2 for Chinese primary school children speaking Mandarin as an L1, through the didactic methods High Variability Phonetic Training and Onset Rhyme Detection Test. The second question addresses if it is possible to improve phonetic perception over a short period of time, using didactic methods focused on improving phonetic perception during two sessions for each method. The third and last question addresses, if it is one of the two didactic methods, High Variability Phonetic Training and Onset Rhyme Detection Test, is better than the other in a short-term learning situation.

Forty-five students participated in the study, divided into three groups; one was a control group. Two groups received treatment, one with the Onset Rhyme Detection Test and the other High Variability Phonetic Training method. All groups conducted a pretest and posttest. The results revealed that the two methods used had some positive effect on the development of phonetic perception for Chinese primary school children. Through didactic methods, it is possible to improve phonetic perception to some extent, even during a short period of time.

KEYWORDS

Speech Perception, Phonemes, Phonetic Perception, HVPT, ORDT

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1. Introduction

Indo-European languages, amongst other language families, are different from the Mandarin language. Nonnative English speakers tend not to hear the difference between phonemes as accurately as native speakers (NS). According to cross-linguistic speech perception (CLSP) studies, nonnative speakers (NNS) tend to be unable to hear some of the phonological contrasts (Barriuso & Haves-Harb, 2018, p. 178). In the early 1980s, the question arose if it was possible for an L2 learner to learn to distinguish between phonemic sounds (ibid). However, when it comes to a classroom situation with a second language (L2), learning phonetic perception is unfortunately a neglected topic (Lai et al., 2007). The same neglect applies to the importance of speech perception in L2 learning (Isbell, 2016, p. 57).

In this essay previous research regarding speech perception, transfer, and phonemic and phonetic perception. The discussion will focus on how important these factors are for L2 learning and so they in the future can reach output as close to a native speaker (NS) as possible. However, to achieve the correctly pronounced output, the learner must hear the phonetic differences before pronouncing them (Isbell, 2016, p. 58). Since the focus of the study will be on Chinese primary school children, the literature review contains several didactic methods regarding speech perception and phonemic perception that work with young Mandarin speakers learning English as an L2 (Wong, 2006; Barriuso & Haves-Harb, 2018; Perrachione et al., 2011; Wang et al., 2003; Wang et al., 1999)

The concepts phonemic and phonetic sound very similar but are a bit different regarding the meaning of them both. Phonetic provide information about how an actual sound sounds and is pronounced while phonemic is more focused on how people interpret a specific sound (Oxford, 2000).

This research will focus on the didactic methods High Variability Phonetic Training (HVPT) (Barriuso & Haves-Harb, 2018) and Wong's (2006) Onset Rhyme Detection Test. Both methods are used to improve phonemic perception in speech perception. The methods will be used with Chinese primary school children grade 4, age 10, to determine which one is more effective in achieving phonetic perception and speech perception in L2. The study will investigate Mandarin native speakers' (NS) ability to distinguish between English phonemes. Phonemic perception is the ability to hear sounds and recognize spoken words, as words consist of sequences of speech sounds (Lai et al., 2007)

1.1 Aim and Research Questions

Studies regarding phonemic perception are often focused on output and not input (Gass & Selinker, 2008, p. 90). However, this study will focus on input and speech perception. Researchers of transfer claim what one learns in the L1 will affect the learning of L2. This can affect the ability to hear and distinguish new phonemic sounds (Gass & Selinker, 2008, p. 93). The aim of this study is to improve phonemic perception for a group of NS of Mandarin learning English as a second language (L2). The aim is to determine which of the two didactic method High Variability Phonetic Training and Onset Rhyme Detection Test is best for developing Chinese primary school children's phonemic perception.

The research questions that will be assessed are:

- Is it possible to improve phonemic perception in English as an L2 for Chinese primary school children speaking Mandarin as an L1 through the didactic methods High Variability Phonetic Training and Onset Rhyme Detection Test?
- Is it possible to improve phonemic perception over a short period of time, using didactic methods focused on improving phonemic perception during two sessions for each method?
- Is one of the two didactic methods, High Variability Phonetic Training and Onset Rhyme Detection Test, better than the other in a short-term learning situation?

2. Literature Review

The literature review will discuss phonemic and phonetic perception; it will also discuss the term transfer since it is an important aspect of language learning (Gass & Selinker, 2008, p. 93). The literature review will explain and discuss seven methods and models focused on the concepts mentioned above. The methods and models are High Variability Phonetic Training (HVPT), Onset Rhyme Detection Test (ORDT), Perception-Production Link (PPL), the Speech Learning Model (SLM), the Perceptions Assimilation model (PAM), Contrastive Analysis Hypothesis (CAH), and the Awakening to Language Approach (AtL).

It is known that good pronunciation can help with reading and writing (Wong, 20o6, p. 2). In a classroom situation, pronunciation is often a neglected topic (Seyedabadi et al., 2015, p. 76). If a student mispronounces something and lacks phonemic perception skills, it will be difficult for them to distinguish their

pronunciation issues (Yilmaz, 2014, p. 4; Wong, 2006, p. 2). A learner with good phonemic perception ability will distinguish the phonemic sounds of new words (Lightbown & Spada, 2012, pp. 68-69). The phonemic perception ability will cause a domino effect where pronunciation, reading, spelling, and listening comprehension will be easier (Lightbown & Spada, 2012, pp. 68-69; Wong, 2006, p. 2).

One of the apparent differences between the English language and Mandarin language, is that Mandarin consist of characters and not on an alphabet. Mandarin is also a tone language; this means the words are pronounced with different tones to indicate the meaning of the words. In English, tones are used to express emotion, not to change the meaning of the word. Another example is words in Mandarin lack consonant clusters at the start and end of words with nuclear vowels. When words from Indo-European languages are presented in Mandarin, they are often split up, and every consonant has its syllable (Wang, 1973, p. 57). Transfer is an important factor when it comes to learning an L2. Transfer in L2 learning refers to the phenomenon of linguistic features transferred from the L1 to the L2 (Gass & Selinker, 2008, p. 93). Phonetic transfer can involve transfer of similar sounds, which can make it harder to learn new similar sounds in the L2 (Shirkhani, 2015, p. 2). When discussing the term transfer in second language acquisition, there are two types, negative and positive transfer. Negative transfer is when previously learned language interferes with the current language learning (Gass & Selinker, 2008, p. 94). Positive transfer is when the previously learned language helps with the new language learning (Gass & Selinker, 2008, p. 94). According to behaviorists, L1 habits must be unlearned before mastering an L2 (Mitchell et al., 2013, p. 16). It is harder for an L1 speaker of Mandarin to learn English as an L2 than for a German L1 speaker (Sinha et al. 2009, p. 119; Lightbown & Spada, p. 69). Whether transfer from the L1 is negative or positive has most often been based on the learners' output (Gass & Selinker, 2008, p. 90).

The term "perceptual foreign accent" refers to the difficulty adults have in L2 learning when producing most of the phonetic contrasts in their L2 (Sinha et al. 2009, p. 119). The foreign accent is transferred from the L1 to the L2 and can interfere with perceiving and pronouncing phonemes correctly; this can be referred to as transfer or cross-linguistic influence. Transfer starts at the phonological level, and learners transfer similar sounds from their L1 to their L2 (Shirkhani, 2015, p. 2). According to Long (1990), children must be exposed to English before the age of 6 to have a chance to reach native-like pronunciation.

2.1 High Variability Phonetic Training

In a study from 1991, Logan et al. conducted a listening study to research if listening to various speakers could help L2 learners rule out irrelevant differences and focus on the relevant acoustic contrast. Their research founded the didactic method High Variability Phonetic Training (HVPT). According to Barriuso & Haves-Harb (2018, p. 178), even if phonemes such as [i] and [i:] have specific sounds, most speakers cannot make the same sounds. The importance and difficulty with recognizing phonemes make the HVPT theory especially suitable for L2 learners since they must distinguish the same phoneme from several people in real life (Barriuso & Haves-Harb, 2018, p. 178).

Barriuso & Haves- Harb (2018) focused on [r] and [l] and recorded 68 minimal pairs such as 'rock - lock'. The participants were Japanese NS learners of English as an L2. Two groups were involved. The groups received an identical pretest; after the pretests, one group received 15 training sessions over three weeks. All participants in the training session listened to five voices that were listened to five times each. To further see if the training sessions gave any results, a sixth voice was used; it was only included in the pretest and posttest. The results showed that the group that received the training showed improvement in the ability to distinguish between sounds, while the group without training gained no such improvements. This was the first groundbreaking research in HVPT research (Barriuso & Haves-Harb, 2018, p. 179). The research by Strange & Dittmann (1984, p. 131), which is the foundation of HVPT, is relevant since it focuses on the difficult perception of the English [l] and [r] for an L2 learner. Strange & Dittmann (1984) choose Japanese L1 speakers to participate in the study (ibid). They used three sets of materials; all tasks involved minimal pairs containing [r] and [l]. During the training, all participants participated individual tests (Strange & Dittmann, 1984, p. 133). They received positive results but could not distinguish results between familiar and unfamiliar voices. The initial research on HVPT focused mainly on Japanese NS learning English as an L2. Later, it focused on several languages, English NS learning Mandarin as an L2 and English NS learning French as an L2.

HVPT has shown great results in developing phonemic perception by using different voices in training. Compared to the group that received training, the results showed that the group without training sessions had no improvement. The focus has mainly been on Japanese learners of English. Only a few researchers such as Perrachione et al. (2011), Wang et al. (2003), and Wang et al. (1999) have studied

Mandarin according to Barriuso & Haves-Harb (2018, p. 188). One of the remaining questions is if it is possible to use HVPT as a pedagogical tool since most tests and studies have been conducted in a laboratory.

2.2 Onset Rhyme Detection Test

Wong (2006) conducted a study to research if phonological perception could affect the learning of English as an L2. Wong (2006) focused on Chinese L1 and Korean L1 speakers learning English as an L2. All participants were primary school children, with no age specified. Wong (2006) suggested that training children early in phonemic perception will help them in their future language learning. By having children studying the smallest unit in the phonological order, phonemes, the chances of bettering the children's reading progress increases (Wong, 2006, p. 2). The phonological sensitivity of speech sounds of spoken words is necessary and important in learning to read English words (Wong, 2006, p. 2).

The onset-rhyme detection test used one-syllable words; the words consisted of three to five letters. The children were supposed to listen to three words and find the word with a different start than the other two (Wong, 2006, pp. 7-8). The results of the study showed that the native language could constrain the ability to realize and produce the sounds of the L2. Speech perception seems to be a language-specific process, and some learners seem to perceive and produce the L2 based on the categories and structures from their L1. The categories and structures of, for example, phonemes from the L1 can affect sound recognition in the L2 (Wong, 2006, p. 24).

However, Wong's (2006, p. 24) results show that the Chinese children had an overall accuracy of 73.68% while the Korean Children scored over 90%. Compared to the Korean children, the Chinese children were overall significantly lacking skill in terms of phonemic perception.

As mentioned by this theory, phonemic perception will help with language learning, and therefore it is essential to include it in the early stages of L2 learning. Wong's (2006) study showed that, focusing on phonemic perception training, children will increase their speech perception.

2.3 Other Theories and Approaches

In the following sections, interesting and important theories will be presented. The theories and approaches are, The Perception-Production Link, Speech Learning Model,

Perception Assimilation Model, the Contrastive Analysis Hypothesis, and Awakening to Language Approach.

2.3.1 Perception-Production Link, Speech Learning Model, and Perception Assimilation Model

The Perception-Production Link (PPL) states that perception in language involves recognizing sounds that belong to phonological categories during aural input (Isbell, 2016, p. 57). Perception is when input becomes intake. Input does not necessarily lead to intake; intake is when input is matched with prior knowledge and becomes intake or perception (Gass & Selinker, 2008, p. 481). Perception will then result in production, which is what the oral outcome of the intake will be (Isbell, 2016, p. 57). The PPL has been relevant in several popular theories, such as the Perceptual Assimilation Model (PAM) and the Speech Learning Model (SLM) (Isbell, 2016, p. 58).

SLM, which James Flege created, has been particularly important for the validation of the perception-production link (PPL) (Isbell, 2016, p. 60). SLM predicted that phonetic categories are readily created when an L2 sound is different enough from a sound already existing in the L1 (Shikari, 2015, p. 2). For PPL to acquire the support it needs to be relevant, Flege's model examines both perception and production. The support for the PPL has been necessary since there has been evidence stating that production happens without perception and perception without production (ibid).

A segment is the smallest speech sound that a word can be split into (Oxford, 2000). The Speech Learning Model (SLM) claims that each segment has its limits of perception and pronunciation accuracy (Isbell, 2016, p. 58). The SLM posits that once the segment is learned it is learned for life, when an individual reaches production accuracy and becomes available for L2 learning. SLM also states that an L2 learner will not create a new phonetic category if the sounds are not sufficiently different from phonetic sounds in their L1. One of the examples brought up is the comparison of English [r] and [l] with Japanese [r] and [l]. English [r] is more distant from Japanese [r] than English [l]. It is essential to understand that Japanese has one phoneme [r] while English has two [r] and [l]. A phoneme is the smallest possible sound unit that will differentiate words (Oxford, 2000), such as the [r] in 'Lorry' and the [l] in 'Lolly. According to SLM, Japanese NS should create a new category for [r]. However, if the [r] sounds had been too similar, it would, according to SLM, be difficult for an L2 learner to create a new sound for [r] (Isbell, 2016, p. 58). This should then apply to the L1 Mandarin speakers learning English as an L2. The [r] that exists in English does not exist in Mandarin, and therefore there should be room for a Mandarin NS to create a

new category for the [r] (CPW, 2020)

Minimal pairs are pairs of words or sounds that differ from each other by one feature, such as the phonemes [i] in 'ship' and [i:] in 'sheep' or [l] in 'lolly' and [r] in 'lorry' (Oxford, 2000). The minimal phonetic difference in speech sounds in two words in a language is known as the phonemic contrast that determines the phoneme, which is the smallest unit of sound in a word (Swadesh, 1936),

Perception Assimilation Model (PAM) is similar to the Speech Learning Model (SLM) since it focuses on articulatory similarities and dissimilarities with native and nonnative phonemes (Tyler et al., 2013, p. 6). PAM claims that the ability to perceive the phonemic contrast in language learning is affected by the language environment, which is the ambient environment, where the learner is exposed to language (ibid). PAM also focuses on what functioning role the L1 phonological system has in L2 learning (Sinha et al., 2009, p. 118). Both PAM and SLM are said to be two of the most common theories in the 1970s and 1980s that investigated the roles of phonemes in L2 learning (ibid).

2.3.2 Contrastive Analysis Hypothesis

The Contrastive Analysis Hypothesis was first developed in Lado's book Linguistics Across Cultures from 1957 (Wardhaugh, 1970, p. 124). The Contrastive Analysis Hypothesis explains why some features of an L2 are harder to acquire. To use the method, the teacher must compare the L1 to the L2 and then construct the appropriate material to learn the difficult aspects of the L2 (ibid).

