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Iconic or beat gestures? A study on the role of gesture in Second Language Acquisition (SLA)

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Bachelor's thesis

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Introduction

Because of globalization, people become more and more connected and can more easily be in contact with different people from all over the world. However, not everyone speaks the same language. In order to communicate effectively in different aspects of society it is important that people learn to speak a second language. For the acquisition of a second language (SLA), it could be useful to focus on gestures. Gestures are part of non- verbal communication and communication is multimodal so not only speech but also gestures are a part of communication. Gestures exist in a large variety with different implications, therefore several researchers have tried to categorize gestures into different categories. One of these categories is gesticulations, which is relevant for this research. (e.g. Gullberg 2008, McNeill 1992). The role of gesticulations in communication has been investigated by previous research. It has been demonstrated that gestures cannot only be seen as a communicative device, but can also have additional functions. For example, it has been shown that gestures' close relationship to speech means it can possibly contribute to learning processes. More specifically, prior research has shown that gestures are useful to learn a first language (Tellier 2005), so it would be logical to find out whether gestures can also help for learning a second language. Methods such as matching iconic gestures with novel verb meaning (Goodrich and Kam 2009) and video tasks for word learning with speech accompanied by an iconic gesture/ no gesture and repeating it with/ without gesture (Tellier 2008) have shown an effect of gestures for word learning in a second language (L2). Kelly, McDevitt and Esch (2009) performed a study on verb and noun recall in SLA, whereas Kushch and Prieto Vives (2016) described the effect of beat gestures in combination with focal pitch accents in SLA. Another study by Gluhareva and Prieto (2017) focused on the effectiveness of beat gestures in SLA processes. These studies have all shown evidence for the usefulness of gestures in SLA. Moreover, it has been shown that type of gesture could matter for specific aspects of SLA, such as beat gestures could be useful for pitch accents (Leonard and Cummins 2011, Roustan and Dohen 2010, McClave 1994) and iconic gestures could help for word learning (McNeill 1992) The literature has thus shown that different types of gestures can be used for learning a specific aspect of a second language. However, the comparison of the usefulness of gesture types such as beats and iconic gestures for word learning in SLA has not been widely investigated before in one study. It is relevant to compare these two types of gestures for word learning SLA, because both types of gestures have been shown to be favorable in SLA. It would be useful to investigate whether not only iconic gestures but beat gestures could help for word learning in

SLA since beat gestures have shown relevance for other recall processes in SLA. (So, Sim-Chen-Hui & Low Wei-Shan 2012).

Theoretical framework

Definitions of gesture

To communicate effectively, it might be necessary to learn a second language. However, the process of acquiring a second language is not universal. Different factors such as motivation, age, attitude and intelligence can contribute to the success or failure of a second language acquisition process. Gestures are another factor that could influence the SLA process. Gestures form an important part of non-verbal communication. Non-verbal communication functions as a broader term, with kinesics including gestures as a subset of it. In the field of communication science, gestures are defined as movements that are symbolic and related to the ongoing talk (Gullberg 2006). In order to convey a message in the intended way, gestures help to express what people actually want to transmit (Gullberg 2006). Kendon (2004) describes gestures as a visible action, when they are used as an utterance. Some types of movements such as functional actions, symptomatic movements (Ekman & Friesen 1969), proxemics (Hall 1968) and posture are not considered as gestures because they are not a part of the intended message that the sender wants to transmit (Gullberg 2006).

Classifications of gesture

In the area of research on gesture, several different classification schemes have been proposed. For instance, Gullberg (2008), Efron (1972), Kendon (1986) and McNeill (1992) demonstrated some main classifications on gestures. A distinction can be made between gestures that show a direct relation with to the semantic meaning of speech, compared to gestures that cannot directly be linked to the semantic meaning of speech. Gestures with a direct relation to speech are connected to the lexical word meaning, like for example pronouncing the word 'ball' can be accompanied by depicting a circle. The circle symbolizes the round object a 'ball' is. Other gestures that do not directly refer to the semantic meaning of speech are for instance making a rhythmic hand movement on a table while pronouncing the stressed syllables of a word. Another group of gestures are culture-related gestures which contain fixed form-meaning pairs, such as the gesture 'thumbs up', which means good luck or success in the Western world.

