

The Effects of Embodied Shadowing on L2 Pronunciation

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ABSTRACT

Previous studies have explored the benefits of shadowing in the EFL classroom and have shown that this technique, which consists in repeating what one hears simultaneously, helps improve pronunciation skills. However, very little is known about the potential beneficial effects of performing “embodied shadowing” while mirroring rhythmic beat gestures.

This study adopts a between-subjects pre-/post-test design to determine if both observing and reproducing manual beat gestures during shadowing training leads to an improvement in pronunciation in terms of fluency, comprehensibility and accentedness when compared to an only-shadowing condition. Crucially, the study controls for shadowing performance by participants. Fifty-four students underwent six shadowing training sessions over a two-week span, in which they were asked to shadow English video recorded readings of a comic narration in two conditions, the Gesture and the No-Gesture condition. Shadowing performance was assessed, and participants were divided into two groups, according to their level in shadowing performance. Pronunciation assessments of a reading task before and after training revealed statistically significant improvements in fluency, comprehensibility and accentedness only in good shadowers and across both Gesture and No-Gesture conditions. The results suggest that both embodied and non-embodied shadowing training have a positive effect for improving L2 pronunciation when participants perform shadowing in a simultaneous way.

Keywords: *shadowing technique, shadowing training, embodied shadowing, beat gestures, pronunciation training, suprasegmentals, comprehensibility, fluency, accentedness, EFL*

1. INTRODUCTION

Pronunciation plays a crucial role in second language acquisition, for it is essential to the development of intelligible and comprehensible speech, which is an important part of communicative competence. As Martinsen (2017: 663) pointed out, an intelligible and comprehensible pronunciation helps students to “participate fully and effectively in social and professional conversations”. Indeed, good pronunciation skills contribute to avoid misunderstandings and achieve successful oral communication.

Although the acquisition of pronunciation represents one of the main challenges for Foreign Language (FL) learners, FL instructors are often “intimidated by the idea of teaching pronunciation” (Burgess & Spencer, 2000; quoted in Derwing, 2010: 24), which occupies a marginal role in many language curricula. Teachers tend to pay little attention to pronunciation for different reasons. Among them, Darcy (2018) identifies three main obstacles which prevent teachers from providing pronunciation instruction in the classroom: “time”, “method” and “focus”. Firstly, teachers feel that there is no sufficient time to concentrate on pronunciation, as students are very busy learning grammar and vocabulary. The fact that they generally give priority to other aspects of language shows that they are not aware of the importance of pronunciation. Harmer (2001) suggested that learning grammar and vocabulary might be pointless if native speakers are not able to understand what a learner utters because of his inaccurate pronunciation. Moreover, pronunciation is connected with all four language skills and not only with speaking abilities (Darcy, 2018), as it can help develop listening comprehension, and improve reading and writing. All in all, instructors are prone to disregard pronunciation also because of multiple insecurities which probably derive from the lack of background or tools to properly teach pronunciation

(Gilakjani, 2011): they often do not know what aspects of pronunciation to focus on and how to teach them.

As Bakar and Abdullah (2015) mentioned, the unpopularity of pronunciation in FL teaching has led to a shortage of empirical studies exploring methods and tools to use in the classroom in order to improve the quality of pronunciation instruction. In this context, it is clear that more Second Language Acquisition (SLA) research on pronunciation can help instructors determine when to teach pronunciation, what aspects to focus on and what methods to use to teach them. In this regard, the present study, which empirically tests the efficacy of shadowing and embodied shadowing techniques, aims to contribute to providing the teachers with an effective pedagogical method to enhance learners' pronunciation skills.

In English as a Foreign Language (EFL) contexts, pronunciation started getting some attention in the 1950s and 1960s when some methods emphasizing its importance started to spread. Among them is the Audiolingual approach, a method consisting in the “behaviouristic drilling of sound contrasts and word pairs, and the articulation of individual sounds” (Gilakjani, 2011: 2). However, this new interest in pronunciation was soon neglected. With the fall of the Audiolingual method and the development of the Communicative approach in the 1970s, explicit phonological instruction in the classroom was no longer given, as teachers tended to believe that foreign learners would never achieve a native-like accent in the target language (Hsieh, Dong & Wang, 2013). Moreover, in the Audiolingual method, pronunciation instruction focused only on segmental aspects of speech (ie., the perception and production of distinctions between target sounds) and not on suprasegmental features such as rhythm, stress, and intonation. Even though many recent pronunciation trainings tend to center merely on segmental instruction, a number of empirical studies have emphasized the importance of teaching suprasegmental features.

Since the late 90's, some research has provided empirical evidence for the importance of suprasegmental instruction in improving L2 pronunciation. Particularly, they have been shown to benefit three specific aspects of pronunciation: comprehensibility, accentedness, and fluency. Comprehensibility can be defined as “the listener’s judgment of how difficult it is to understand an L2 speech production” (Derwing, Munro and Wiebe, 1998: 396), accentedness is related to the listener’s judgment of the extent to which L2 speech is different from native speakers’ pronunciation norms; and finally, fluency refers to the “speed and smoothness of oral delivery” (Lennon, 2000: 25).

Previous studies have shown that suprasegmental instruction helps learners improve their comprehensibility and fluency as well as reduce their foreign accent. Derwing, Munro, and Wiebe (1998) compared the effects of three types of pronunciation instruction on English as a Second Language (ESL) learners’ pronunciation ability: segmental (focusing on individual sound contrasts), global (focusing on speaking rate, intonation, rhythm, projection, word stress, and sentence stress), and no specific pronunciation instruction. Participants in the segmental and global groups received 20 hours of pronunciation instruction over a course of 12 weeks. All learners’ speech was sampled at the beginning and at the end of the ESL course. Statistical analyses revealed that both the segmental and global groups improved in comprehensibility and accentedness on a sentence-pronunciation task. However, only the global group showed significant improvement when spontaneous speech production was tested. A similar study carried out by Derwing and Rossiter (2003) found that only learners in the global instruction group remarkably improved their pronunciation in terms of comprehensibility and fluency after training. However, none of the groups showed significant gains in accentedness.

In a more recent study, Gordon, Darcy and Ewert (2013) investigated the benefits of explicit phonological instruction on L2 pronunciation. Three groups of ESL learners were given different types of explicit pronunciation instruction. The first group was trained on segmentals (i.e. vowel distinctions), the second on suprasegmentals (i.e. stress, rhythm, linking, reductions), whereas the third group received no explicit pronunciation instruction. The two experimental groups underwent a 3-week pronunciation training in which they were given explicit instruction for 25 minutes a day, three days per week. The results demonstrated that only the group that received suprasegmental instruction significantly improved in terms of comprehensibility from the pre-test to the post-test.

Even though the importance of suprasegmental instruction has been demonstrated, few empirical studies have compared the effectiveness of different pedagogical methods to improve L2 suprasegmental features. Some previous studies in the field of gesture research have shown that the development of pronunciation skills is more effective when embodied, that is, when it is integrated with bodily movements. Overall, a growing body of research suggests that the use of gesture is a beneficial tool for L2 learning. Gullberg (2006) pointed out that meaning-related gestures (ie. representational gestures) can play an important role as input to learners for comprehension as well as for learning. Beat gestures have been defined as a rhythmic hand and arm movements that are associated with prosodic prominence in speech (McNeill, 1992). As Llanes-Coromina et al. (2018) pointed out, beat gestures can help highlight prominent syllables and mark rhythm in L2 pronunciation instruction. Gluhareva and Prieto (2017) investigated the benefits of observing rhythmic beat gestures on the acquisition of L2 English pronunciation. Participants underwent brief audiovisual prosodic training in English in two within-subject conditions, the gesture condition and no gesture condition. Both groups were shown a video where

a L2 instructor gave spontaneous responses to discourse prompts with different levels of difficulty. While some of the items were produced with beat gestures that marked the relevant prosodically prominent syllables of the utterance, other items were presented without beat gestures, that is, with the instructor's hands in a neutral position. Statistical analyses revealed that difficult items that were trained with beat gestures significantly improved their accentedness scores after training. Specifically, rhythmic beat training helped participants produce difficult items in a more native-like manner in the post-training phase. This result seems to indicate that rhythmic embodiment through beat gestures might trigger an advantage for pronunciation learning.