In Chang and Heift's (2015) work focusing on Mandarin learners learning German, the Contrastive Analysis Hypothesis is explained and used. Since the German and English languages both belong to the Germanic branch of the Indo-European language family, it is relevant for this study. Chang & Heift (2015, p.84) have argued that transfer from the L1 can be positive and negative. The Contrastive Analysis Hypothesis (CAH) claims to predict what types of errors and difficulties a learner may encounter when learning their L2 (Chang & Heift, 2015, p. 84). CAH has been challenged several times about how effective and predictive it is. However, in Chang & Heift's (2015, p.84) work, they name several researchers and how they have proved the statements in connection to CAH. Chang & Heift (2015) mention Mayr & Escudor (2010) as supporting sources for CAH.

Chang & Heift (2015, p.84) bring up studies involving Mandarin as well, where the focus has been on English lax and tense vowel distinctions. The studies have

in common that they suggest that speech perception for L2 speakers improves with continuous L2 exposure. However, most of the studies have focused on the difficulties of L2 learning and not the benefits of language similarity (Chang & Heift, 2015, p. 84). Chang & Heift's (2015) own study focused on beginners in German as an L2. The groups consisted of Mandarin L1 speakers and English L1 speakers. The Mandarin speakers' similarities with German are very different from English and German similarities. German and English belong to the Indo-European language family, while Mandarin belongs to the Sino-Tibetian language family. Chang & Heift (2015) wanted to examine the effect of L1 experiences on learning an L2 in terms of phonemic perception and why some sounds seem to be more problematic than others for L2 learners (ibid). Chang & Heift (2015) found that there was a positive transfer for English L1 speakers learning German as an L2. However, Mandarin L1 speakers learning German as an L2 had more perceptual difficulties. This result could be explained with the perceptual assimilation model or the speech learning model, according to Chang & Heift (2015). Questions have arisen regarding the CAH's effectiveness and predictiveness; it has, however, shown great results. According to the results of CAH, speech perception will improve when the learner is exposed to the L2.

2.3.3 Awakening to Language Approach

The didactic theory Awakening to Language (AtL) approach is based on research by Hawkins (1996) and claims that to learn an L2, the L1 should be taken into consideration. The idea of AtL programs has been to improve and promote intercultural perception. The programs approach children at an early age and support early contact with multiple languages and cultures. During the program, children are supposed to have the chance to explore new sounds, reflect on similarities, differences, and compare languages and their sounds. The children are also supposed to recognize their linguistic knowledge from their L1 as an asset in L2 learning. The AtL approach is known as one of the most revolutionary pluralistic approaches since it deals with many languages during one learning session (Coelho et al., 2018, p. 200). One of the important outcomes is that the AtL approach is pointing to development in phonological perception, in a comparison of children exposed to several languages compared to children not exposed to several languages. The results revealed that children exposed to several languages seem to have a better perception of the meaning of words than children who are not exposed to several languages (Coelho et al., 2018, p. 201).

The researchers believed that phonological perception was one of the

many skills children could gain from the use of the AtL approach (Lourenço & Andrade, 2014, p. 307). Also, earlier studies suggest that phonological perception is essential to "crack the code" of the alphabet in language learning (ibid). Lourenço & Andrade (2014, p. 307) also claim that recent studies have shown that bilingual and plurilingual children are more sensitive to the syntactic structure of language. The findings mentioned above suggest that learning in the early years of education is crucial for phonological perception (PA) (ibid). Lourenço & Andrade (2014) have studied Mandarin, Greek, and Cherokee amongst other languages, using experimental and non-experimental groups. Their studies with children of these languages showed that the experimental group performed better in phonological perception tests. Lourenço & Andrade (2014) noticed that the experimental group children started to analyze, compare, and observe words, sounds, and graphemes over time. Overall, the AtL approach showed positive results with the experiment group (Lourenço & Andrade, 2014, p. 315)

2.4 Summary of literature review

As a summary of the literature review, it is easy to say that there has not been much research on phonemic perception with Mandarin L1 speakers learning English as an L2. Several studies have focused on Japanese or Korean (Barriuso & Haves-Harb,2018; Isbell, 2016; Chang & Heift, 2015; Cisero & Royer, 1995; Durgunoglu et al., 1993). However, Barriuso & Haves-Harb (2018) have conducted some research on Mandarin L1 speakers learning English as an L2. The High Variability Phonetic Training will be one of the primary methods for this study. It is focused on phonetic training and has been used with Mandarin L1 speakers. Also, Perrachione et al. (2011), Wang et al. (2003), and Wang et al. (1999) have studied Mandarin according to Barriuso & Haves-Harb (2018, p. 188). Wong (2006) conducted a study on Mandarin speakers learning English as an L2. Wong (2006) wanted to research if phonological awareness could affect the learning of English as an L2. The result showed that if the learning is focused on phonemic awareness training, the learners will improve their speech perception. Wong's (2006) Onset Rhyme Detection Test will be the second central method for this study.

The two methods High Variability Phonetic Training (HVPT) and the Onset Rhyme Detection Test (ORDT) are both methods focusing on forms rather than methods focusing on form. This means that the methods are focusing on the grammatical rules rather than the actual meanings of words. Focus on form is focused

on the meaning of words and the connection to linguistic forms is only brief. Focus on forms primarily emphasizes the linguistic structures and focuses on discrete grammar or metalinguistic information (Gass & Selinker, 2008, p. 428).

3. Method

The study had the aim to improve phonemic awareness for Chinese primary school children. The research questions addressed whether it was possible to improve phonemic perception in English as an L2 for Chinese primary school children speaking Mandarin as an L1 through the didactic methods High Variability Phonetic Training and Onset Rhyme Detection Test? The second question addressed if it was possible to improve phonemic perception over a short period of time, using didactic methods focused on improving phonemic perception during two sessions for each method? The third and last question addressed if one of the two didactic methods, High Variability Phonetic Training and Onset Rhyme Detection Test, is better than the other in a short-term learning situation?

The procedure of this study will be found in Section 3.1. The participants will be found in Section 3.2. In Section 3.3, the treatment of the chosen data is described after its selection. In the last Section 3.4 validity and reliability is dealt with.

3.1 Procedure

The study focuses on the minimal English pairs [r]-[l] and [i]-[i:], which are difficult for Mandarin speakers (Jia et al., 2006, p. 1118; Barriuso & Haves-Harb, 2018, p. 177). The site English Club[1] (2020) will be used to ensure that the minimal pairs will be at the right level of knowledge for the students. The students are currently at an pre-intermediate level according to the school used in the study. The site has several groups of minimal pairs at different levels that match the requirements stated above. This study is a between-groups quasi-experimental classroom-based study since intact classrooms will be used. Each classroom only saw one method.

The students are given a pretest and posttest; the students will fill in the answers on a prepared sheet with words to circle for the correct answer (see Appendix I). The pretest and posttest are the same. The test involves 16 minimal pairs lined up. The students will listen to minimal pairs using a PowerPoint. When a pair has been played twice, the students will answer what they hear by circling one of the words on

[1] https://www.englishclub.com/ The English Club is an English site for learning English online. It contains minimal pairs, listening exercises, pronunciation exercise etc

the test paper in front of them. The test that the students will use for the pretest and posttest can be found in Appendix I. The PowerPoint includes 18 slides, including the front page and instructions for teachers and students. Each slide will contain a minimal pair and a recording of one of the minimal pairs of words. The recording will be played twice before the students' answer. The PowerPoint that will be used to implement the test can be found in Appendix II. The PowerPoint used only words and no pictures.

After the pretest, Group 1 will receive treatment based on the High Variability Perception Method. HVPT uses minimal pairs of two words; it uses various voices, and the child is supposed to circle which word they hear. Both sessions for Group 1 contain 25 minimal pairs each. Each session will last approximately 40 minutes. The sessions will include a test and a PowerPoint; the PowerPoint will contain slides with minimal pairs with a sound file. In the pretest and posttest, the students will not be given the correct answers until after both tests are done (see Appendix II). However, the students will receive the correct answers during their training sessions (see Appendix V -VIII) (test for Group 1 Session 1 can be found in Appendix III). The PowerPoint used for session 1 with group 1 can be found in Appendix IV. Group 1, session 2 test, can be found in Appendix V. Group 1, session 2 PowerPoint, can be found in Appendix VI.

Group 2 will receive treatment following the guidelines of the Onset Rhyme Detection Test Method. This test used four words; when one word differs from the others, the child is supposed to say what word is different from the other three. One example of the four words is “lug –rug – rig – rag” (See Appendix VIII). The word “lug” is different from the other words since its first phonetic sound is /l/ instead of /r/ as the other three words. Group 2 will receive two sessions; the session's time schedule is the same as Group 1, approximately 40 minutes. The test contains 9 rows of the numbers 1-4, each number representing a word. To answer, the students should circle a number connected to a word with a different ending or beginning from the other 3 words. Each recording in the PowerPoint connected to the test is played only once, and at least 5 seconds must pass before the next recording is played. The test for sessions one and two can be found in Appendix VII. The PowerPoint can be found in Appendix VIII.

The Control Group received no treatment; they only participated in the pretest and the posttest.

3.2 Participants

The participants were Chinese primary school children in grade 4, age 10. No children had English as their native language; they all had Mandarin as their first language. They all started learning English in school by the age of 6. According to Wong (2006, p. 25), Chinese Mandarin-speaking school children have shown an overall difficulty distinguishing between English phonemes. A total of 45 children participated in the study; each group contained 15 children. The grades were similar in the groups, and the students shared teachers in all their subjects. The primary school is a middle-class school with grades from grades 0 – 10. They have roughly 2,800 students in three different buildings in the same area. In earlier encounters with the students, they have shown a difficulty of being able to distinguish several phonemes, among those [r], [l], [i:], and [i]. The teachers teaching the students also show a difficulty of distinguishing between different phonemes in their speech, especially [r] and [l]. This lack of ability was an issue that was identified in December 2019 at the particular school used in this study.

3.3 Analysis

The results will be presented and analyzed by presenting each student's total amount of answers in amount and percent. This will be done "group-wise" and then compared between groups. All results will be manually calculated. The results will be manually calculated, and to get a total result for each student per test, each correct answer will be added to each other. The number of correct answers will be divided with the maximum number of correct answers to calculate the percentage. The improved number of answers will be divided with the previous result to calculate the improvement from pretest to post-test.

Since two types of phonetic minimal pairs were used, the same procedure will be used to calculate the result of each minimal pair to see which one of the minimal pairs was most improved by each group.

A two sample assuming equal variances test (T-test) was also used to determine whether the mean scores differed significantly across the pretest and posttest for each group.

3.4 Validity and Reliability

Reliability is reached by using the same methods with the same people repeatedly, and the result would be the same. However, when using people for research, external factors will affect the outcome (Litosseliti, 2010, p. 55). Throughout the development of the study and its method, several decisions changed according to the apparent Covid-19

situation. First, the plan was to be at the school performing the sessions in person. When it was impossible to return to China from Sweden, a fellow teacher colleague had to execute the sessions. An exchange of information between researcher and teacher colleague was necessary for the teacher to complete the sessions. She has also been a part of the study all through the process. She has been involved in what the study will examine and how the study will be examined. However, another teacher's practice can affect reliability and validity since she is not as acquainted as the researcher with the research material for the study. The earlier studies regarding the chosen methods have all been performed by the researchers responsible (Wong, 2006; Barriuso & Hayes-Harb, 2018).

Internal validity refers to measuring what is supposed to be measured in a study. External validity refers to if the study is possible to apply in other settings (Litosseliti, 2010, p. 55). All the material will be prepared before the study, which refers to recordings of all voices, PowerPoints, and tests. The voices were all recorded with the Narrator's Voice[2] app (Escolah Tecnologica, 2015). The teacher has to play the recordings according to the time schedule for each method. The punctuation of the time management cannot be confirmed if it has been correctly used, and it can affect the validity of the research. If the study does not follow the methods precisely, then the result might be considered invalid. To ensure validity in research, one must go back to the previous results of the methods and compare the similarities to make sure they are similar enough to be considered valid (Litosseliti, 2010, p. 55). The study only used words and did not use any pictures explaining the words or portraying the words; this could be a problem since the students might not know the words and therefore answer incorrectly. Also, there was no option for when the students did not hear the words, this could result in the students randomly choosing a word. The High Variability Phonetic Training (HVPT) method is very similar in both teaching and testing material. This could negatively affect the validity of the result. The Onset Rhyme Detection test teaching material is not as similar to the testing material as the HVPT. Since the pretest and posttest are the same, there is a risk that the validity and reliability are affected due to the practice effect. The result simply improves because the same task and item is repeated (APA, 2020).

There is always a risk that the students might guess the answer since the posttest, pretest, and the High Variability Perception Test consist of minimal pairs with

[2] This app has a multiple option of voices and it easily converts text to speech.

two words. There is a 50% percent chance of getting the correct answer. The possibility of a guessed answer cannot be prevented or assessed. The control group is also used to prove that the result of the methods is accurate. The control group will present what would happen if no methods would have been used (Cohen et al., 2013, p. 55). Using a control group makes it possible to compare the result to a group with the same requirements as the test group. The control group allows the researcher to eliminate and isolate the variables tested (Cohen et al., 2013, p. 55). The control group had a delay of 1 week between pretest and posttest.

4. Results and Discussion

The study had the aim to improve phonemic awareness for Chinese primary school children. The research questions were if it is possible to improve phonemic perception in English as an L2 for Chinese primary school children speaking Mandarin as an L1 through the didactic methods High Variability Phonetic Training and Onset Rhyme Detection Test? The second question addressed if it was possible to improve phonemic perception over a short period of time, using didactic methods focused on improving phonemic perception during two sessions for each method? The third and last question addressed if one of the two didactic methods, High Variability Phonetic Training and Onset Rhyme Detection Test, is better than the other in a short-term learning situation?

4.1 HVPT Result

In this subsection follows the result for Group 1, which is the group that received treatment with the High Variability Phonetic Training (HVPT) method. It also gives a brief explanation of the pretest and posttest.

The three groups all participated in the pretest and posttest. The posttest was implemented after the pretest and the training sessions. A total of 45 students participated; all the groups had 15 participants answering 16 questions. This means that each student can have a maximum score of 16 correct answers. After the results were calculated in number of correct answers, the results have also been calculated with the percent of total correct answers for each student. The results have been manually calculated, and to get a total result for each student per test, each correct answer was added to each other. The number of correct answers was divided with the maximum number of correct answers to calculate the percentage. The improved number of answers was divided with the previous result to calculate the improvement from pretest to post-test.

Table 1 shows that 12 students had an improvement from pretest to posttest and 3 of the students had no improvement. Table 1 also shows that the mean result for Group 1 in the pretest was 9.1 (57%) correct answers, and the posttest had a mean result of 11.3 (75%) correct answers. The increase shows a percentual increase of correct answers by 24 % (2.2 units) from pretest to posttest. A T-test of the means shows that the difference between pretest and posttest is significant (t=3.01, p= 0.005). The alpha used in the test was 0.05.

Table 1. Overview of the data for Group 1.