A more detailed classification scheme comes from McNeill (1992). McNeill (1992) organized several types of hand movements into one scheme, which is also known as

Kendon's continuum *(figure 1).* The scheme is a continuum on which different types of hand movements are positioned according to their degree of convention and connection to speech. It starts with *gesticulations* on the left-hand. McNeill (1992 p.37) defines the term gesticulation as 'idiosyncratic spontaneous movements of the hands and arms accompanying speech'. Gesticulation is also called co-speech gesture, and is the focus of the current study. On the right-hand of gesticulation in the continuum, *language-like gestures* are positioned. Language-like gestures represents context-dependent gestures and could replace a syntactic part of speech. *Pantomimes* form the middle of the continuum, and function in alternation with speech. Likewise, pantomimes can replace parts of a story, or even an entire story. *Emblems* follow pantomimes, which are culturally specific gestures with a fixed form and meaning. Emblems can occur without speech. Besides, the codification of hand movements as emblems differs among cultures. At the end on the right side, *sign languages* are positioned. These hand movements are part of a specific coding set, used by the deaf (McNeill 1992).

Figure 1. Kendon's continuum

Based on the context of this current research h, the term 'gesture' can be considered as co-speech gesture. Gesture can be identified at the left-hand of the continuum, which falls under the term gesticulations. Rossini (2012, p. 32) defines co-speech gesture as 'a subset of gestures strictly correlated to and co-occurring with speech within communicative acts'. Gullberg (2008, p. 278) mentions: 'The hand movements that represent, illustrate or emphasize some aspect of what is being conveyed by speech are labelled by many authors as co-speech, or speech-associated, gestures'.

Moreover, McNeill and Levy (1982) categorized co-speech gestures into four different types: iconic gestures, deictic or pointing gestures, beats, and metaphors. Movements such as depicting objects or events are also known as iconic gestures. Iconic gestures are connected to the semantic meaning of concrete speech. Metaphoric gestures show in a certain way similarities with iconic gestures, but they rather demonstrate abstract concepts or images

(McNeill 1992). Deictic or pointing gestures are finger, hand, arm or body movements referring to objects, persons, places or time. Also, deictic/pointing gestures can be actual or metaphoric (e.g. in relation with time). A final type of co-speech gesture, beats, includes a rhythmical movement of the hand, depending on stressed syllables (Leonard & Cummins 2011, Roustan & Dohen 2010) and prosodic peaks (McClave 1994) during speech.

Gestures and speech are closely related

As the literature on gesture classifications described above shows, gestures and speech can be seen as related. There are several ways in which this relation shows itself. For instance, McNeill (1992, 2000) emphasizes that gestures can be seen as complementary to speech. Gestures are not a translation from speech to another modality and they cannot be seen as a different version of a similar spoken message. Indeed, gesture and speech are separate and different forms of communication but both arise from the same thought and are both essential for the expression of the intended meaning formed in the mind. McNeill (1992) considers gesture and speech production as dependent on each other. Stam and McCafferty (2008) mentioned several views on the relationship between gesture and speech. In the literature, there is disagreement about the degree to which gesture and speech can be seen as a dependent. A strong connection between speech and gesture comes from the view that gesture precedes speech. This means that gestures arise in the mind by the start of the translation from image to speech. However, another view is that gesture and speech are independent and autonomous processes, with speech production as dominant (Butterworth & Hadar 1989). Moreover, others state that gesture and speech can work together while speaking but can be seen as two separate processes in the mind, as described in the Information Packaging Hypothesis (Kita 2000). At last, another view is based on the Sketch Model and proposes that gesture and speech do not cooperate but develop in parallel (de Ruiter 2000). In relation to the production of language, McNeill (1992) proves that speech and gestures are part of an integrated system and gestures are a natural part of speech, as mentioned in the Growth Point Theory. Thus, McNeill (1992) claimed that gesture and speech can not be separated.

Gestures and learning

Previous literature on gesture classifications has demonstrated various connections between gesture and speech. This relationship between gesture and speech is also visible in the functions that gestures can have. Gullberg (2006, 2008) claims that gestures are multifunctional because they can serve self-directed and other-directed functions at the same

time. Krauss, Chen and Rebecca (2000) are in line with Gullberg (2006, 2008) by mentioning that gestures may not have one specific function. They indicate that gestures can function as a communication device, can help for tension reduction, and can be useful for lexical retrieval, which means 'the process of getting from a concept to a spoken word.' (Friedmann, Biran and Dotan, 2013, p. 350). Krauss et al. (2000) indicated that gestures help for communication but there is also evidence that gestures could be helpful for learning and memorization processes such as lexical retrieval.