The present study aims to investigate the efficacy of two training methods, namely shadowing and embodied shadowing. One technique among non-embodied instructional practices that have been proven to be effective for improving L2 learners' overall pronunciation is *shadowing*. Shadowing was introduced by Tamai (1992) and was originally used in order to train interpreters to listen and speak simultaneously. Afterwards, this technique was adopted as a teaching method for listening in Japan and its popularity started to grow increasingly throughout East Asian and international EFL contexts (Hamada, 2018). Shadowing has been defined as “a paced, auditory tracking task which involves the immediate vocalization of auditorily presented stimuli” (Lambert, 1992: 266; cited in Hamada, 2018). In other words, this pedagogical method consists in a highly demanding cognitive activity involving an “on-line process”, which requires L2 learners to replicate what they hear in a simultaneous fashion (Hamada, 2016a). In this respect, shadowing differs from traditional repetition tasks, which involve an “off-line process” (Hamada, 2016c). While performing shadowing, learners only focus on the phonological features (both segmental and suprasegmental) of what they listen to and do not pay attention to meaning, as they have “little cognitive resource left for higher processes such as accessing meanings and

comprehending the message” (Kadota, 2007; cited in Hamada, 2018). Since this technique does not require to focus on meaning, learners’ “cognitive load” is reduced and all their efforts can be directed to phoneme perception (Field, 2008; quoted in Hamada, 2016c: 16), which, as a result, will be enhanced (Hamada, 2012, 2014, 2016a). According to Miyake (2009), the mechanism which is activated when shadowing is dependent on the “phonological loop” (i.e. the component of the working memory dealing with sound related information), as this technique consists in retaining sequences of verbal items over short periods of time before rehearsal and immediately vocalizing them openly. Hamada (2016b) suggests that the phonological loop is essential to listening comprehension, and thus its reinforcement can contribute to enhance listening skills.

While the shadowing technique is effective for improving L2 learners’ phoneme perception as well as listening skills, a number of studies have shown that it can be also beneficial for L2 speech pronunciation (not only for perception) (Bovee & Steward, 2009; Zakery, 2014; Martinsen, Montgomery et al., 2017; Foote & McDonough, 2017). Bovee and Steward (2009) carried out a pilot study in which four hundred Japanese first and second-year student performed a 10-week individual shadowing training. The participants were asked to record themselves while performing the shadowing tasks and to send their recordings to their teachers via email. Prior to receiving any shadowing instructions and again after training, students recorded the same shadowing audio file. Among the participants who had completed the set of shadowing tasks, twenty-one were randomly selected and split into three group according to their level of proficiency: low, mid and high. Eight native English raters evaluated the students’ pre- and post-training recordings based on overall pronunciation quality (i.e., closeness to native-like pronunciation). The results revealed that shadowing training benefitted all three proficiency groups. However, low-proficiency learners showed the most significant gains. In another study, Zakery (2014) investigated the link between

shadowing and fluency of EFL learners' oral performance. Forty Iranian students with an intermediate level of English proficiency were divided into two groups: an experimental group performing shadowing of the listening and reading exercises in their English textbook, and a control group not performing any shadowing task. The participants underwent an eight-session training program over a course of one month. Results showed that the students in the shadowing group significantly improved their pronunciation in terms of fluency, and thus confirmed that there is a strong link between shadowing and this fundamental aspect of pronunciation. Martinsen, Montgomery and Willardson (2017) explored the effects of video-based shadowing on L2 intelligibility. Nineteen learners of French with an intermediate level of proficiency carried out a series of five- to- ten-minute pronunciation practice sessions three times per week over a course of ten weeks. In addition to these in-class whole-group sessions, in which the students performed tracking exercises¹, they participated in a weekly 20- to- 30-minute laboratory individual session, where they trained their pronunciation by shadowing online videos. Both before and after the training they performed a picture description task and a read-aloud task. The comparison between pre- and the post-training data showed an improvement in learners' pronunciation performance in both spontaneous and controlled speech in terms of fluency. Finally, Foote and McDonough (2017) investigated the role of an 8-week technology-assisted shadowing training in improving advanced English learners' pronunciation in terms of comprehensibility, fluency and accentedness. The results showed a remarkable improvement in comprehensibility and fluency but not in accentedness.

¹ "Tracking is a type of imitation activity in which learners listen to recordings of native speakers, follow along with subtitles or transcripts, and attempt to produce what the speakers are saying as closely as possible with as little delay as possible" (Martinsen, Montgomery and Willardson, 2017:665). In this study by Martinsen, Montgomery and Willardson, tracking and shadowing are similar tasks with the only difference being that, in tracking, students have to speak along while reading subtitles of the recordings in the target language, whereas, in shadowing, they have to repeat what they hear but slightly after the speaker.

While the aforementioned studies have shown positive effects of shadowing on the acquisition of L2 pronunciation in intermediate and advanced learners, more studies are needed to confirm this result. Firstly, only one of them (i.e. Zakery, 2014) included a control condition. Moreover, none of them explored the effectiveness of the shadowing technique as compared to another instructional method, specifically one integrating body movements. Some studies compared shadowing with another technique (e.g. listen-and-repeat), but they couldn't find significant differences between them (e.g. Iino, 2014; Hamada, 2016c). Secondly, only the latter among the abovementioned studies has assessed the effects of shadowing on L2 pronunciation based on all three main parameters for pronunciation evaluation, namely comprehensibility, fluency, and accentedness. Finally, only one shadowing training among the ones adopted in the previous studies used an audiovisual input (i.e. Martinsen, Montgomery and Willardson, 2017). The first goal of the present study aims is to determine whether non-embodied shadowing training is effective to improve L2 pronunciation in terms of fluency, comprehensibility and accentedness. Crucially, I wonder whether an embodied shadowing training which highlights L2 suprasegmental patterns can be more effective than non-embodied shadowing. Given the fact that some previous studies have not found significant differences between shadowing and other techniques for improving L2 pronunciation, and since shadowing training is a highly demanding cognitive activity, the present study will control for shadowing performance. I expect that learners who show good shadowing performance (i.e. when there is little lag time between the model speaker and the learner's repetition) will show the greatest improvements in pronunciation.

To my knowledge, only two studies have investigated whether encouraging bodily rhythmic movements while shadowing may benefit L2 pronunciation. Hamada (2018) explored the effect of "haptic shadowing" – namely, the act of "punching" stressed syllables while

shadowing an audio input – on comprehensibility as well as segmental and suprasegmental productions. Fifty-eight Japanese second-year students with a level of English proficiency from near-intermediate to intermediate participated in a fifteen-session prosodic training in which they studied a passage of 450-550 words focusing on segmental (i.e. specific sounds) and suprasegmental features (i.e. the placement of stress) and then shadowed a 40- to- 60-word passage. In the shadowing exercise, the participants, “air-punched” the most stressed syllable in the most stressed word (e.g. “We went to *Kyoto* on a school trip in June”) while repeating the passage they were listening to simultaneously. Statistical analyses revealed an improvement in all three features. However, this study lacked a control group to allow for a comparison between the gains obtained with embodied shadowing and those of non-embodied shadowing. In a study by Yamane et al. (2019), a group of learners of English was asked to mirror the beat gestures that were produced by a video recorded speaker while performing speech shadowing, whereas another group only shadowed the audio version of the same speech. Acoustic analyses showed that the embodied shadowing group increased its pitch range after training compared to the audio-shadowing group. Since no general measures of pronunciation were reported, further information on the effects of audiovisual embodied shadowing on intermediate and advanced learners is needed, as well as more in-depth reports of general pronunciation abilities (fluency, comprehensibility and accentedness).