Group 1	Pretest amount of correct answers	Amount of correct answers in %	Posttest amount of correct answers	Amount of correct answers %
Student 1	8	50%	10	63%
student 2	7	44%	12	75%
student 3	9	56%	10	63%
student 4	14	88%	11	69%
student 5	8	50%	9	56%
student 6	10	63%	11	69%
student 7	10	63%	12	75%
student 8	7	44%	14	88%
student 9	6	38%	11	69%
student 10	9	56%	9	56%
student 11	10	63%	13	81%
student 12	6	38%	13	81%
student 13	8	50%	11	69%
student 14	14	88%	12	75%
student 15	10	63%	11	69%
Mean	9.0	57%	11.2	70%
Standard Derivation	2.3	15%	1.3	9%

4.2 ORDT Result

In this subsection follows the result for Group 2, which is the group that received treatment with the Onset Rhyme Detection Test (ORDT) method.

Table 2 shows that 12 students improved from pretest to posttest, and 3 students did not show any improvement. Table 2 also shows that the mean result in the pretest was 7.46 (47%) correct answers, and the posttest had a mean result of 10.33 (69%) correct answers. The increase shows a percentual increase of correct answers by 38 % (2.9 units) from pretest to posttest. A T-test of the means shows that the difference between pretest and posttest is significant (t=3.90, p= 0.001). The alpha used in the test was 0.05.

Table 2. Overview of the data for Group 2.

Group 2	Pretest amount of correct answers	Amount of correct answers in %	Posttest amount of correct answers	Amount of correct answers %
Student 16	7	44%	10	63%
Student 17	8	50%	9	56%
Student 18	8	50%	12	75%
Student 19	7	44%	10	63%
Student 20	9	56%	10	63%
Student 21	5	31%	14	88%
Student 22	5	31%	11	69%
Student 23	7	44%	11	69%
Student 24	6	38%	11	69%
Student 25	7	44%	7	44%
Student 26	11	69%	10	63%
Student 27	9	56%	10	63%
Student 28	6	38%	12	75%
Student 29	10	63%	9	56%
Student 30	7	44%	9	56%
Mean	7.4	47%	10.3	65%
Standard Derivation	1.6	10%	1.5	10%

4.3 Control Group

In this subsection follows the result of the Control Group. In Table 3, the result shows that 5 students had an improvement from pretest to posttest. The other 10 students had no improvement.

Table 3 shows that the mean result in the pretest was 8.4 (53%) correct answers, and the posttest had a mean result of 9.26 (62%) correct answers. The result shows a percentual increase of correct answers by 11 % (0.9 units) from pretest to posttest. A T-test of the means shows that the difference between pretest and posttest is not significant ($t=1.15$, $p= 0.28$). The alpha used in the test was 0.05.

Table 3. Overview of the data for the Control Group.

Control Group	Pretest amount of correct answers	Amount of correct answers in %	Posttest amount of correct answers	Amount of correct answers %
Student 31	6	38%	13	81%
Student 32	10	63%	13	81%
Student 33	7	44%	11	69%
Student 34	12	75%	9	56%
Student 35	6	38%	6	38%
Student 36	8	50%	6	38%
Student 37	8	50%	8	50%
Student 38	10	63%	7	44%
Student 39	8	50%	8	50%
Student 40	12	75%	12	75%
Student 41	9	56%	9	56%
Student 42	6	38%	11	69%
Student 43	8	50%	11	69%
Student 44	8	50%	7	44%
Student 45	8	50%	8	50%
Mean	8.4	53%	9.2	58%
Standard Derivation	1.8	12%	2.3	15%

4.4 Cross comparison between groups

This subsection presents the mean results of all groups in pretest and posttest. Table 4 shows that out of the three groups, Group 2 had the greatest improvement by 38%. Group 1 had an improvement of 24% and the Control Group an improvement of 10%. The mean improvement for all groups was 24%.

Table 4. Overview of the data for all groups.

	Pretest	Mean % on pretest	Posttest	Mean % on posttest	Total increase from Pretest to Posttest	Precental increase from Pretest to Posttest	T-Stat	P-Value
Group 1 Mean	9.1	57%	11.3	75%	2.2	24%	3.01	0.005
Group 2 Mean	7.4	47%	10.3	69%	2.9	38%	3.90	0.001
Group 3 Mean	8.4	53%	9.2	62%	0.9	11%	1.15	0.28
Total Mean	8.3	52%	10.2	69%	2.0	24%		

4.5 Results of the Minimal Pairs /r/ - /l/ and /i/ - /i:/

This subsection will present the findings of the different results found with the two minimal pairs that were used in the study. All the results regarding the total result for each student and the mean score per group for each minimal pair.

4.4.1 HVPT Group

This section will present Group 1 results for each minimal pair for each student. See Table 5, for each student result presented for pretest and posttest regarding the two

minimal pairs. It also shows the mean result and the standard derivation. The pretest and posttest consisted of 16 questions, 8 of the questions were based on the minimal pairs of /i/ and /i:/ and the other eight questions were based on the minimal pairs of /r/ and /l/ (see Appendix I for pretest and posttest).

Table 8 shows that the mean increase for Group 1 result was 12% from pretest to posttest regarding the /i/-/i:/ minimal pairs for each student. Table 8 also shows that Group 1 increased their mean result by 33% from pretest to posttest with the minimal pair /r/-/l/ for each student.

A T-test of the means shows that the difference between pretest and posttest is significant. The /r/-/l/ minimal pair (t=2.88, p= 0.007). The /i/-/i:/ minimal pair (t=1.27, p=0.21)The alpha used in the test was 0.05.

Table 5. Overview of the data for Group 1(Minimal Pairs).

	Pretest		Posttest	
Group 1	/i/ -/i:/	/r/-/l/	/i/ -/i:/	/r/-/l/
Student 1	3	5	5	5
Student 2	5	2	6	6
Student 3	5	4	4	6
Student 4	6	8	5	6
Student 5	4	4	3	6
Student 6	4	6	4	7
Student 7	7	3	5	7
Student 8	3	4	6	8
Student 9	3	3	6	5
Student 10	5	4	5	4
Student 11	4	6	5	8
Student 12	3	3	6	7
Student 13	5	3	5	6
Student 14	6	8	4	8
Student 15	5	5	7	4
Mean	4.5	4.4	5.0	6.2
Standard Derivation	1.2	1.7	1.0	1.3

4.4.2 ORDT Group

This section will present Group 2 results for each minimal pair for each student. Table 6 shows each student's pretest and post-test results regarding the two minimal pairs used in the study in Group 2. It also shows the mean result and standard derivation.

Table 8 indicates that the students had a slightly larger increase of correct answers with the minimal pair /r/ -/l/ than with /i/ - /i:/. Group 2 had a mean increase of 30% from pretest to posttest with the minimal pair /i/-/i:/ and an increase of 36% from pretest to posttest with the minimal pair /r/-/l/.

The mean increase for Group 2 with /r/-/l/ minimal pairs was 1,73 (36%) since the pretest (See Table 8). A T-test of the means shows that the difference between

pretest and posttest is significant. The /r/-/l/ minimal pair (t=3.12, p= 0.004). The /i/-/i:/ minimal pair (t=2.26, p=0.03)The alpha used in the test was 0.05.

Table 6. Overview of the data for Group 2(Minimal Pairs).

	Pretest		Posttest	
Group 2	/i/-/i:/	/r/-/l/	/i/-/i:/	/r/-/l/
Student 16	4	6	3	4
Student 17	6	5	2	4
Student 18	4	4	7	5
Student 19	3	4	3	7
Student 20	5	4	3	7
Student 21	4	1	6	8
Student 22	2	3	5	6
Student 23	3	4	4	7
Student 24	3	3	4	7
Student 25	3	4	4	3
Student 26	7	4	6	4
Student 27	4	5	6	4
Student 28	1	5	4	8
Student 29	4	6	4	5
Student 30	3	4	6	3
Mean	3.7	3.7	4.8	5.4
Standard Derivation	1.4	1.2	1.2	1.7

4.4.3 Control Group

This subsection will present the Control Group result for each minimal pair for each student. Table 7 shows each student's pretest and post-test results regarding the two minimal pairs used in the study in the Control Group. It also shows the mean result and standard derivation.

The mean results of Group 2 (See Table 4) indicate that the students had a lower increase of correct answers with the minimal pair /r/ -/l/ than with /i/ - /i:/. The mean result shows that the Control Group increased their result by 16% with the minimal pair /i/-/i:/ and only 6% with the /r/-/l/ minimal pairs (see Table 8).

A T-test of the means shows that the difference between pretest and posttest is significant. The /r/-/l/ minimal pair (t=0.50, p= 0.61). The /i/-/i:/ minimal pair (t=1.31, p=0.19)The alpha used in the test was 0.05.

Table 7. Overview of the data for the Control Group (Minimal Pairs)

	Pretest		Posttest	
Control Group	/i/ -/i:/	/r/-/l/	/i/ -/i:/	/r/-/l/
Student 31	2	4	6	7
Student 32	5	5	6	7
Student 33	2	5	7	4
Student 34	5	7	4	5
Student 35	3	3	2	4
Student 36	3	5	4	2
Student 37	5	3	3	5
Student 38	4	6	4	3
Student 39	4	4	3	5
Student 40	6	6	5	7
Student 41	4	5	4	5
Student 42	3	3	5	6
Student 43	5	3	5	6
Student 44	3	5	4	3
Student 45	4	4	5	3
Mean	3.8	4.5	4.4	4.8
Standard Derivation	1.1	1.2	1.3	1.6

4.5 Cross comparison between groups (Minimal Pairs)

This subsection presents the mean results of all groups in pretest and posttest regarding each minimal pair. Table 8 shows that Group 1 improved with the minimal pair /r/-/l/ by 33% and with the /i/-/i:/ an improvement by 12%. Group 2 improved by 36% with the /r/-/l/ minimal pair and an improvement of 30% with the /i/-/i:/ minimal pair. Opposite to Group 1 and Group 2, the Control Group had a greater improvement with the minimal pair /i/-/i:/. The Control Group improved their result by 16% with the minimal pair /i/-/i:/, while with /r/-/l/, they improved by 6 %.

Table 8. Overview of the data for all groups. (Minimal Pairs)

/i/-/i:/	Pretest /i/ -/i:/	%	Posttest /i/ -/i:/	%	Increase between pre- to posttest for /i/ -/i:/		T-Stat	P-Value
Group 1 Mean	4.5	57%	5.0	63%	0.5	12%	1.27	0.21
Group 2 Mean	3.7	47%	4.8	61%	1.1	30%	2.26	0.03
Control Group Mean	3.8	48%	4.4	56%	0.6	16%	1.31	0.19
Total Mean	4,00	51%	4.8	60%	0.7	19%		
/r/-/l/	Pretest /r/-/l/	%	Posttest /r/-/l/	%	Increase between pre- to posttest for /r/-/l/		T-Stat	P-Value
Group 1 Mean	4.5	57%	6.2	78%	1.6	33%	2.88	0.007
Group 2 Mean	3.7	47%	5.4	68%	1.7	36%	3.12	0.004
Control Group Mean	4.5	57%	4.8	60%	0.2	6%	0.50	0.61
Total Mean	5.2	53%	5.4	69%	1.2	25%		

4.6 Discussion

When analyzing the diagrams, the percentages reveal that the second group had the most significant development from the pretest. Group 2 had a mean increase of 38 percent since the pretest (see Table 4). Group 1 had a mean increase of 24% percent

since the pretest (see Table 4).

Group 2 had the best result of all three groups. Group 1 had classes using the High Variability Perception Training (HVPT) method. The result from Group 1 agrees with the result from Barriuso & Haves – Harb's (2018) study, where the results also showed that the experimental group had improvements and the control group did not. The pre and posttest were much similar to the HVPT method. Group 2 received treatment with the Onset Rhyme Detection Test Method, which performed better in the posttest. The result of Group 2 is also similar to the result of Wong's study. His experimental groups reached an overall accuracy of 73.68%, and in this study, the students of Group 2 reached an accuracy of 69% (see Table 4.). Wong (2006) does not give any age of his participants, but he indicates in his introduction that the children are under the age of 12 and that the children are in school. Wong (2006) did not indicate in his article how long his study went on or how long time the children had between their tests.

The results for Group 1 and Group 2 in the two sample assuming equal variances test (T-test) suggest that there is significant difference in the means of pretest and posttest. Group 1 had a P-value of 0.005 and Group 2 had a P-value of 0.001, these values are both below the alpha 0.05 (see Table 4.). However, the Control Group had a P-value of 0.28 which is above the alpha 0.05 (see Table 4.). This shows that there was no significant difference in the means of pretest and posttest for the Control Group. The result of Group 1 and Group 2 suggest that the methods had a positive effect on the Chinese primary school children's phonemic perception.

Both Group 1 and Group 2 had a better result with the minimal pairs /r/ and /l/, and both groups had a lower result with the /i/ and /i:/ minimal pairs. When reading the literature review, more studies mainly focused on the minimal pair /r/ and /l/ also sound-wise. It might be easier to distinguish the difference between/r/ and /l/ sounds than with /i/ and /i:/ sounds. The /i/ sound is an allophone in Mandarin, but the /i:/ does not seem to exist. According to the Speech Learning Model (SLM), it should be easier for the L2 learner to make a new category for the new sound. However, the SLM might also suggest that the /i/ and /i:/ allophones are too similar for it to be possible for the L2 learner to make a new sound category (Isbell, 2016, p. 58). The /r/ and /l/ phonemes are both liquid phonemes.

A two sample assuming equal variances test (T-test) was also done regarding each minimal pair. With the /i/-/i:/ minimal pair, Group 2 was the only group

with a significant effect. Group 1 had a P-value of 0.21 and the Control Group had a P-value of 0.19 (see Table 8.). It seems like the result of the /i/-/i:/ minimal pair was mostly random and there was no significant difference in the means.

In the T-test for the /r/-/l/ minimal pair both Group 1 and Group 2 had a P-value lower than the alpha of 0.05. Group 1 had a P-value of 0.007 and Group 2 a P-value of 0.004. This suggests that the result was not random and that there was a significant difference in the means result. However, the Control Group had a P-value of 0.61 which suggest that the Control Group had no significant difference.

Group 2 received treatment with the Onset Rhyme Detection Test and had a smaller difference between the minimal pairs (see Table 8.). Group 2 heard more /i/ and /i:/ words since the Onset Rhyme Detection Test (ORDT) works with four words in each pair in the training session. For example, the ORDT training sessions are the four words "Deep – Dip – Sick – Sin" (see Appendix VIII). In this word order, the child is supposed to take away the word with a different middle sound. Since there are four words and the words do not start with the same letter, it might cause more confusion than the High Variability Phonetic Training (HVPT) sessions. It might be that the minimal pair /i/ and /i:/ needs more time than the /r/ and /l/ to be able to distinguish the difference. HVPT mainly focused on the /r/ and /l/ minimal pairs in previous research (Barriuso & Haves-Harb, 2018), and the ORDT did not focus on a particular minimal pair (Wong, 2006).