The use of gestures in teaching might therefore facilitate the learning process. Leaver, Ehrman and Shekhtman (2005) mention it can be valuable to realize the existence of many different types of learners and learning methods. Main categories of learners are formed by verbalists (memorize letters of a word), auditory learners (focus on sounds), visual learners (acquire new information through sight) and motor learners (perceive new information through movement). Especially for motor and visual learners, the use of gestures for learning can be useful (Leaver et al. 2005). Another example which demonstrates the importance of gestures for learning, comes from Cook and Goldin-Meadow (2006). They conducted a study on gestures providing insight in learning and thinking processes at children. Children had to produce gestures while learning new concepts. This study concluded that requiring children to use gesture while they learn something new can be useful for helping them to remind what they have learned during an instruction.

Gestures and first language acquisition

Prior research has shown the role of gestures for learning and thinking processes. Evidence found for the contribution of gestures for learning and thinking processes raises the question to what extend gestures can also contribute to a more specific learning process: the acquisition of a language. For example, Tellier (2005) has done research on short-term memorization in children. Their task was to recall words in their first language. One group only had to observe gestures and listen to words and repeat them. The other group had to repeat the observed gestures. The results illustrated that teacher's gestures for word learning in first language acquisition can have a positive effect on recall. The children who had to reproduce the gestures performed better on the free recall task than children who have not done this. Thus, gestures can play a role in the acquisition of a first language.

Gestures and second language acquisition

Previous studies have not only focused on the possible relevance of gestures for first language acquisition but also for SLA. One might wonder why it is relevant to study gestures for SLA. Gullberg (2006) has a logical and relevant answer to this question, namely that gestures are everywhere and affect all human interaction. Studying gestures is therefore also relevant for second language learners and teachers. Knowledge of gestures could facilitate second language learners. For second language teachers, knowledge about ways of using gestures can help them to optimize their gesture use for specific teaching aspects of SLA such as word learning or pronunciation.

      Prior research on gestures and SLA has mainly focused on iconic and beat gestures. As previously mentioned by McNeill and Levy (1982), several qualities of iconic and beat gestures can be considered as relevant for learning semantic and pragmatic aspects in word acquisition processes and pitch accents in SLA. Evidence for the usefulness of iconic gestures for SLA has been demonstrated. For instance, Goodrich and Hudson Kam (2009) focused on whether iconic gestures can contribute to acquire novel verb forms in a second language. This has been investigated by an experiment. The participants were both children and adults, who had to acquire the meaning of four novel verb forms that referred to novel actions performed by unfamiliar toys. Participants saw one of the following conditions: 1. Speech accompanied by an iconic gesture, the meaning could be inferred, 2. Speech accompanied by a different gesture, from which no meaning could be inferred, 3. Speech without a gesture. The interpretation of this novel verb was assessed using a forced choice task. Participants had to indicate, point to or touch their answer to the question: 'Sam likes to *(novel verb).* Which toy lets Sam go *(novel verb-)* ing?' Based on this experiment, it can be concluded that both children and adults can disambiguate the meaning of novel verbs with the help of iconic gestures since the number of correct answers was the highest for condition 1. To conclude, it is likely that iconic gestures can play a role in SLA.

      Other research on iconic gestures by Kelly et al. (2009) confirmed these findings. They conducted two experiments on learning Japanese nouns and verbs. Participants were placed in all four conditions: 1. Speech 2. Speech and congruent gesture 3. Speech and incongruent gesture 4. Repeated speech. In the speech condition, the instructions were explained to the participants without seeing a gesture. In the congruent gesture condition, an iconic gesture accompanied speech. The iconic gesture was semantically congruent with the Japanese word and its English translation in the incongruent condition, the Japanese word and

its translation in English were not semantically congruent with the gesture. The fourth condition was similar to the speech condition, only instructions were given twice. The word training consisted of three sessions. After every session, there was a 2-minute break. Every session consisted of the same words, only the order was randomized in each session. After the last training session, a 5-minute break was included, followed by two memory tasks (free recall task and recognition task). These tasks were created to test the usefulness of iconic gestures. The results of both experiments showed that iconic gesture supports word learning and memorization. It was found that gestures congruent with speech are more useful than speech only for word memorization. Gestures incongruent with speech had negative effects on word memorization. Thus, Kelly et al. (2009) also found evidence for the influence of iconic gestures on SLA. These results are in line with research conducted by Tellier (2008). Tellier (2008) investigated whether gestures have an impact on long-term word memorization for SLA. This research found that the reproduction of iconic gestures has a stronger impact on L2 word memorization than pictures only, which again demonstrates the relevance of iconic gestures for word memorization.