As previously mentioned, a number of studies have demonstrated that prosodic training with manual beat gestures have a positive effect for improving L2 pronunciation. Similarly, the exploratory studies carried out by Hamada (2018) and Yamane et al. (2019) have shown that incorporating beat gesture in shadowing trainings seems to be beneficial. However, to my knowledge no previous studies have systematically compared the gains obtained between the two

types of training. Therefore, the main goal of the present study is to further examine the effects of an audiovisual embodied shadowing training on the pronunciation of intermediate and advanced learners of English. I hypothesize that observing and reproducing beat gestures while shadowing can be more effective for improving overall L2 pronunciation than performing shadowing alone. In addition, since shadowing training is a highly demanding cognitive activity, the present study will control for shadowing performance. I expect that learners who show good shadowing performance (i.e. when there is little lag time between the model speaker and the learner's repetition) will show the greatest improvements in pronunciation.

In order to test the hypotheses, fifty-four undergraduates were divided into two groups and underwent a 2-week shadowing training with six sessions in which they performed shadowing either with or without gestures. Although I believe that both groups will improve in reading fluency, comprehensibility and accentedness after training, we expect the gesture group, and especially “good shadowers”, to show the largest gains.

2. METHOD

The present study adopts a between-subjects pre-test and post-test design. Participants carried out an initiation session consisting of a reading pre-test task and a pre-training session followed by two weeks of shadowing training in which they performed three 15- to- 20-minute sessions per week for a total of six sessions over the course of two weeks. After the training, they performed the same reading task at post-test. A delayed post-test consisting of the same task was carried out one week after the post-test.

2.1 Participants

The participants involved in this study ($N = 54$; 45 females and 9 males) were undergraduates aged between 19 and 24 ($M = 19.9$; $SD = 1.22$) studying at the Faculty of Translation and Language Sciences of Universitat Pompeu Fabra, Barcelona. In the initiation session, participants were asked to fill out an online questionnaire which allowed the author to gather information about the participant's native language and to assess their level of English proficiency. The questionnaire showed that most students were bilingual speakers of Catalan/Spanish with a mean Catalan dominance of 62%. As for their English proficiency level, participants were asked which score they had gotten in the Prova Passaport test that translation students at UPF are required to take in order to apply for an ERASMUS+ grant. The results revealed that the level of English proficiency ranged between B2 and C2 CEFR levels (B2: 21; C1 = 26; C2: 3; ND: 4)

2.3 Materials

In this section, the materials used in the pre-test, the post-test, the delayed post-test and the training will be presented. For all training sessions as well as the pre-test, the post-test and the delayed post-test, a total of seven narrations (one for the pre-test, the post-test and the delayed post-test, and six for the training) about two cats were used (see Appendix A). These 130- to- 150-word narrations were based on a series of comic strips adapted from *Simon's Cat* by Simon Toefield (see Figure 1). After creating the narrations, which included pronunciation features which might be difficult to pronounce for non-native English learners, seven native English speakers rated them on a 7-point scale (1 meaning very easy and 7 meaning very difficult) in order to assess their degree of difficulty in terms of comprehension, pronunciation and accuracy in describing the comic images. An average score calculated for each narration allowed the authors to order them from easiest to hardest. The comic narration selected for the pre-test, the post-test and the delayed post-test were the ones who had gotten the lowest scores on the scale. Thus, participants were tested on relatively easy texts. On the contrary, the items used in the training had an increasing level of difficulty.



Figure 1. Example of a comic strip used in the training.

2.3.1 Pre-test, Post-test and Delayed Post-test

In the pre-test, participants performed a *read speech task* consisting in reading aloud a narration of approximately 150 words. The post-test included the same read speech task (with the same narration) they had carried out in the pre-test. The delayed post-test consisted, again, in a reading aloud task and was carried out approximately one week after the last training session and the post-test. The pre-test, the post-test and the delayed posted were performed with the help of a PowerPoint containing a brief description of what they would be doing throughout the session as well as instructions on how to carry out the read speech task.

2.3.2 Pre-training

This pre-training session, which helped the participant get an insight into shadowing. First, participants were explained what shadowing was, emphasizing that attention should not be placed on the content of speech, but rather the speech sounds they hear. They were then shown an example of someone shadowing, followed by a set of six short exercises – three in either Catalan or Spanish and three in English – with different levels of difficulty and sorted from the easiest to the hardest. In each exercise, the participants performed shadowing one time while reading the text and then two times without reading it with the help of a PowerPoint.

2.3.3 Training Videos

The actual training materials consisted of six videos of a male native American English speaker reading a comic narration aloud at a normal speech rate. The videos were recorded in a

professional broadcasting studio at Universitat Pompeu Fabra. In order to create the audiovisual input for both conditions (Gesture group and No-gesture group), the speaker was filmed with his face and upper body visible. The difference between the stimuli for the two conditions was that in the gesture condition video prompts the speaker accompanied speech with beat gestures (see Figure 2), whereas in the No-Gesture condition video prompts the speaker had his hands in a neutral position and did not move them (see Figure 3)².

In order to determine what lexical items to affiliate hand movements with in the Gesture condition videos, the same native English speakers who evaluated the comic narrations filmed themselves while reading each of the six passages used in the training sessions. The speakers were explicitly told to be expressive with their hands while reading the texts aloud. After collecting the videos, they were analyzed and a gesture heatmap was created. When the same word was accompanied by gestures by a majority of the native English speakers' videos, it was decided to have the speaker in the actual video prompt for the gesture condition associate that word with a beat gesture.



Figure 2. Gesture condition.



Figure 3. No-Gesture condition.

² The No-Gesture condition videos are the ones used by Sharon Gutiérrez in the experiment she carried out for her master's thesis (2019).

2.3.4 Control measures

Two questionnaires were used as control measures to assess individual differences among participants. An initial questionnaire (see Appendix B) allowed the authors to gather information about the participants' L1 (if they were Catalan dominant or Spanish dominant) and their English background. In the first part of the questionnaire, students were asked various questions about their level of English proficiency, the length of time they had studied English, whether they had any English certificate and if they had spent any time abroad. The survey consisted of either "yes/no" questions or short-answer responses. In order to quantify the English experience of each participant, the yes/no questions were scored with either 1 if the response was *yes* or 0 if *no*. In addition, 1 point was counted for every year participants had studied English and for each unique study-abroad experience. Additional points were given for the total time spent abroad. Thus a higher score indicated more English experience.

A final questionnaire (see Appendix C) helped gather information about participants' motivation and performance during the training. A different survey for each condition was created. Students in both groups were asked to indicate on a 7-point scale with 1 meaning not *at all* and 7 meaning *a lot* whether they liked the shadowing training, if they thought it was helpful and whether they felt shy, nervous or uncomfortable having to film themselves. Additionally, participants in the gesture group were asked how difficult it was from 1 to 7 to perform gestures with the speaker in the training videos, whereas students in the No-Gesture group had to indicate how hard it was to speak simultaneously with him. The last question for both groups dealt with Covid-19 situation: students were asked whether they thought that the virus affected their performance in the training.

2.4 Procedure

The shadowing activity to train pronunciation was part of the participants' English class. Their English teachers gave them information about the activity and its timeline so that they would be able to carry it out autonomously.