In the future, it would be interesting to investigate further why it is difficult to hear the difference in the minimal pair /i/ and /i:/.

Since both methods, High Variability Phonetic Training and Onset Rhyme Detection Test are both Focus on Forms rather than Focus on Form, it would be interesting to in the future do similar research with methods with Focus on Form. According to Gass and Selinker (2008, p. 407), learners generally focus on the meaning of words instead of the other linguistic features. This is especially with learners that are at a low level of proficiency. According to Gass and Selinker (2008, p. 411), the timing is also important, and the students might not at a young age be able to understand the complicated linguistic contexts. In contrast, it is argued by Long (1990) that early exposure to language is of importance and that, according to Chomsky, learning a language before the age of 12 is critical (Salwa, 2015). Therefore, it would be interesting to investigate further if the Focus on Form approach could give better results than the Focus on Forms approach.

The chance of practice effects and the students guessing the correct answer remains a factor that might have affected the results. Another factor that might have affected the results is that the students might not know all the words. A pseudo-word is a fake word supposed to resemble a real word (APA, 2020). Wong (2006) mentions pseudo-word decoding in his article; according to one of his studies and the literature in his article, the Chinese children speaking Mandarin have difficulties decoding pseudo-words.

The posttests indicate that it is possible to, through didactic methods, improve phonemic perception in English as an L2 for Chinese primary school children speaking Mandarin as an L1. The results also indicate that it is possible to do so in a short period of time. The overall result suggests that the Onset-Rhyme Detection Test is the better of the two options for the phonemic contrasts assessed.

As mentioned in the Reliability and Validity section, there was a risk that the practice effect could affect the result since the pretest and posttest are the same. Regarding the results, there seems to be a small risk of such effect. The Control Group increased its mean result by 11% in total in the posttest.

5. Conclusion

This essay aimed to determine if it is possible to improve phonemic perception for a group of young Mandarin-speakers learning English as a foreign language. Also, if it is possible to improve phonemic perception in English as an L2 for Chinese primary school children speaking Mandarin as an L1 through the didactic methods High Variability Phonetic Training and Onset Rhyme Detection Test, this was done by the use of three groups of Chinese primary school children. Group 1 received treatment by HVPT; Group 2 received treatment by ORDT, and Group 3, also known as the control group, received no treatment. All groups did a pretest and posttest. Group 1 and Group 2 received two training sessions following the two methods, HVPT and ORDT. The results of the pretest and posttest were then compared.

The result suggests that the groups that received treatment had a better result than the Control Group that did not receive any treatment. Over a short period of time, both Group 1 and Group 2 improved their phonemic awareness. When the Control Group result was analyzed, there seemed to be a slight indication that practice effects had affected the study's validity. The conclusion from the result of the study is that it is possible to, through didactic methods, improve phonemic perception among Chinese

primary school children. The Onset Rhyme Detection Test was the better of the two methods and gave an overall better result than the High Variability Phonetic Training method.

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Appendices

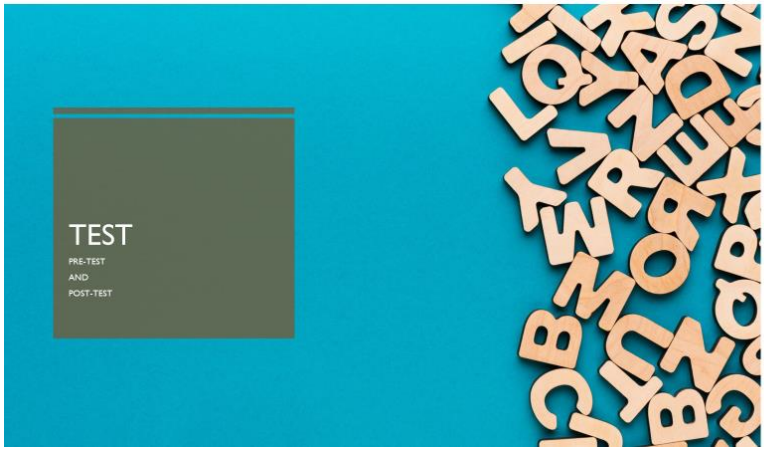
Appendix I

PRE-TEST - POST-TEST

1. Fill	or	Feel
2. Fit	or	Feet
3. Grin	or	Green
4. Hit	or	Heat
5. Is	or	Ease
6. Mitt	or	Meet
7. Slip	or	Sleep
8. Collect	or	Correct
9. Did	or	Deed
10. Glamour	or	Grammar
11. Glass	or	Grass
12. Lace	or	Race
13. Lane	or	Rain
14. Law	or	Raw
15. Lead	or	Read

16. Lock or Rock

Appendix II



INSTRUCTIONS

- Each slide will have two words written on it. Example Cat and Hat.
- On the paper infront of you, you will have the same options.
- When the voiceclip has been played you will circle the word that you heard.
- The voiceclip will only be played TWICE per slide.
- A total of 8 slides with 2 words on each will show.
- Good luck and thank you !

EXAMPLE
Read the words and then press play

Cat or Hat

PRESS TO PLAY

Now circle what you hear on your paper

Cat or Hat

PRESS TO PLAY

Is

or

Ease

Fit

or

Feet

Mitt

or

Meet

Fill

or

Feel

Grin

or

Green

Slip

or

Sleep

Hit

or

Heat

Collect

or

Correct

Lane

or

Rain

Did

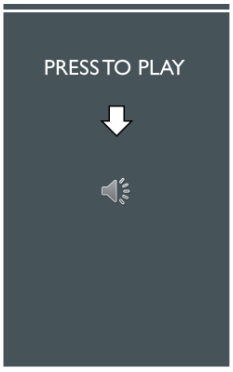
or

Deed

Law

or

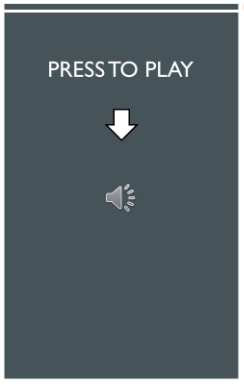
Raw



Glamour

or

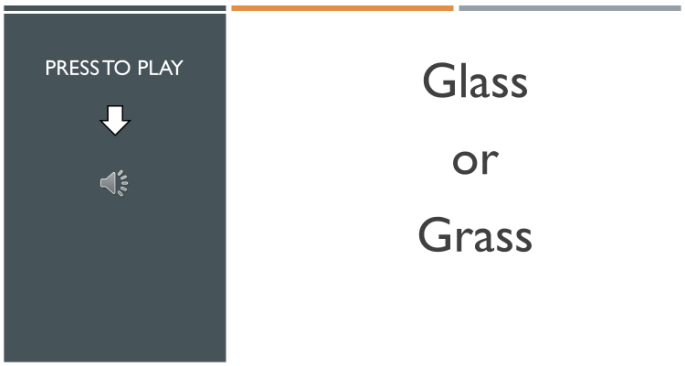
Grammar

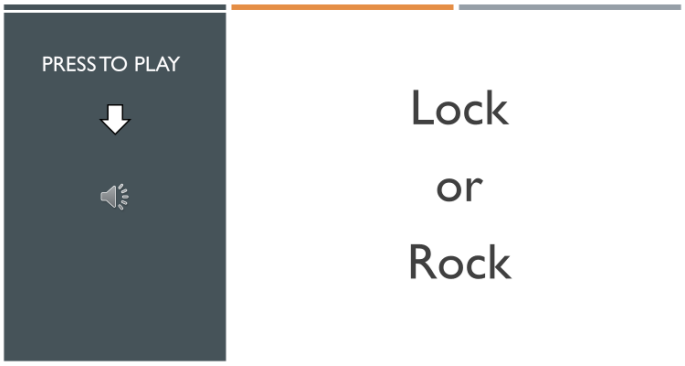


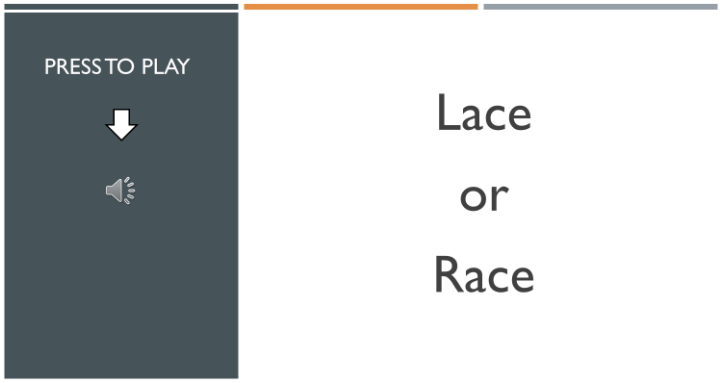
Lead

or

Read







Appendix III

1 Session – Group 1

Circle what you hear!

1. Belly Berry

2.	Blew	Brew
3.	Blue	Brew
4.	Blush	Brush
5.	Clash	Crash
6.	Clown	Crown
7.	Flee	Free
8.	Glow	Grow
9.	Lack	Rack
10.	Lamb	Ram
11.	Lamp	Ramp

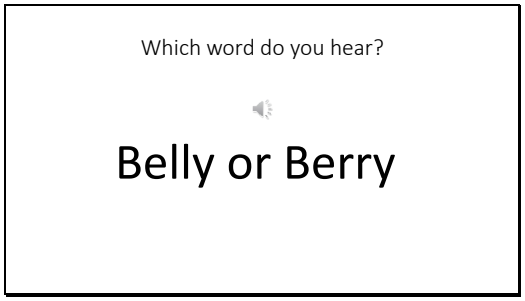
12. Lane	Rain
13. Late	Rate
14. Laze	Raise
15. Lead	Read
16. Lice	Rice
17. Lied	Ride
18. Lies	Rise
19. Lip	Rip
20. List	Wrist
21. Locket	Rocket

22.	Loom	Room
23.	Lows	Rose
24.	Luck	Ruck
25.	Lush	Rush

Appendix IV
Slide 1

Slide 2

Slide 3



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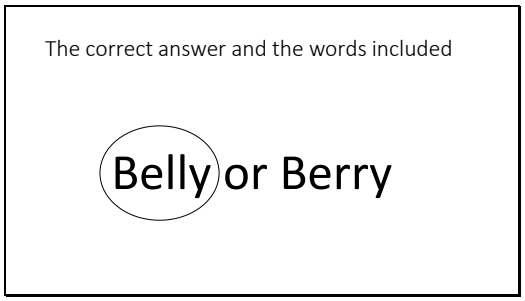

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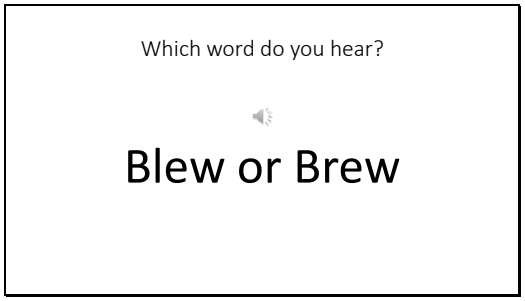

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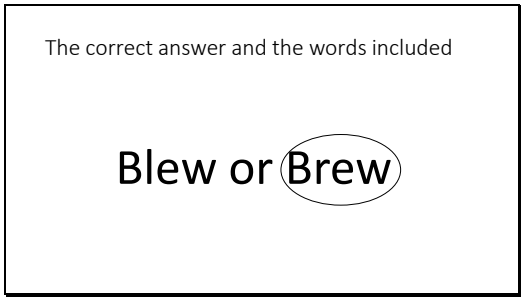

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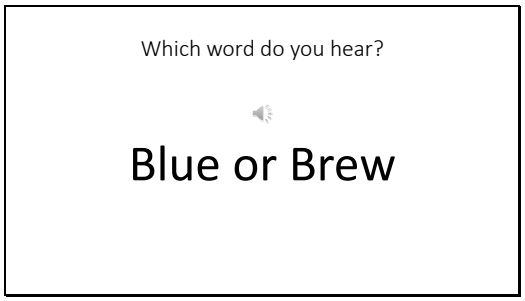

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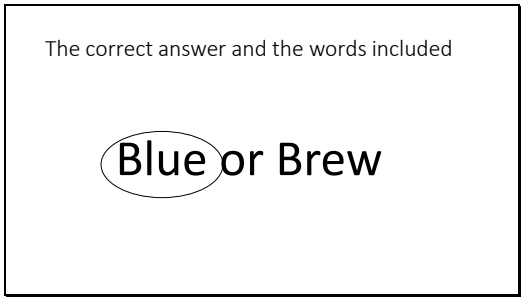

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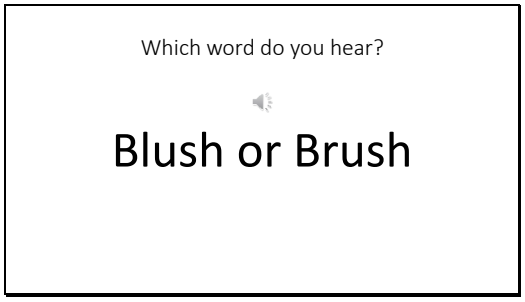

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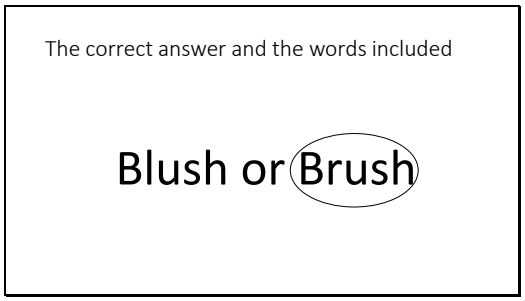

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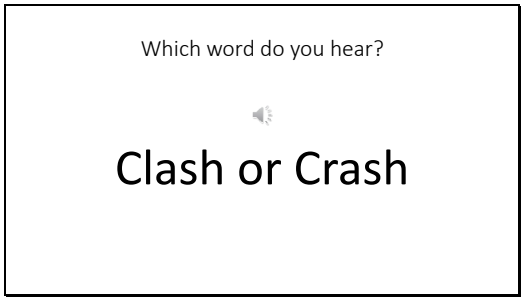

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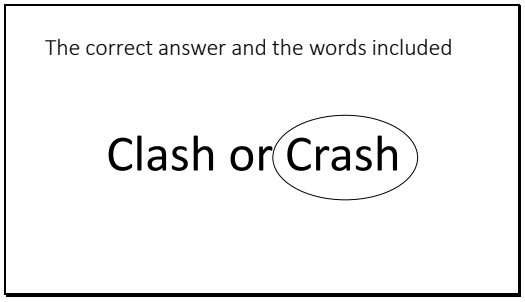

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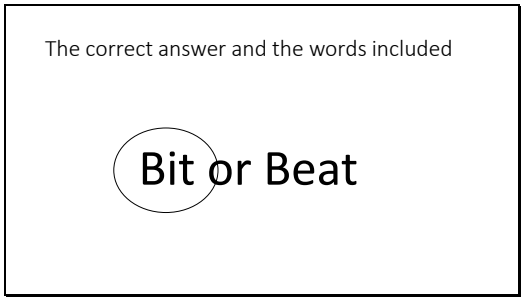
Slide 14