Students were tested and trained individually through online surveys. They were firstly asked to get access to a laptop with speakers, a microphone, and a webcam. In order to be able to film themselves, they were also suggested to download a free software (*Filmora Scrn*) which would allow them to record themselves as well as their computer screen. The materials were provided to the students using Google Drive. A folder containing the pre-test and the pre-training materials was created and shared with the students. Also, an individual empty folder was created for each student, in order to allow them to share their video recordings with the authors after completing every session. In order to allow me to collect their recordings and include their data in the present paper, students submitted written consent.

The study followed a pre-/post-test design (see Figure 3 for the experimental procedure). First of all, the participants carried out a 15- to- 20-minute pre-test. In the read speech task, they started by reading the text silently to themselves one time in order to ensure that there were no vocabulary or pronunciation issues, and then they were asked to read it aloud. Afterwards, they filled out the questionnaire about their linguistic and musical background. Prior to starting the actual training, the participants performed a pre-training session in which they were given basic

information on the shadowing technique and had the opportunity to practice it first in their native language and then in English in order to get familiar with it.

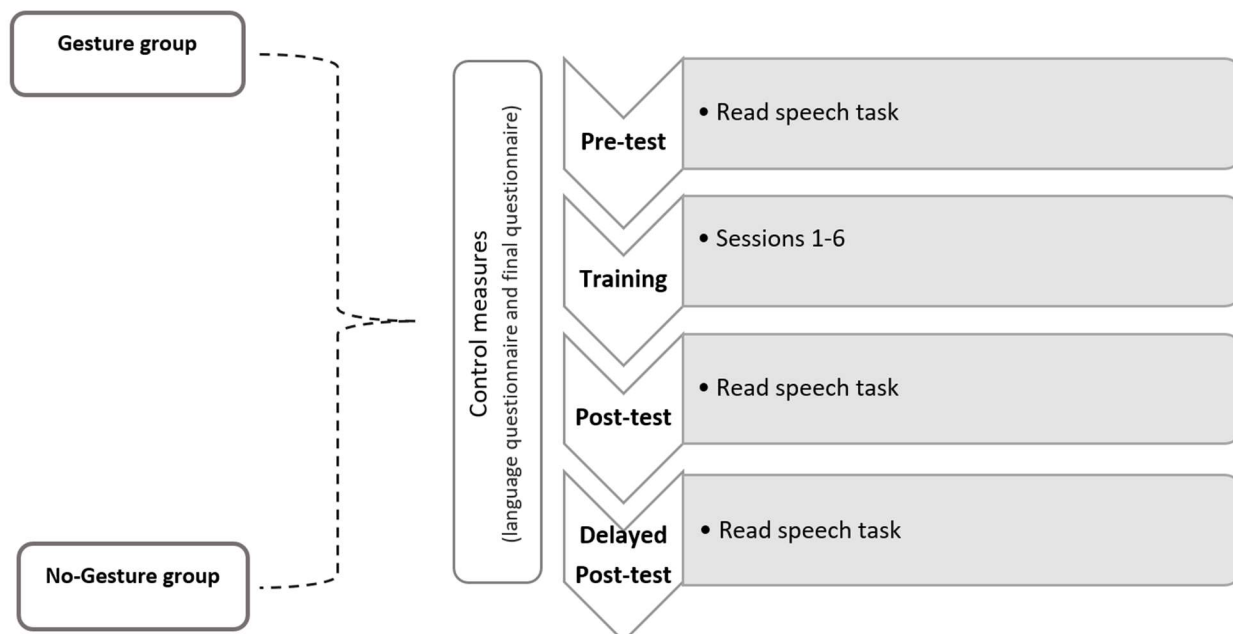


Figure 3. Experimental procedure.

Once the students completed both the pre-test and the pre-training and uploaded their videos to their individual folder, they were evaluated so as to divide the participants into two balanced groups. In order to guarantee that the participants in the two conditions (shadowing and embodied shadowing) were balanced with respect to their pronunciation and shadowing abilities, the pre-test videos (read speech task) were evaluated on a 7-point scale based on general pronunciation with 1 meaning *very inaccurate pronunciation* and 7 meaning *excellent pronunciation*. The pre-training videos were also evaluated in order to be sure that the students knew how to shadow correctly before starting the training. The scores for shadowing skills were given on a 5-point scale based on the ability to keep up with the speaker and shadow as simultaneously as possible. If there was a complete overlap between the target speech and the

repetition, the participant got the highest score on the scale, whereas if there was a very long lag time between the target speech and the repetition, the participant was given the lowest score on the scale. The students received feedback on how they performed the shadowing technique in the pre-training session so that they could perform better in the training, and thus gain maximum benefits from it. After obtaining a preliminary score for pronunciation and one for shadowing skills, the author placed each participant in either one or the other group (Gesture or No-Gesture) so that they did not differ significantly across groups. A Mann-Whitney U test showed that there was no significant difference in the scores for perceived pronunciation ($U = .626$; $p = .691$) and shadowing skills ($U = .614.50$; $p = .604$) between the two groups.

Approximately two weeks after carrying out the pre-test and the pre-training, the students were given access to the first training session. A Google Drive folder was created for each session. Each folder contained the training video, a corresponding transcription of the video with a cartoon image sequence, a translation of the transcription in Catalan and a sheet containing comprehension questions about the narration. The training videos for the G group and the ones for the NG group were placed into separated folders (I created a total of twelve folders: six for the G group and six for the NG group). As with their pre-test and the pre-training videos, the students uploaded their recordings of each training session to their personal folder. In order to prevent the participants from carrying out all the sessions in a row – which might affect the effectiveness of the training, I waited forty-eight hours after receiving the recording of a session before sharing the following one. In summary, students carried out a training session every two days for a total of three sessions a week over the course of two weeks. Each training video had a duration of 20- to- 30 minutes and comprised nine steps. The shadowing procedure adopted in this study (see Figure 4) is based on the one proposed by Hamada (2016a).

Steps	Instructions
1	Watch the video and answer the comprehension questions
2	Mumbling repetition
3	Parallel repetition
4	Check the text for content
5	Three rounds of repetition
6	Check the text to review any pronunciation issues
7	Final repetition with focus on both content and pronunciation
8	Final listen and reflection
9	Final reading aloud

Figure 4. Shadowing procedure used in the experiment.

In step 1, the participants listened to a native English speaker telling a comic narration and answered six comprehension questions. In step two, they performed simultaneous mumbling of the same narration, that is, they shadowed it with a quiet voice. In step 3, students read the transcript of the narration while listening to it. In step 4, they reviewed the text for two minutes to make sure they understood its content (they were also provided with a translation in Catalan). In step 5, the participants shadowed the text three times in a row without reading it. In step 6, they review the text again, this time focusing on difficult sounds. In step 7, they performed the last simultaneous repetition paying attention to both the sound and the meaning. In step 8, they reflected on their pronunciation while listening to the passage one last time. Finally, in step 9, they read the text aloud. Each video included instructions on the steps as well as examples, so that the participants could carry out the whole remote training easily and correctly. Both groups followed the same steps in each of the six training session with the only difference being that the G group was encouraged to mirror the speaker’s gestures while simultaneously repeating his words.

Immediately after completing the last training session, the participants carried out a 15-minute post-test, which followed almost the same procedure as the pre-test. Students performed a read speech task and filled out a questionnaire. The text which the participants were asked to read aloud was the same they had read for the pre-test.

One week after the post-test, students performed the very last session of the experiment: the delayed post-test. As in the pre-test and the post-test, also in this session, the participants performed a read speech task.