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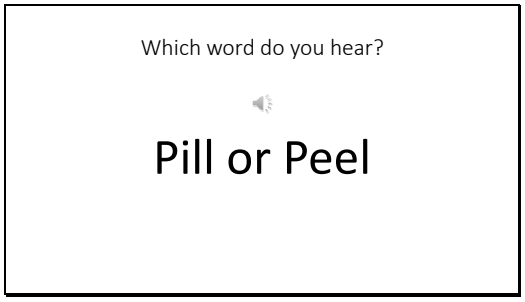

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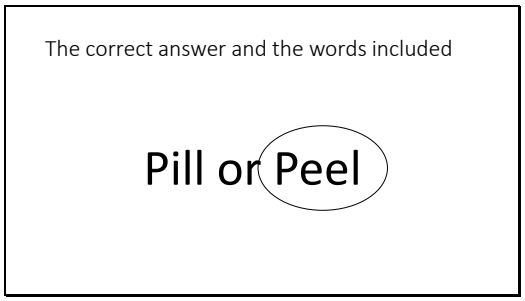

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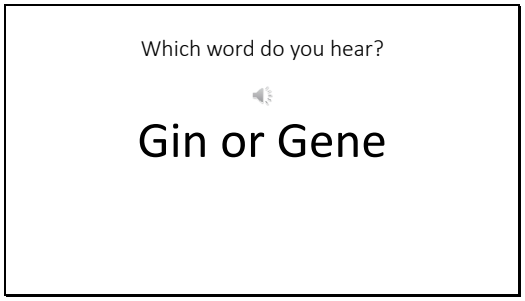

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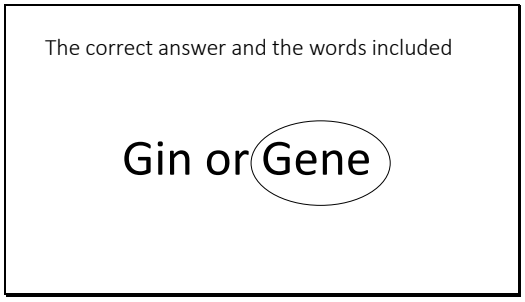

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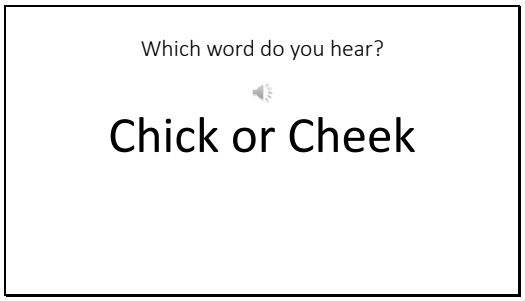

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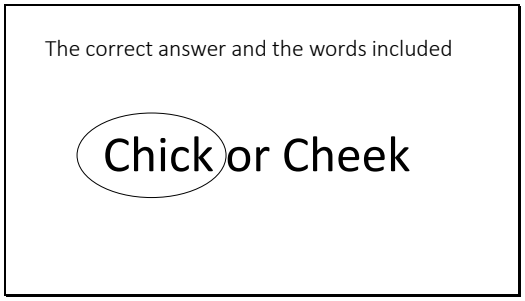

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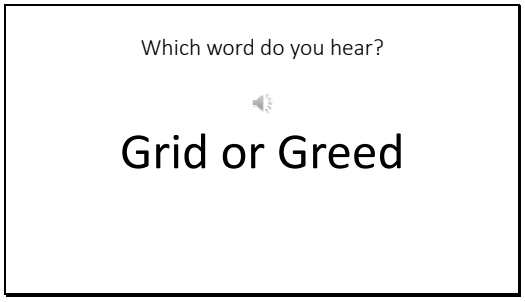

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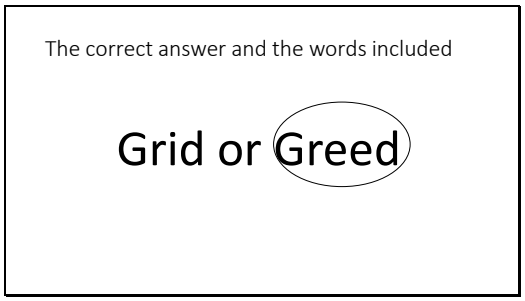

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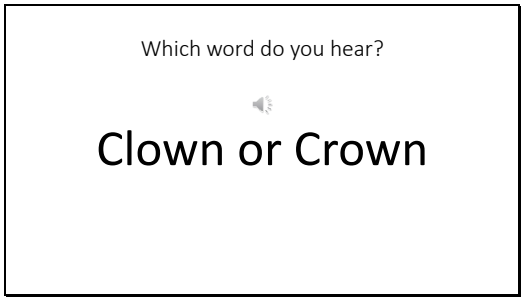

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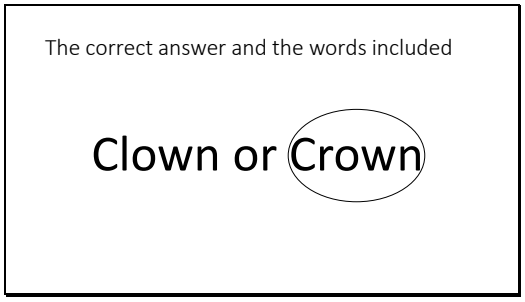
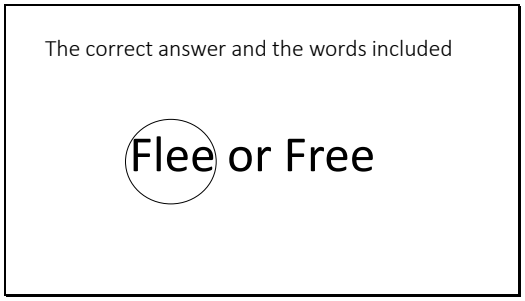


Slide 25

Slide 26



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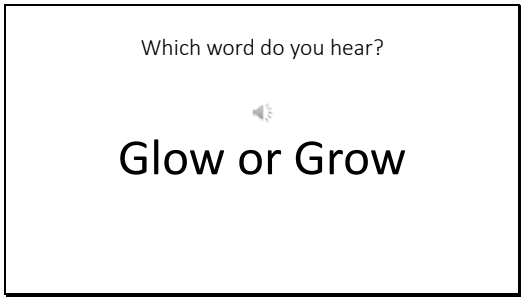

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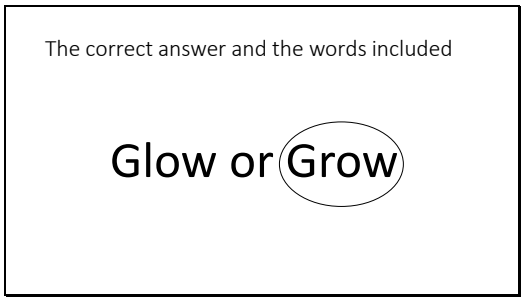

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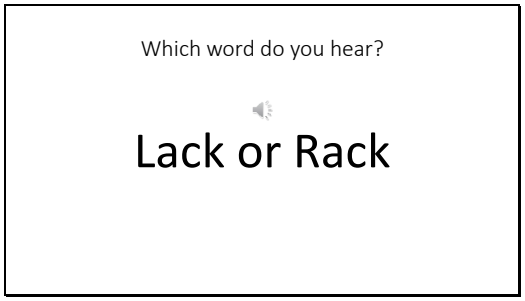

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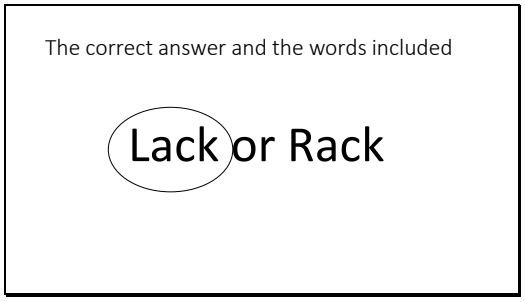

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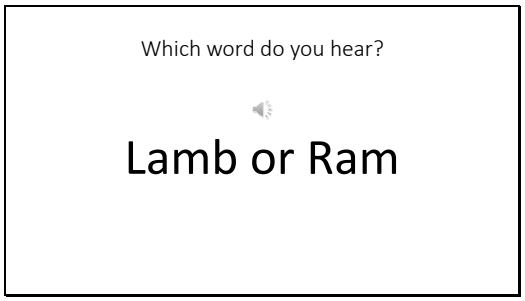

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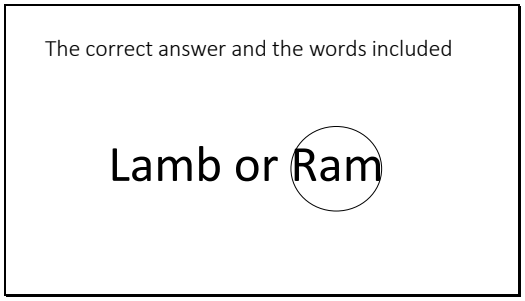

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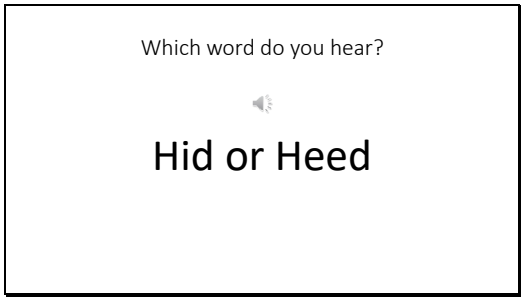

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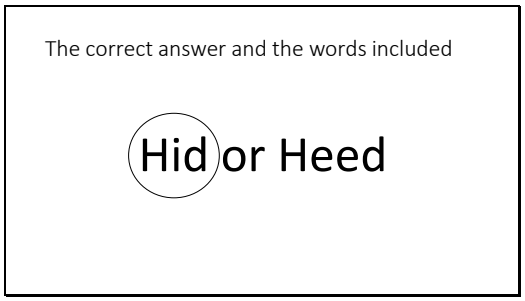
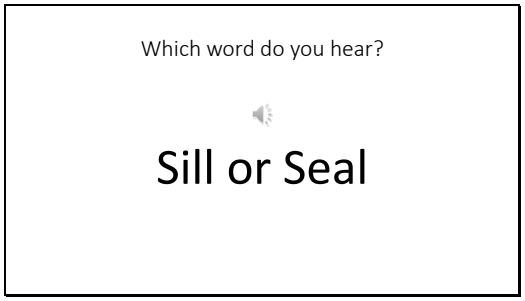
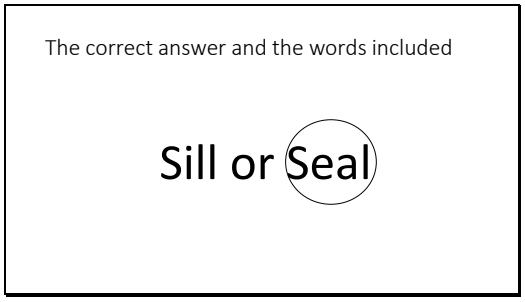


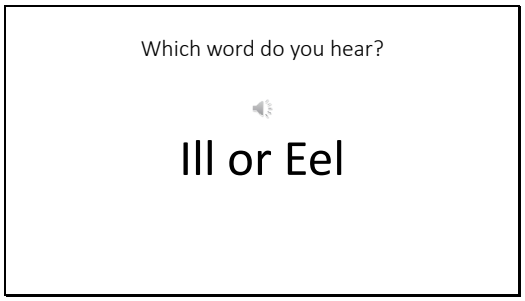
Slide 35



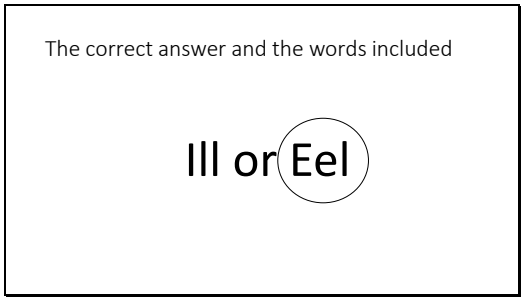
Slide 36



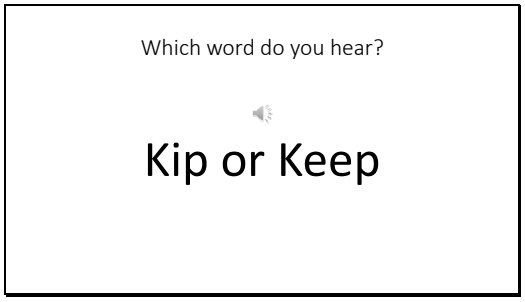
Slide 37



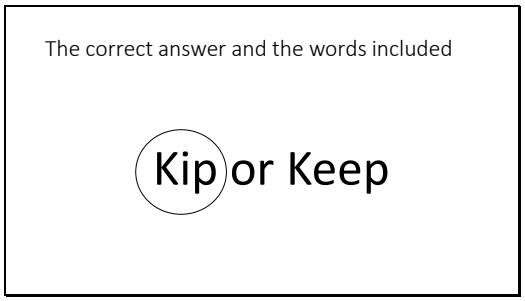
Slide 38



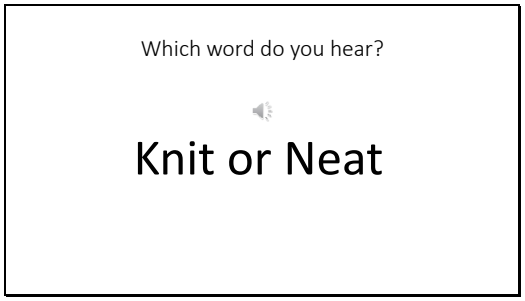
Slide 39



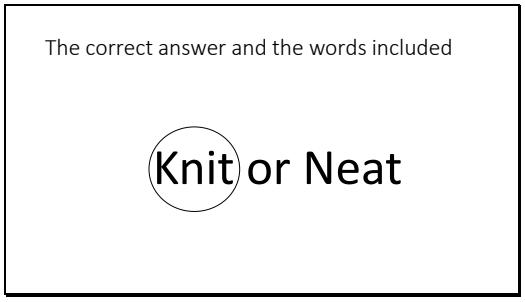
Slide 40



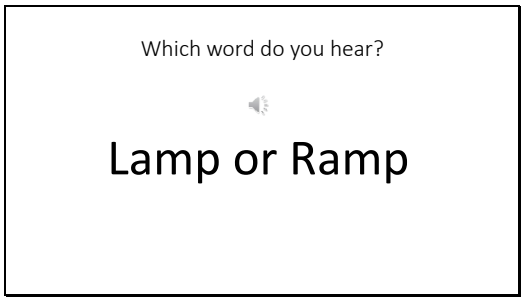
Slide 41



Slide 42



Slide 43



Slide 44

The correct answer and the words included

Lamp or Ramp

Slide 45

Which word do you hear?