2.6 Pronunciation ratings

The rating materials consisted of a set of online surveys (9 in total) created with *SurveyGizmo*. The surveys contained audio samples from the pre-test, the post-test and the delayed posttest for each participant presented in a random order and multiple-choice questions on their comprehensibility, fluency, and accentedness (see Appendix D).

The participants' recordings from the pre-test, the post-test and the delayed post-test were rated by three native American English speakers (two females and one male) over the course of two weeks. Prior to evaluating the samples, the raters attended an online training session for pronunciation rating. This training, in which the raters received instructions on what they would be rating and how, was carried with the aim of having them evaluating the recordings in a homogeneous way. After being provided with a definition of comprehensibility, fluency and accentedness and some examples of good, intermediate and poor pronunciation in terms of these three parameters, the raters had the opportunity to do some practical exercises.

In the surveys, the raters were asked to evaluate the comprehensibility, the fluency and the accentedness of 162 speech samples from the read speech task on a 9-point scale. For comprehensibility, 1 meant *very comprehensible* while 9 *not comprehensible at all*. For fluency, 1 corresponded to *very fluent* whereas 9 corresponded to *not fluent at all*. Finally, for accentedness, 1 meant *native-like* while 9 *strong foreign accent*. For each participant, the raters listened to three recordings entirely in order to get a general idea of the student's pronunciation ability. Then, they listened to the samples again for 10 seconds focusing on comprehensibility in order to be able to rate this specific aspect of the participant's pronunciation. Afterwards, they rated fluency and accentedness by following the same procedure.

After the rating process, inter-rater reliability among the three raters was measured. Cronbach's alpha statistic revealed that the degree of agreement among the raters' evaluations was acceptable ($\alpha = .648$).

2.7 Statistical analyses

Three Generalized Linear Mixed Models (GLMMs), one for each feature (fluency, comprehensibility, and accentedness), were run using SPSS Statistics 25.0 (IBM Corporation, 2017). In all three models, Time, Condition, Shadowing Performance, Time*Condition, Time*Shadowing Performance, Time*Condition*Shadowing Performance were set as fixed factors, and Participants and L2 Level as random effects.

3. RESULTS

3.1 Effects on fluency

The results of the GLMM analysis for fluency showed a significant interaction between Time and Shadowing Performance ($F(2, 357) = 8.014, p < .001$). Post-hoc analyses revealed that only good shadowers improved from pre-test to post-test ($t(357) = 4.990, p < .001$), and from pre-test to delayed post-test ($t(357) = 4.501, p < .001$) with no significant difference between post-test and delayed post-test. Poor shadowers showed no significant differences in fluency across time. Figure 5 shows the mean fluency scores separated by Shadowing Performance (good shadowers and bad shadowers) and Time (pre-test, post-test and delayed post-test). It is important to bear in mind that in this study higher scores are indicative of lower performance (the ratings were carried out on a 9-point scale with 1 meaning *very fluent* and 9 *not fluent at all*).

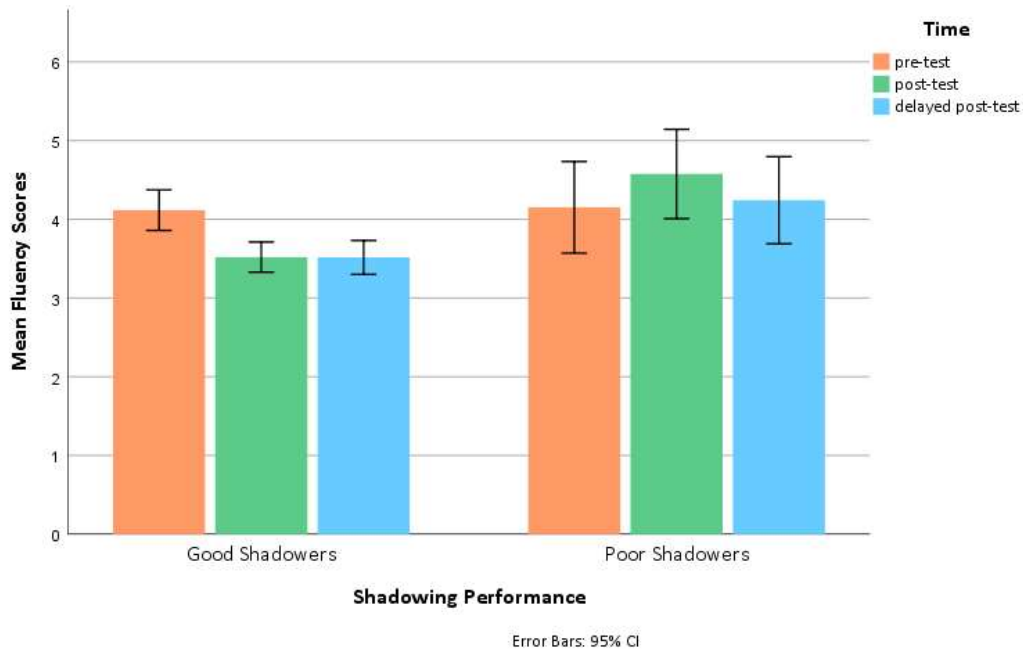


Figure 5. Mean fluency scores separated by Shadowing Performance and Time.

3.2 Effects on comprehensibility

The results of the GLMM analysis for comprehensibility showed a significant main interaction between Time and Shadowing Performance ($F(2, 357) = 7.929, p < .001$). Post-hoc analyses of the interaction revealed that good shadowers performed significantly better from pre-test to post-test ($t(357) = 3.129, p = .006$), and from pre-test to delayed post-test ($t(357) = 3.051, p = .006$). Poor shadowers did significantly worse from pre-test to post-test ($t(357) = -2.825, p = .015$) and then significantly improved from post-test to delayed post-test ($t(372) = 2.592, p = .02$) with no significant difference between pre- and delayed post-test. Moreover, good shadowers performed significantly better than poor shadowers at post-test ($t(357) = -2.184, p = .03$). Figure 6 shows the mean fluency scores separated by Shadowing Performance (good shadowers and bad shadowers) and Time (pre-test, post-test and delayed post-test). It is important to bear in mind that in this study higher scores are indicative of lower performance (the ratings were carried out on a 9-point scale with 1 meaning *very comprehensible* and 9 *not comprehensible at all*).

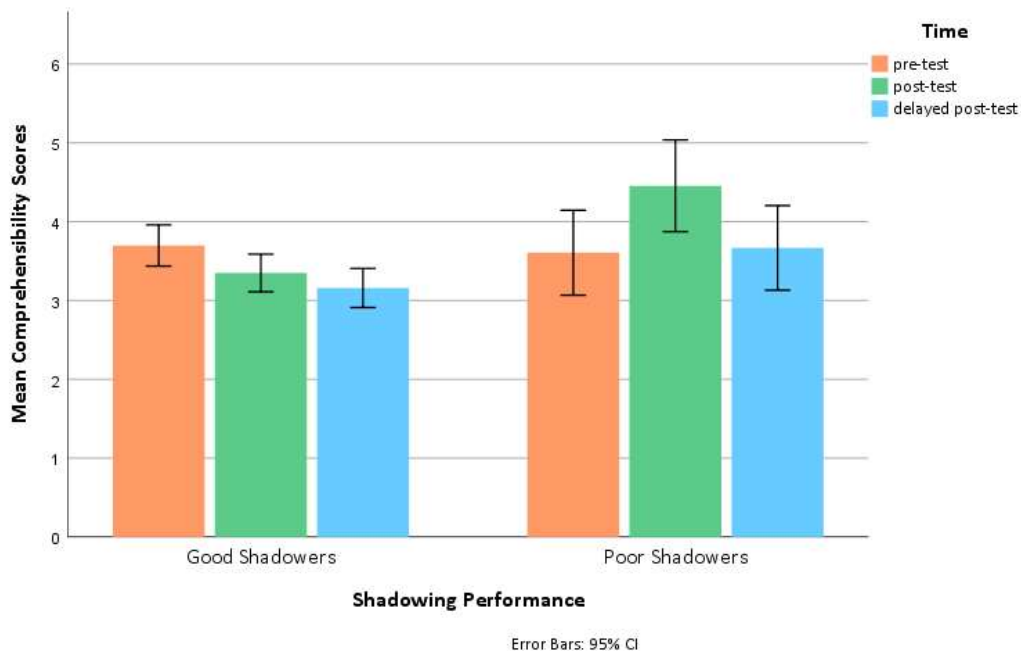


Figure 6. Mean comprehensibility scores separated by Shadowing Performance and Time.