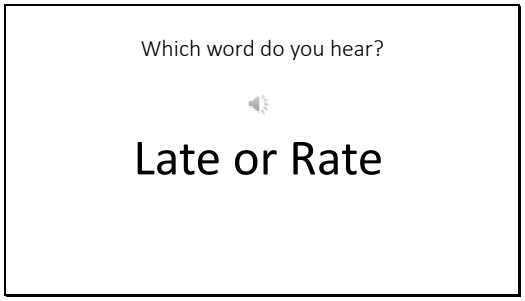
Lane or Rain

Slide 46

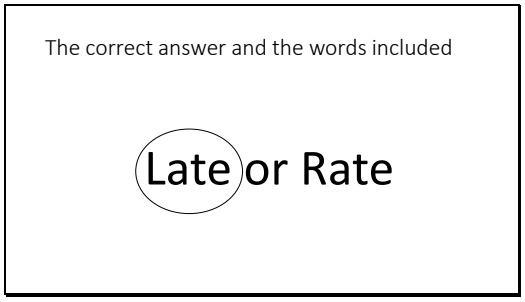
The correct answer and the words included

Lane or Rain

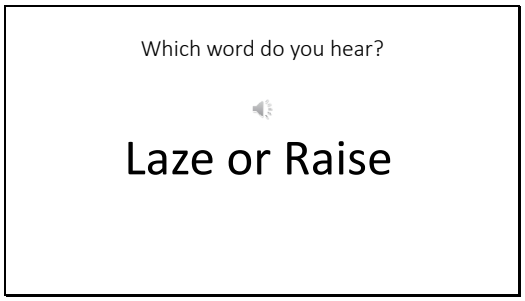
Slide 47



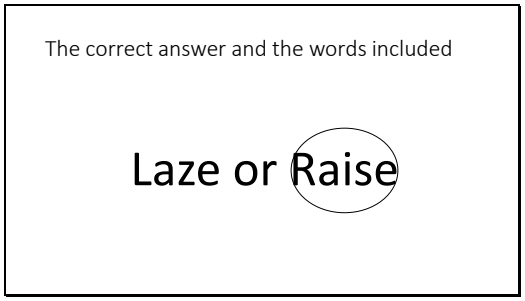
Slide 48



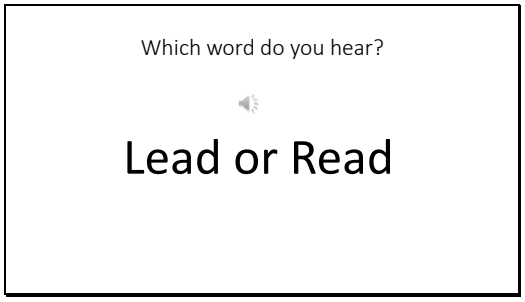
Slide 49



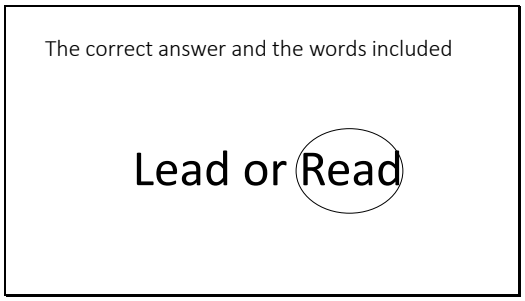
Slide 50



Slide 51



Slide 52



Appendix V

Session 2 – Group 1

Circle what you hear!

1.	Pilot	Pirate
2.	Bit	Beat
3.	Pill	Peel
4.	Gin	Gene
5.	Chick	Cheek
6.	Grid	Greed
7.	Hid	Heed
8.	Sill	Seal
9.	Ill	Eel
10.	Kip	Keep
11.	Knit	Neat
12.	Lick	Leak
13.	Lip	Leap
14.	Mill	Meal
15.	Pick	Peek
16.	Chip	Cheap

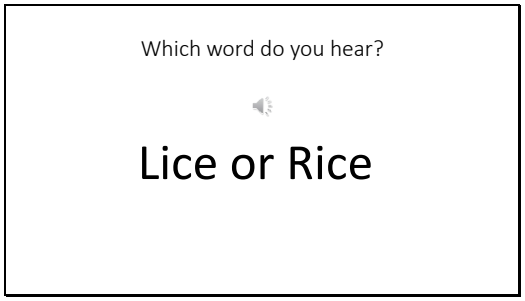
17.	Risen	Reason
18.	Dip	Deep
19.	Sick	Seek
20.	Sin	Scene
21.	Sin	Seen
22.	Still	Steel
23.	Tin	Teen
24.	Alive	Arrive
25.	Bin	Bean

Appendix VI

Slide 1

Slide 2

Slide 3



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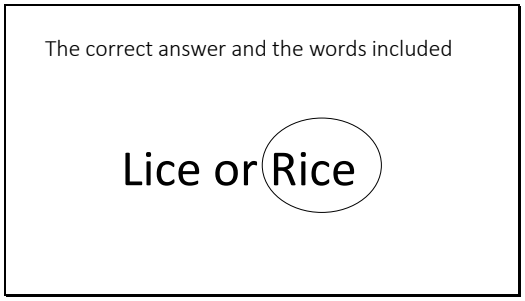

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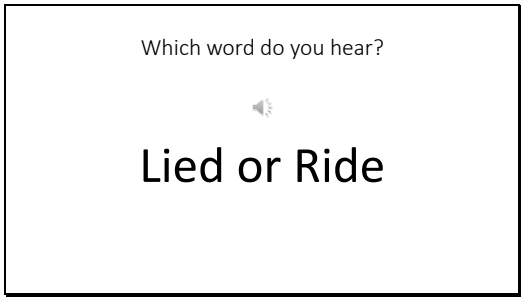

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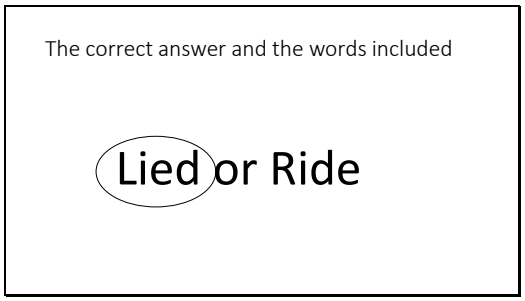

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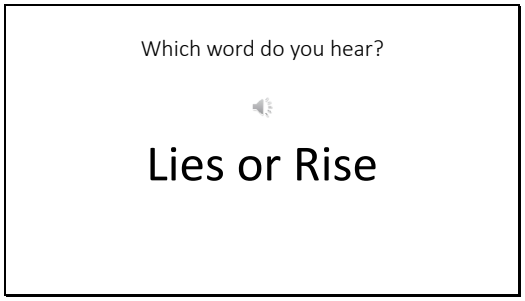

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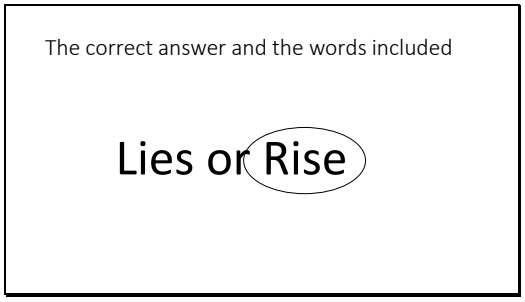

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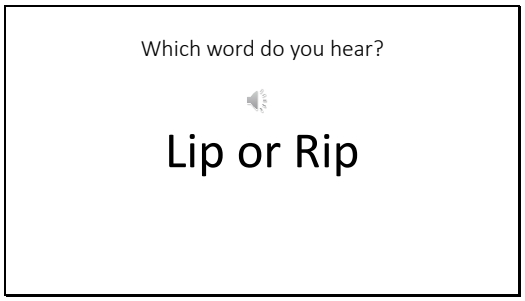

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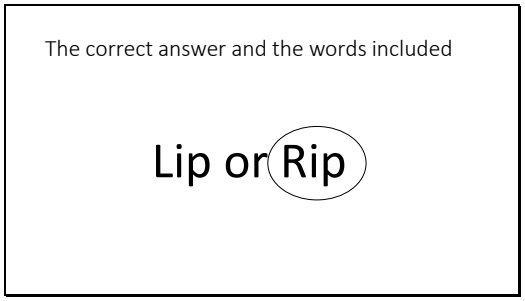

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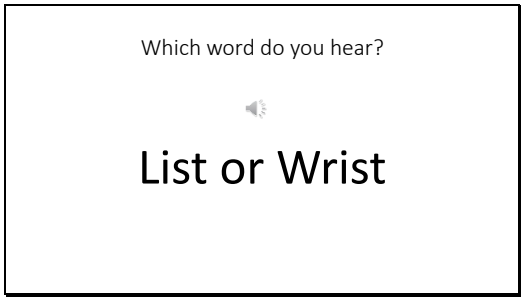

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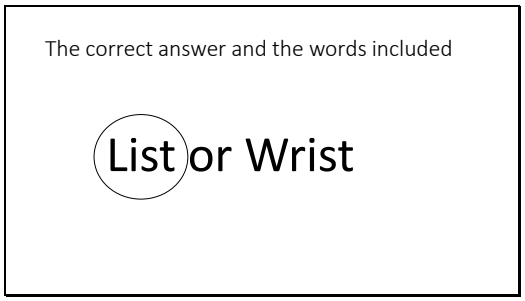

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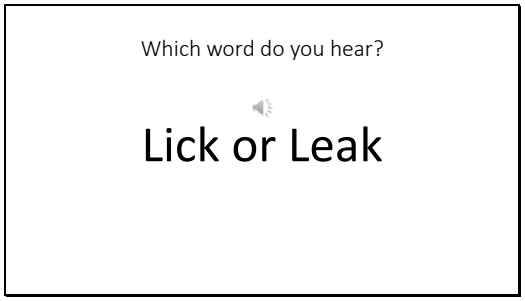

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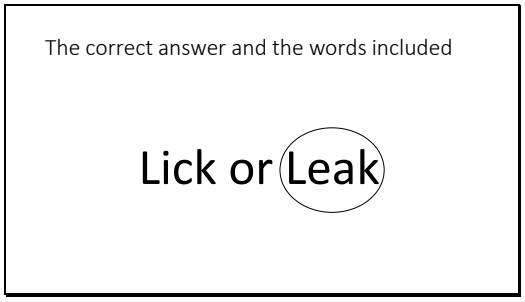

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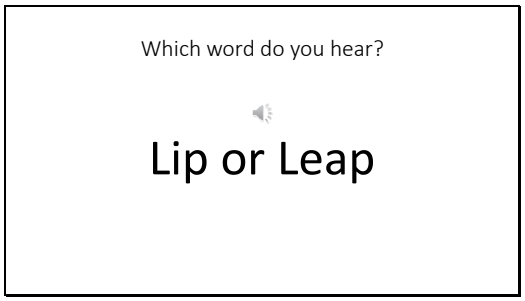

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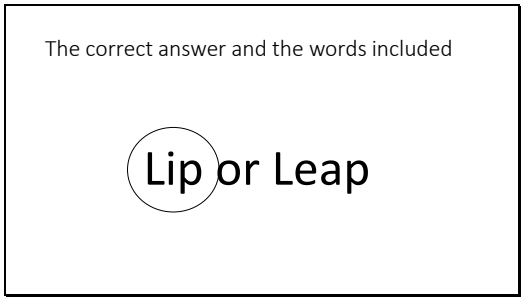

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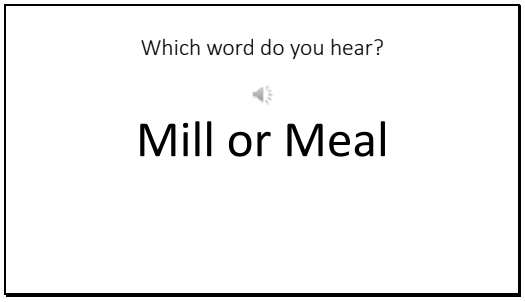

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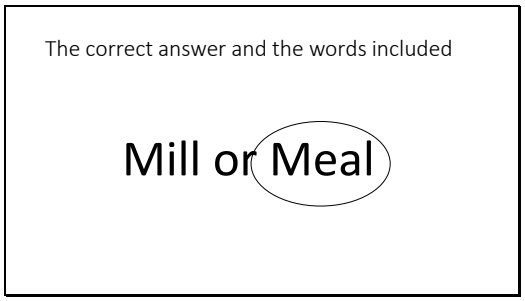

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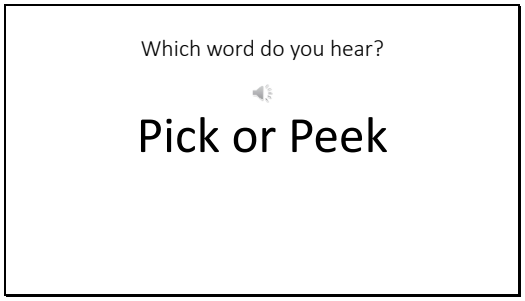

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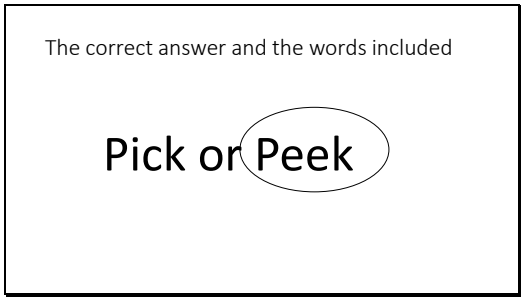

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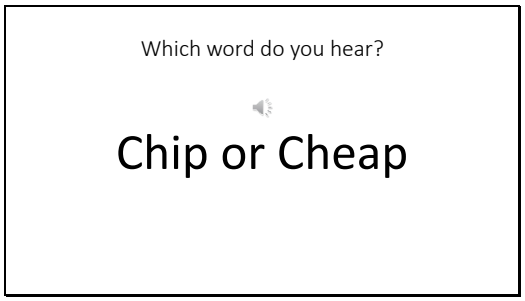

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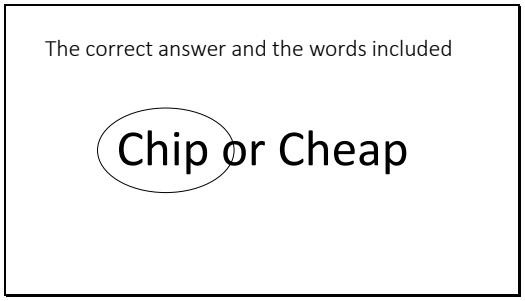

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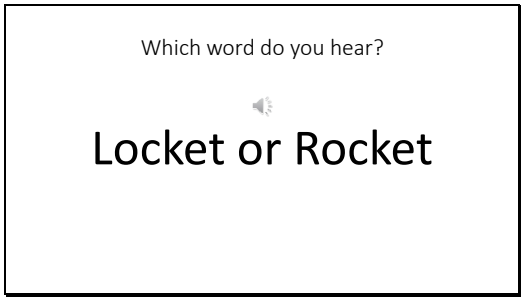

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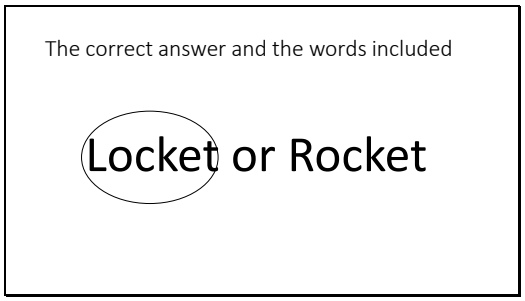

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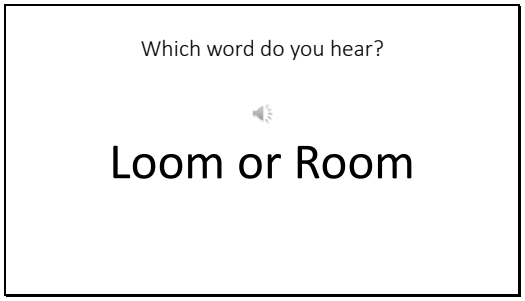

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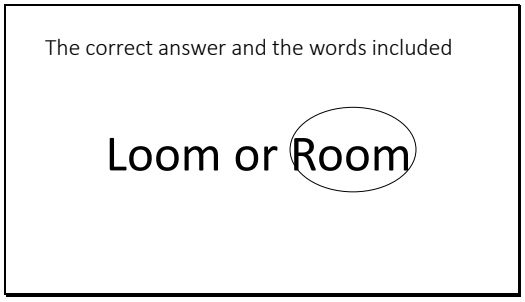

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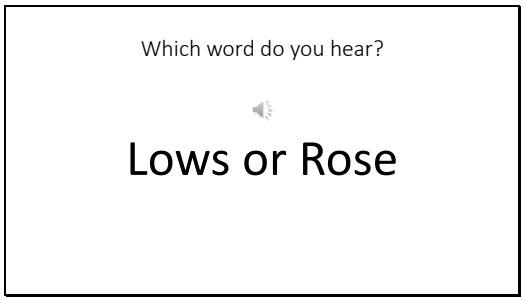

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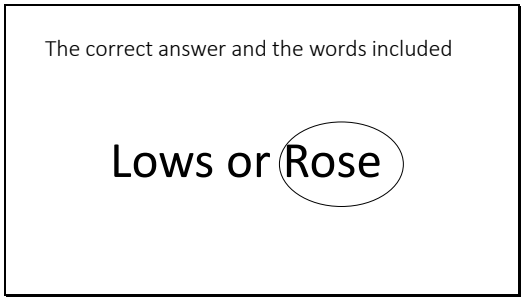

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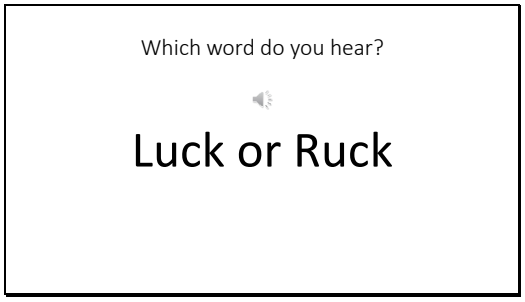

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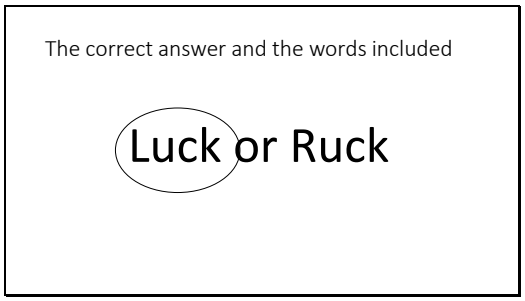

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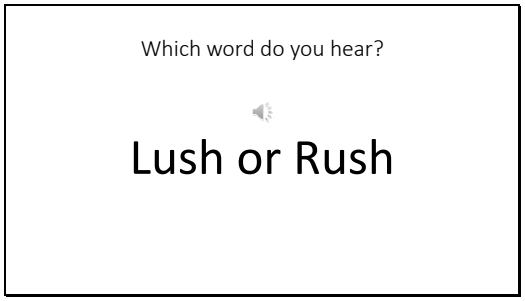

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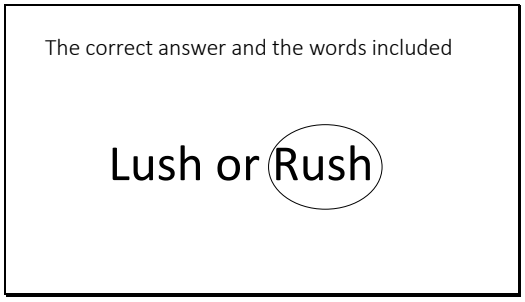

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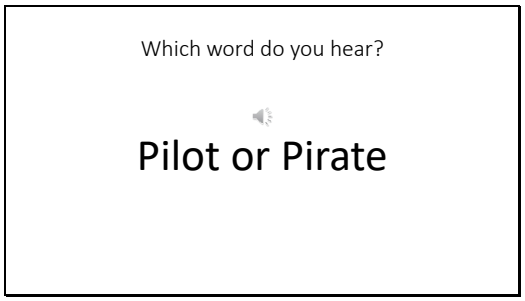

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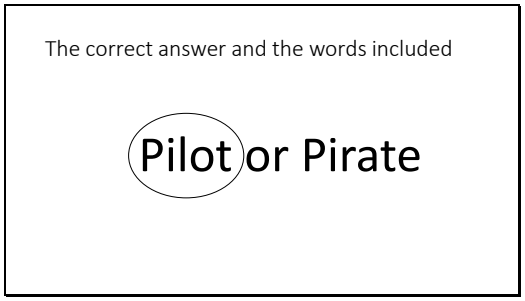

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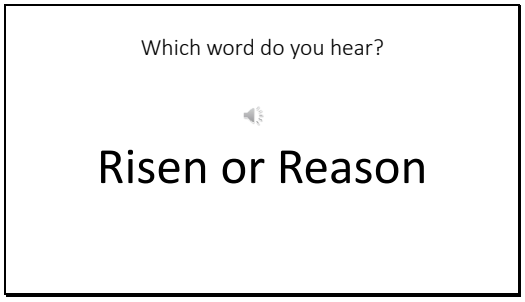

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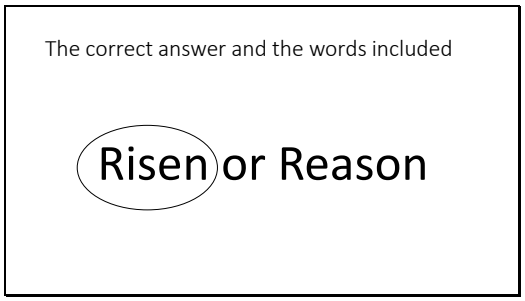

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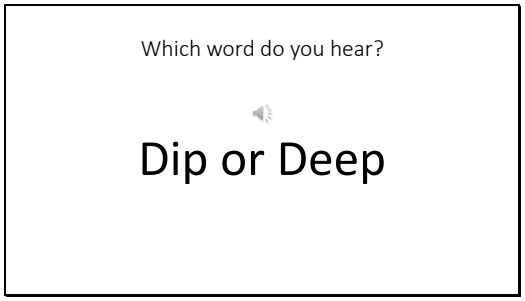

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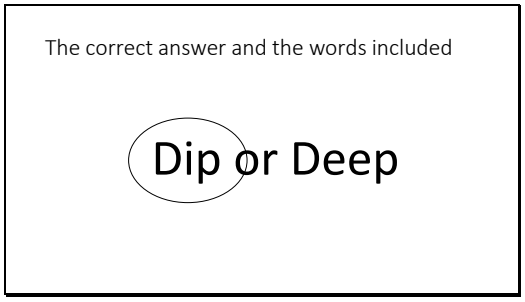

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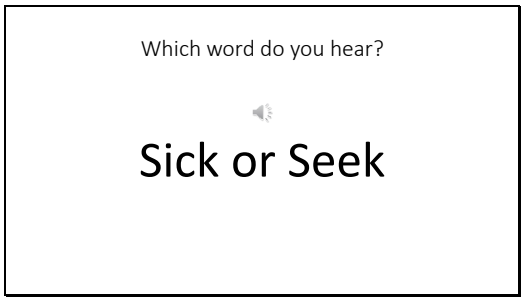


Slide 40

The correct answer and the words included

Sick or Seek

Slide 41

Which word do you hear?

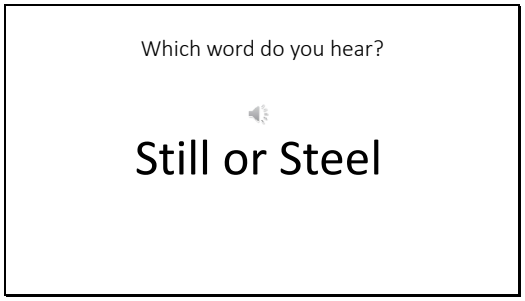
Sin or Scene

Slide 42

The correct answer and the words included

Sin or Scene

Slide 43



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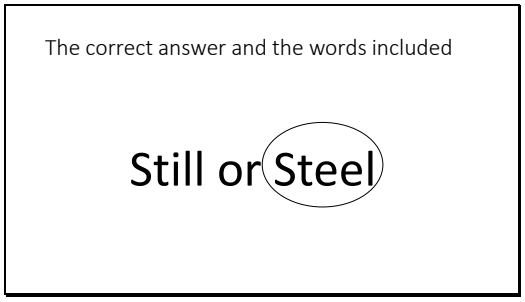

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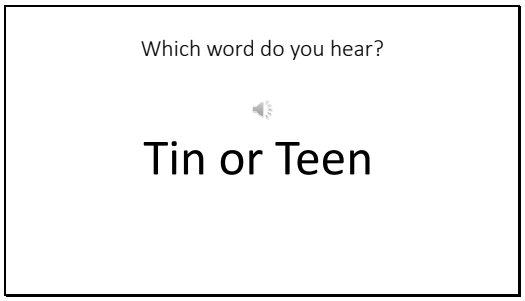

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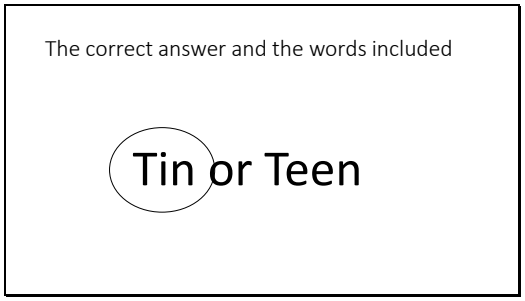

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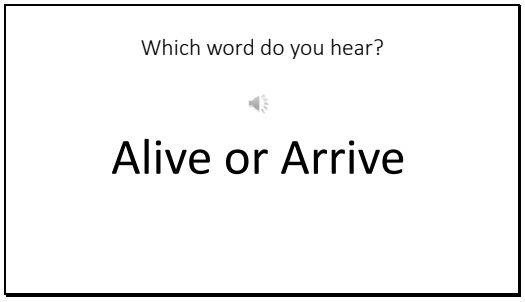

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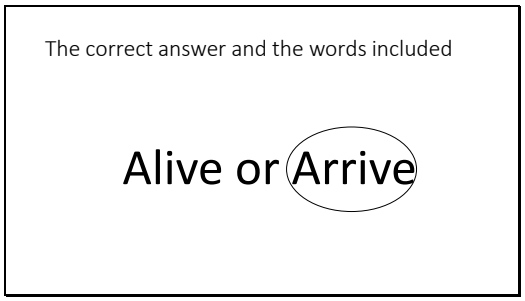

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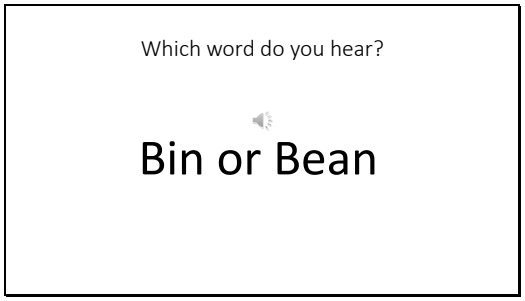

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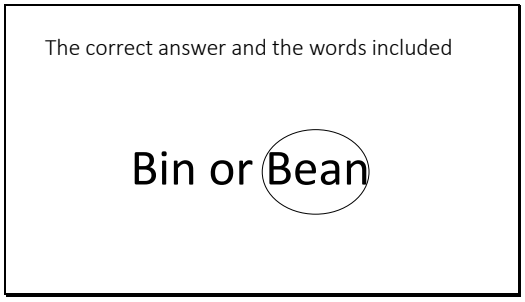

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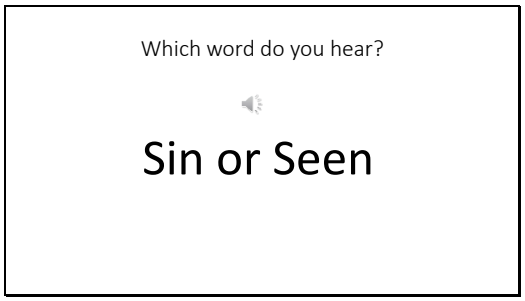

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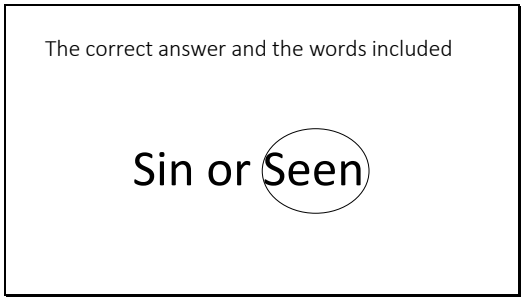


Appendix VII

Session 1 & 2 – Group 2

Circle the word that has a different beginning than the others

1	2	3	4
1	2	3	4
1	2	3	4

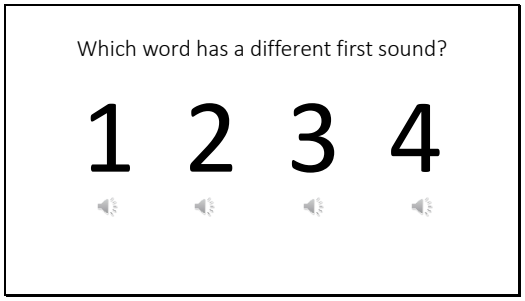
1	2	3	4
1	2	3	4
1	2	3	4
1	2	3	4
1	2	3	4
1	2	3	4

Appendix VIII

Slide 1

Slide 2

Slide 3



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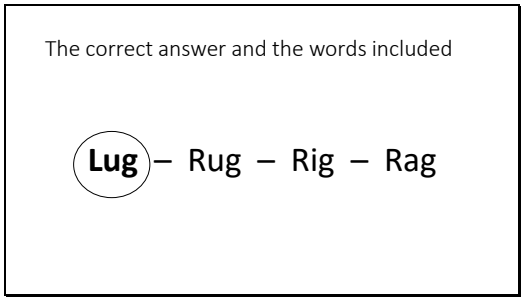