3.3 Effects on accentedness

The results of the GLMM for accentedness showed a significant interaction between Time and Shadowing Performance ($F(2, 357) = 4.003, p = .019$). Post-hoc analyses revealed that only good shadowers significantly improved from pre-test to post-test ($t(357) = 2.718, p = .021$). Figure 7 shows the mean accentedness scores separated by Shadowing Performance (good shadowers and bad shadowers) and Time (pre-test, post-test and delayed post-test). It is important to bear in mind that in this study higher scores are indicative of lower performance (the ratings were carried out on a 9-point scale with 1 meaning *native-like/no accent* and 9 *strong foreign accent*).

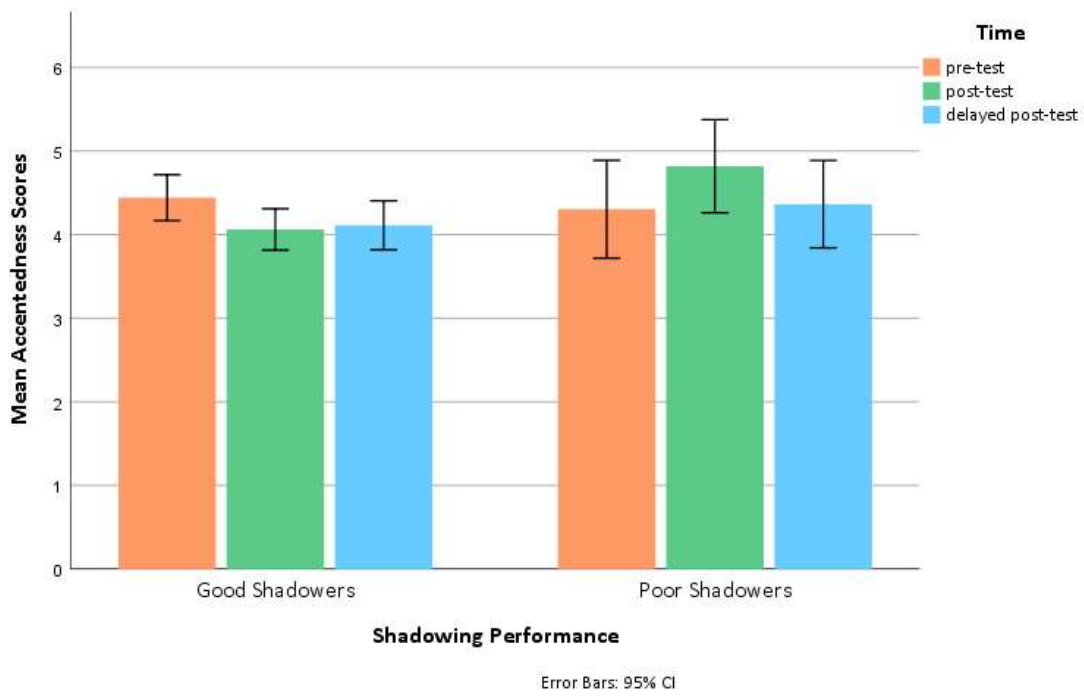


Figure 7. Mean accentedness scores separated by Shadowing Performance and Time.

4. DISCUSSION AND CONCLUSION

Although previous studies have shown the positive effects of shadowing on the acquisition of L2 pronunciation, none has explored the effectiveness of the shadowing technique as compared to another instructional method, specifically an embodied shadowing technique. As far as I know, only two studies have investigated the effects of embodied shadowing on L2 pronunciation. Even though both showed that embodied shadowing can benefit pronunciation, only one of them included a control condition while the other did not examine the effects of embodied shadowing training on specific pronunciation features, such as fluency, comprehensibility and accentedness. Therefore, the present study aimed to assess whether a two-week embodied shadowing training compared to a non-embodied shadowing training could help intermediate and advanced learners improve their English pronunciation in terms of fluency, comprehensibility and accentedness.

Fifty-four undergraduates were divided into two homogeneous groups based on their pronunciation skills and shadowing ability at pre-training. One group undertook 6 shadowing training sessions with gesture while the other group undertook the same shadowing training sessions without gestures. Shadowing performance was rated on a 5-point scale with 1 *meaning poor shadowing ability* and 5 *meaning excellent shadowing ability*. Statistical analyses revealed that students with good and excellent shadowing performance (3 to 5 points) significantly improved from pre-test to post-test and from pre-test to delayed post-test in fluency and comprehensibility. Good shadowers also showed significant gains in accentedness from pre-test to post-test. These results corroborate the hypothesis that learners who perform shadowing more accurately, that is, with little lag time between their repetition and the target speech, show the greatest improvements in overall L2 pronunciation. Moreover, in addition to doing significantly better than poor shadowers at post-test, good shadowers also maintained their improvement from

post-test to delayed post-test. In contrast, poor shadowers showed no significant differences in fluency across time and they even did worse in comprehensibility from pre-test to post-test. In sum, the results of the three GLMMs showed a significant interaction between Time and Shadowing Performance. Post-hoc analyses revealed that good shadowers significantly improved in all three measures across time: significant gains in fluency were shown from pre-test to post-test ($p < .001$); then, noticeable improvement in comprehensibility was shown from pre-test to post-test ($p = .006$); finally, remarkable gains in accentedness were shown from pre-test to post-test ($p = .021$).

Contrary to my expectations, this study could not demonstrate that observing and reproducing beat gestures while shadowing is more effective for improving overall L2 pronunciation than performing shadowing alone, as no interaction between Conditions (Gesture and No-Gesture) and Time (pre-test, post-test) was obtained for any of the three measures (fluency, comprehensibility and accentedness). A potential explanation for the impossibility to demonstrate the superiority of embodied shadowing over non-embodied shadowing could be the fact that shadowing is in itself a highly demanding cognitive activity and producing it with rhythmic beat gesture can represent an added difficulty. An analysis of the final questionnaires confirms this hypothesis, as 52% of the students in the Gesture group found it difficult to perform gestures with the model speaker. Importantly, even though embodied shadowing does not seem to be more effective than non-embodied shadowing, statistical analyses clearly showed that, as far as the shadowing performance is accurate, both techniques are beneficial for improving overall L2 pronunciation. Interestingly, both groups appreciated the training equally (mean score across conditions: 5 points) and believed that the training was beneficial for their L2 pronunciation improvement (mean score across conditions: 4 points).

The present study shows some limitations. First, this study only took into account students' shadowing performance at pre-test, but future studies could also consider the participants' shadowing performance during the actual training. Monitoring students' performance during the training to check whether they are carrying out the repetition simultaneously and giving them corrective feedback could help reduce the number of poor shadowers and is an important feature to take into account for the application of this technique in the FL classroom. Since good quality training is crucial for improving pronunciation, minimizing the lag time between the input and the students' repetition while shadowing could ensure them to achieve optimal results. Also, a more extensive training could have given students the opportunity to practice shadowing during a longer time and could have helped them master this technique, thus gaining maximum benefits from it. I would like to entertain the hypothesis that if bodily movements are integrated into the training once students are already familiar with shadowing and are able to perform it accurately, gestures might represent an added value (and not an added difficulty), and thus be able to play a crucial role in improving pronunciation, more than shadowing alone.

In sum, the present study has been the first one including a control group to explore the effects of embodied shadowing on fluency, comprehensibility and accentedness. Its findings reinforce previous findings by demonstrating that embodied shadowing is beneficial for improving L2 pronunciation. Crucially, this study has shown that the shadowing training, either embodied or non-embodied, is only effective when shadowing is performed correctly. What is also novel about the present work is that it is the first study on shadowing in which improvements in pronunciation have a lasting effect from post-test to delayed post-test in good shadowers.

In conclusion, although the present study could not demonstrate that embodied shadowing is more effective for improving overall L2 pronunciation than non-embodied shadowing, its

findings are encouraging in the sense that both techniques triggered a substantial improvement in L2 pronunciation for good shadowers, providing a basis for further research.

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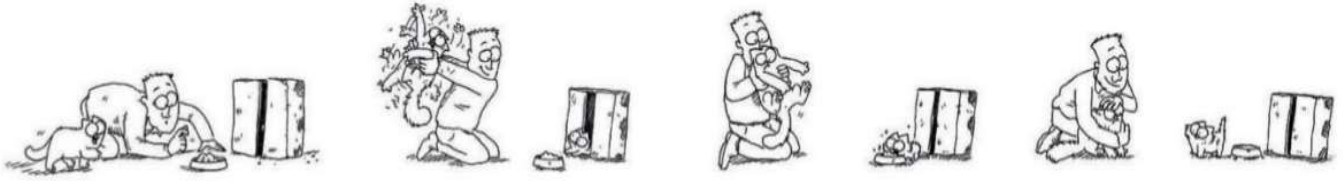
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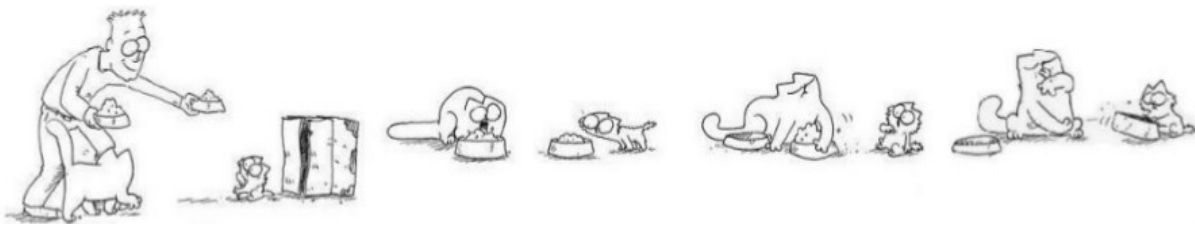
Appendix A: Comic narrations

Pre-test, post-test and delayed post-test narration for the reading task



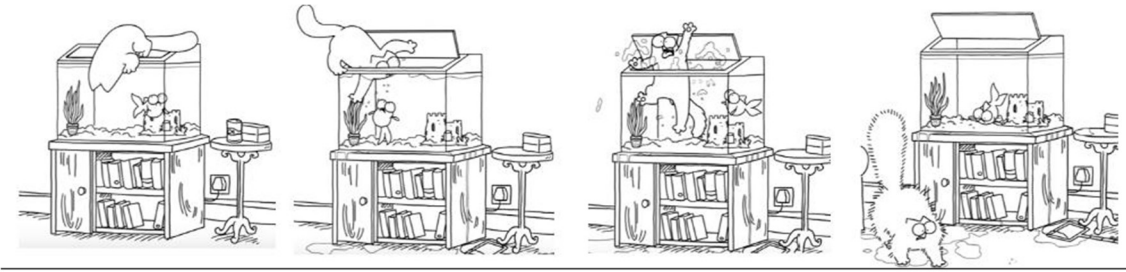
First, there is a man on his knees looking at an empty box. The man is holding a little piece of food toward the box. In front of the man is a bowl of cat food, and next to him there is a cat who is looking at the food. Next, we see that the box has opened, and a little kitten is sticking his head out. The man is sitting up on his knees and is holding the cat. The cat is screaming and waving his arms. Then, we see that the kitten has come out of the box and is eating the food. The man is now holding the cat in front of him. They are calmly watching the kitten eat. Finally, the kitten has finished all of the food. He is looking at the other cat, now sitting in front of the man.

Training session 1



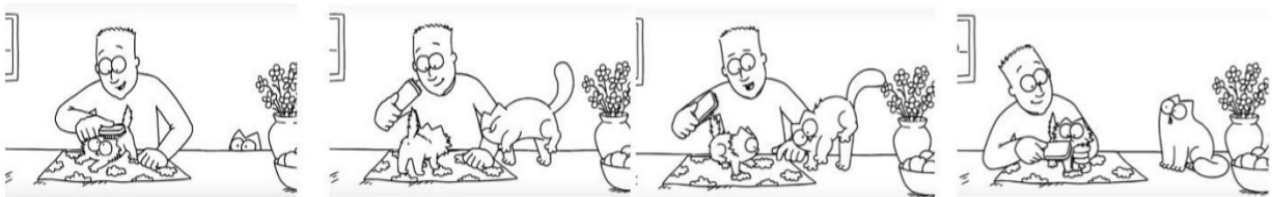
First, we see a man bringing food to his two cats. A large cat is walking in front of the man. A smaller kitten is patiently sitting to the man's left. Next, we see both cats at their food bowl, on the ground. The larger cat is eating his food while also looking at the kitten's bowl. The smaller kitten hesitantly smells their food bowl. Then, we see that the large cat has moved his empty bowl aside and has moved the kitten's full bowl in front of him. The kitten looks surprised. Finally, we see the kitten is sad and looking inside his empty bowl. The larger cat is licking his arm.

Training session 2



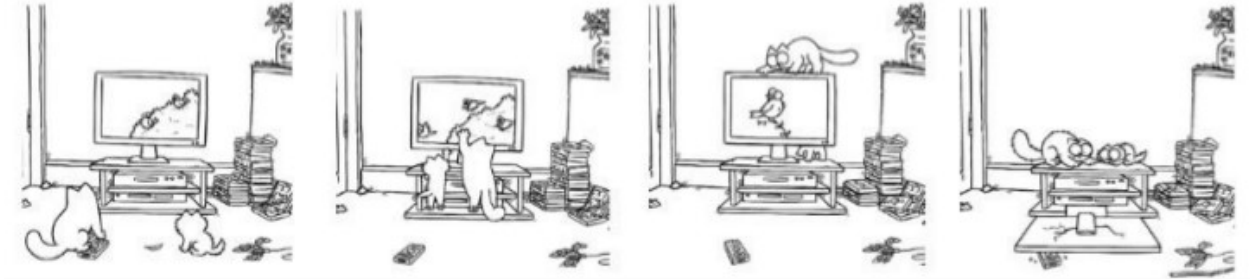
First, we see a fish tank on top of a bookshelf. There is a cat who has climbed on top of the fish tank and is looking inside of it. Inside the fish tank there is a fish, a small castle, and a plant. Next, we see that the cat has opened the cover of the fish tank and is reaching into the tank. The cat tries not to get too wet while the fish looks at him a little bit nervously. Then, we see that the cat has fallen into the fish tank and looks really scared. The cat is moving their arms and legs trying to get out. Finally, the cat is on the ground, looking terrified and their fur is wet and frizzy.