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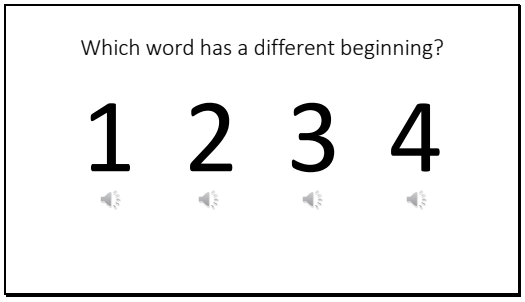

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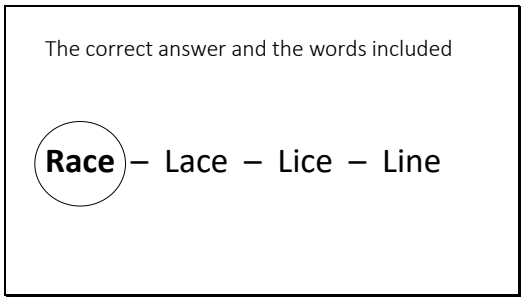

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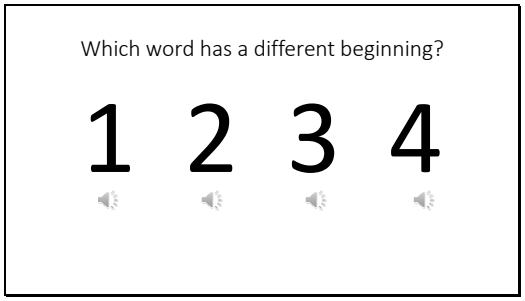

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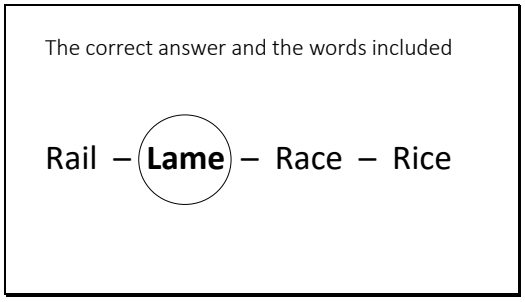

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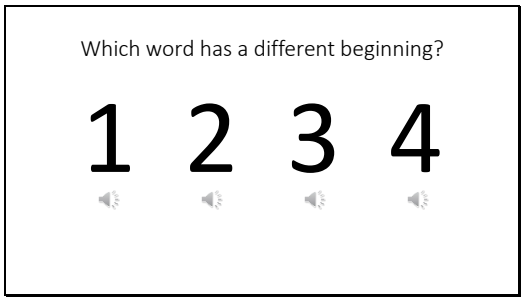

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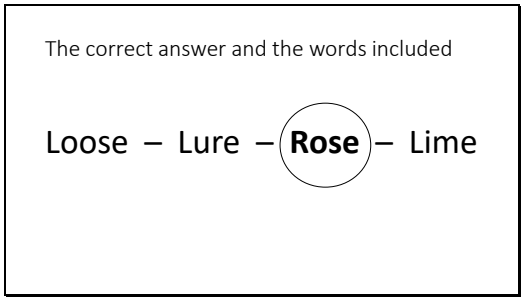

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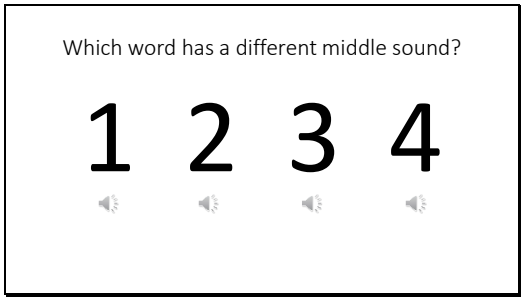

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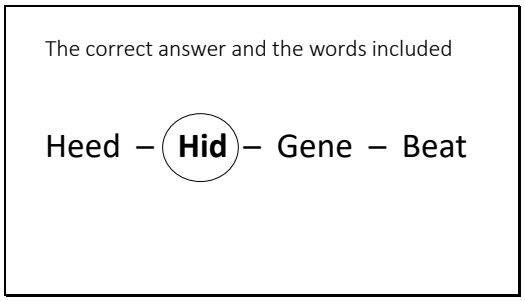

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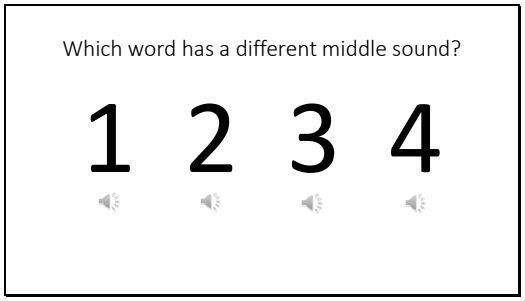

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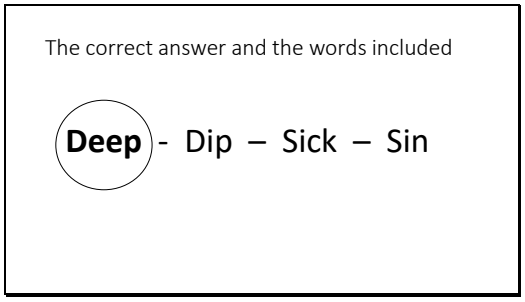

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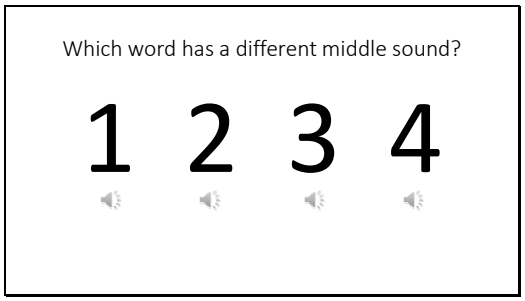

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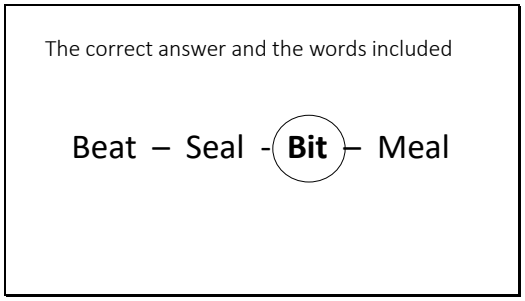

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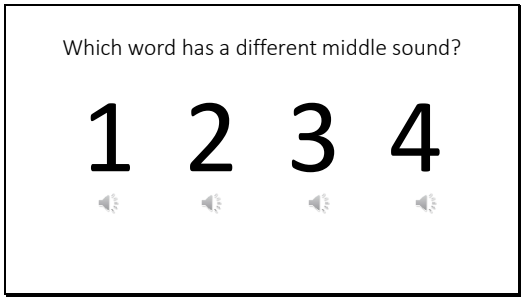

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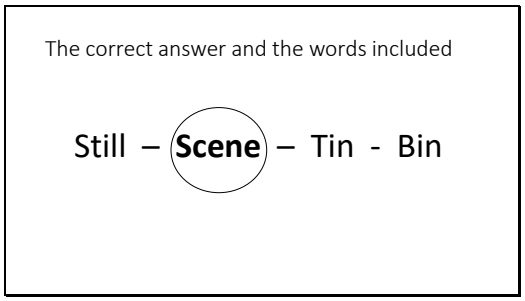

Appendix IX

Slide 1

Slide 2

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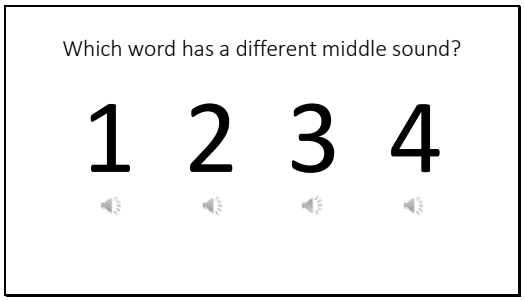

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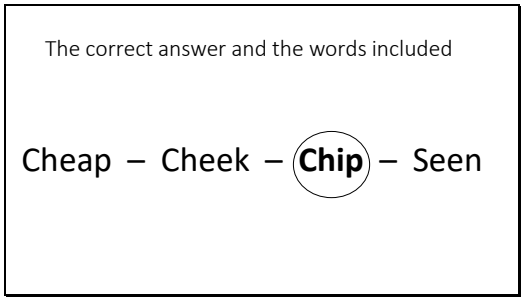

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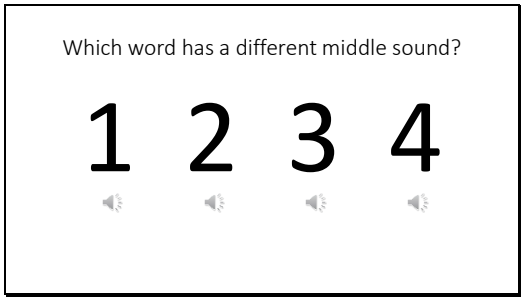

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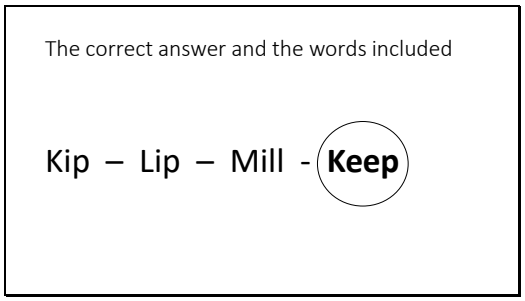

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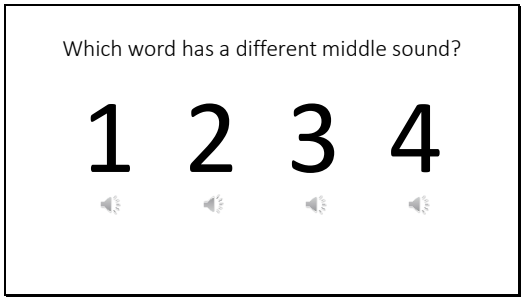

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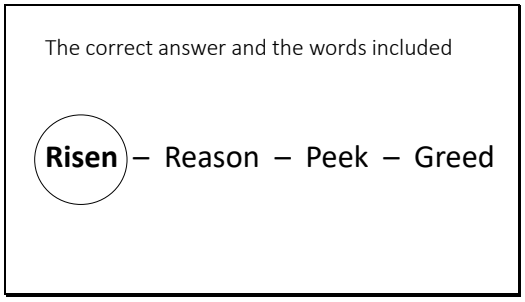

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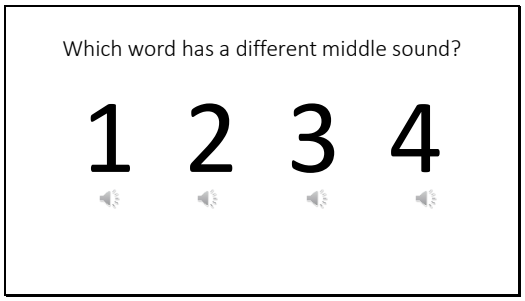

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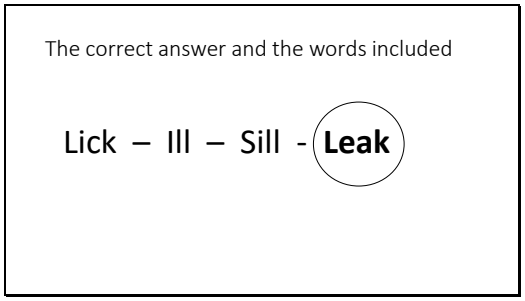

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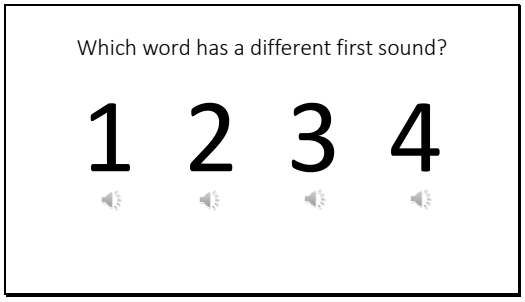

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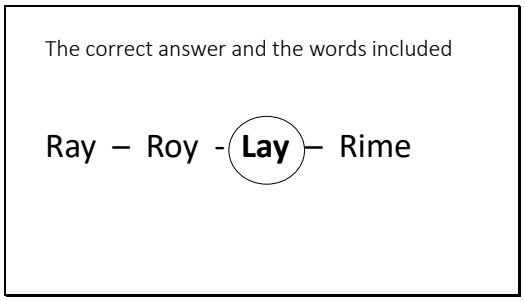

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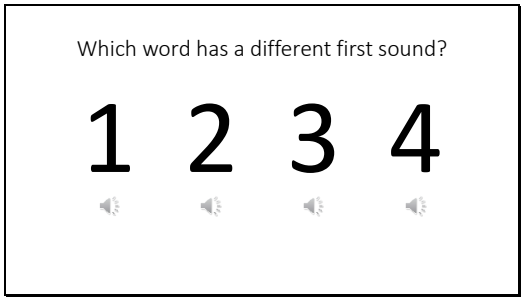

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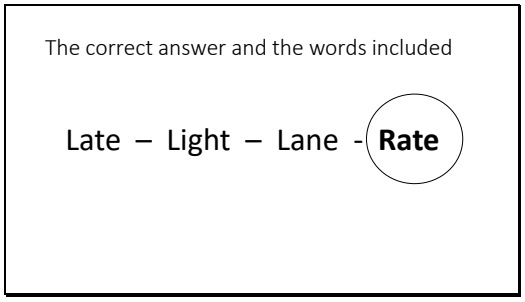

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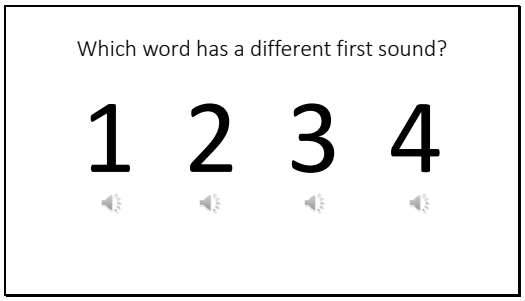

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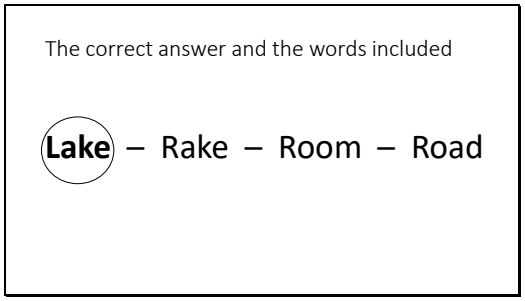

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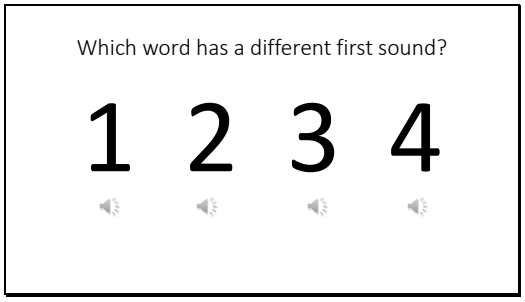

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