Training session 3



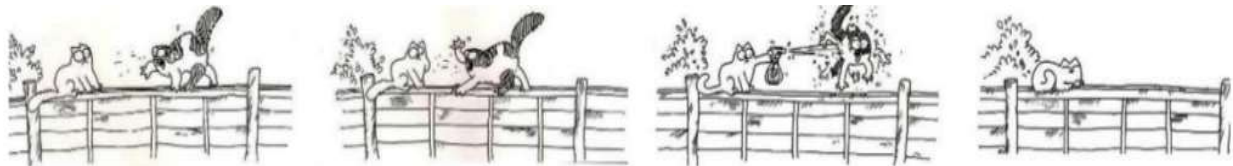
First, we see a man standing at a countertop. In front of him is a small kitten. The man is brushing the small kitten's back. To the man's left, we see a small flower vase and a bowl of fruit. Next to the vase, we see the head of a cat peeking over the counter. Next, we see the larger cat is on the countertop, his eyes are closed, and he is rubbing himself against the man's arm. The small kitten has turned around and is now facing the man. Then we see the large cat has opened his eyes and has a shocked look on his face. The kitten has turned to face the large cat. Finally, we see the large cat sitting next to the flower vase with a disappointed look on his face. The kitten is sitting in front of the man, who has resumed brushing his chest.

Training session 4



First, we see a large television on an entertainment system. On the television screen, we see two birds. Next to the television there are two stacks of magazines, and a shelf with a flower vase. A cat and a small kitten are sitting in front of the TV. Next, we see that the television screen shows three birds. Both the cat and the kitten have climbed onto the entertainment system. The larger cat is reaching his hand towards the screen. Then, we see the TV screen shows one bird on a branch. The large cat has climbed on top of the TV screen and is looking down at the bird, while the kitten is behind the television. Finally, we see the two cats on the entertainment system, both of them looking shocked. The TV has fallen, with the screen flat against the ground and the back of the television cracked.

Training session 5



First, two cats are on a wall facing each other. There is a bush behind a white cat towards the left. The cat on the right has 3 black spots: one on his head, one on his left leg, and one on his tail. The spotted cat is hissing at the white cat, who looks worried. Next, the spotted cat moves closer to the white cat. He has his hand raised in the air, about to attack. The white cat has his hand out of view,

behind him. Then, the cat on the left pulls out a spray bottle and is shooting water at the spotted cat. Surprised, the spotted cat is jumping in the air. Finally, we see the white cat lying down on the wall, smiling.

Training session 6



First, we see two cats. A large cat is pointing and laughing at a kitten. The kitten is sitting down, wearing a large cone around his head. Next, we see the small kitten trying to get the cone off of their head with their feet. The larger cat is laughing and has both hands on their hips. Then, we see the kitten has gotten their head out of the cone, which is flying towards the larger cat. The larger cat is backing away and looks scared. Finally, we see the kitten laughing and pointing at the large cat, which is inside of the cone with their head sticking out of the small hole at the top, and the tail sticking out at the bottom.

Appendix B: Initial Questionnaire

Language Questionnaire

Dades generals

1. Nom i cognoms *

2. T'identifiques com: *

Home

Dona

Altre – especifica'l:

3. Edat *

4. Adreça electrònica *

5. Telèfon de contacte

6. Lloc de naixement *

7. Lloc de naixement dels teus pares o tutors legals *

Mare:

Pare:

Tutor/s:

8. Lloc de residència actual *

9. Si no és el mateix lloc on vas néixer, quant temps fa que hi vius? *

Dades lingüístiques

10. Quina llengua parles amb els teus pares o tutors legals? *

Català

Castellà

Altres – especifica-les:

11. Si a casa parles tant català com castellà, més o menys, a quin percentatge parles català i a quin castellà? *

Català

Castellà

12. En quina llengua et sents més còmode?

Català

Castellà

13. Parles altres llengües des de la teva infància (ets multilingüe)? *

Sí – especifica-les:

No

14. En quina llengua somies? *

15. Si tingués un animal de companya, en quina llengua li parlaries?

16. Quines altres llengües saps? (indica el teu nivell de coneixement de A1 a C2) *

Nivell d'anglès

17. Durant quants anys has estudiat anglès en la teva formació? *

18. Has fet classes fora de l'escola/universitat? (Per exemple, a una acadèmia o classes particulars?) *

Sí – especifica durant quants anys les has fet:

No

19. Has fet estades a l'estranger? *

Sí – especifica quantes, on les has fet i la durada:

No

20. Llegeixes llibres en anglès? *

Sí – especifica quants n'has llegit el darrer any:

Non

21. Veus pel·lícules o series en anglès? *

Sí – especifica durant quantes hores per setmana les veus:

No

22. Les veus subtítulades?

Sí – especifica en quina llengua:

No

23. Tens algun títol oficial de nivell d'anglès? *

Sí – especifica el nivell:

No

24. Quina nota has tret a la prova passaport? (Si no te'n recordes, contacta amb Secretaria)

Appendix C: Final Questionnaire

Gesture group

1. Full name *

2. How did you like the shadowing training? *

1 (not at all)

7 (a lot)

Please write any additional comments you may have about Question 2:

3. How do you think shadowing improved your pronunciation? *

1 (not at all)

7 (a lot)

Please write any additional comments you may have about Question 3:

4. How difficult was it to perform the gestures with the speaker? *

1 (not difficult
at all)

7 (very
difficult)

Please write any additional comments you may have about Question 4:

5. Did you feel shy, nervous, or uncomfortable having to film yourself? *

1 (not at all)



7 (a lot)

Please write any additional comments you may have about Question 5:

6. Do you think the Coronavirus situation affected your performance in the training? *

1 (not at all)



7 (a lot)

Please write any additional comments you may have about Question 6:

No-Gesture group

1. Full name *

2. How did you like the shadowing training? *

1 (not at all)

7 (a lot)

Please write any additional comments you may have about Question 2:

3. How do you think shadowing improved your pronunciation? *

1 (not at all)

7 (a lot)

Please write any additional comments you may have about Question 3:

4. How difficult was it to speak simultaneously with the speaker? *

1 (not difficult
at all)

7 (very
difficult)

Please write any additional comments you may have about Question 4:

5. Did you feel shy, nervous, or uncomfortable having to film yourself? *

1 (not at all)



7 (a lot)

Please write any additional comments you may have about Question 5:

6. Do you think the Coronavirus situation affected your performance in the training? *

1 (not at all)



7 (a lot)

Please write any additional comments you may have about Question 6:

Appendix D: Example of a rating survey

1. Listen to the first recording



2. Listen to the second recording



3. Listen to the third recording



2. Rate the comprehensibility of the first recording. *

	1	2	3	4	5	6	7	8	9	
Very comprehensible	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	not comprehensible at all

3. Rate the comprehensibility of the second recording. *

	1	2	3	4	5	6	7	8	9	
Very comprehensible	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	not comprehensible at all

4. Rate the comprehensibility of the third recording. *

	1	2	3	4	5	6	7	8	9	
Very comprehensible	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	not comprehensible at all

5. Rate the fluency of the **first** recording. *

	1	2	3	4	5	6	7	8	9	
Very fluent	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	not fluent at all

6. Rate the fluency of the **second** recording. *

	1	2	3	4	5	6	7	8	9	
Very fluent	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	not fluent at all

7. Rate the fluency of the **third** recording. *

	1	2	3	4	5	6	7	8	9	
Very fluent	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	not fluent at all

8. Rate the accentedness of the **first** recording. *

	1	2	3	4	5	6	7	8	9	
Native- like / No Accent	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strong foreign accent

9. Rate the accentedness of the **second** recording. *

	1	2	3	4	5	6	7	8	9	
Native- like / No Accent	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strong foreign accent

10. Rate the accentedness of the **third** recording. *

	1	2	3	4	5	6	7	8	9	
Native- like / No Accent	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strong foreign accent