Focusing on another form of co-speech gestures, beat gestures, there is evidence that beat gestures can play a role in SLA as well. Beats have also been studied for word learning processes in L2. For instance, Kusch and Prieto Vives (2016) looked at the effects of beats in combination with focal pitch accents for word learning in L2. Main results indicated that beat gestures combined with focal pitch accents have the largest effect on word learning in L2. Kusch et al. (2016) conclude that beat gestures facilitate word learning in a second language. Moreover, another research by Gluhareva and Prieto (2017) found more evidence for the relevance of beat gestures for SLA. In their research, instruction videos with speech accompanied by beat gestures showed a positive effect for participants. Beat gestures improved their accentedness evaluations. The results suggested that beat gestures could be useful for SLA.

With regard to comparing the effect of beat and iconic gestures in SLA, little research has been performed. However, a study performed by So, Sim Chen-Hui and Low Wei-Shan (2012) on verb recall found that adults and children had a better verb recall after being exposed to speech accompanied by iconic gestures compared to speech without gesture. By way of contrast, the use of beat gestures for verb recall only showed a higher level of memorization for adults. In other words, it can be concluded that iconic gestures enhanced word memorization for both children and adults, but beat gestures were only helpful for verb recall for adults. The results of this article on recall provide reasons for further research for an

7

influence of both beat and iconic gestures in SLA. So et al. (2012) have shown evidence that both iconic gestures and beat gestures can facilitate memorization processes but future research has to investigate whether iconic or beat gestures can be more relevant for word memorization processes in SLA.

The present study

Prior research has shown that gestures do not only function as a communicative device, but function also for lexical retrieval, learning and memorization processes. Moreover, gestures can be useful for specific learning processes, such as the acquisition of a first or second language. Most research aimed to measure the usefulness of iconic gestures for word memorization in L2. As previously mentioned, in the literature evidence can be found for this. This can be explained by the fact that McNeill and Levy (1982) found that iconic gestures are connected to the semantic meaning of speech, which plays a major role in the word learning aspect of SLA. Furthermore, prior research has also looked at beat gestures for word learning, often in combination with focal pitch. This logically follows from the literature, which indicated that beats are connected to a pragmatic function and include a rhythmical movement of the hand, depending on stressed syllables (Leonard and Cummins, 2011, Roustan and Dohen, 2010) and prosodic peaks (McClave, 1994). Therefore, previous studies focused on beat gestures in combination with pitch accents for word learning in a second language. However, as far we as know, there is limited evidence that iconic gestures are more favorable for word memorization in L2 in comparison to beat gestures. However, this expectation is likely to be true because iconic gestures are closely related to the semantic meaning of speech. This is not the case for beat gestures, due to their connection to pragmatic aspects of language (Leonard and Cummins, 2011, Roustan and Dohen, 2010). Information about the semantic meaning of a word might be crucial in the SLA process. The little evidence that has been found is likely because of that there are not many previous studies who compared both beat and iconic gestures for word learning in L2 in one research.

For this current study, the hypotheses considering no gesture, iconic gesture and beat gesture and word memorization are the following:

Hypothesis 1. Gestures facilitate the memorization of words in a second language compared to no gestures.
Hypothesis 2. Iconic gestures facilitate the memorization of words in a second language compared to beat gestures.

Method

The method used for this research is based on Kelly et al. (2009). A few adaptations have been made to the original method for the purpose of this current research.

Subjects

In this experiment, Dutch participants took part in an experiment where they learned words in Tamil. There were 91 participants with no prior knowledge of Tamil. 41 subjects were male and 50 subjects were female. A Chi-square test showed no significant difference between gender and gesture condition (X^2 (2) = .07, p = .967). All participants had a bachelor or master level of education, to have ruled out the influence of intelligence on L2 acquisition. A Chi-square test showed no significant difference between educational level and gesture condition (X^2 (2) = 2.29, p = .318). The age range for subjects varied between 18 and 27 years (M = 20.7, SD = 1.69). A one-way ANOVA showed no significant difference between age and gesture condition (F (9, 81) = .190, p = .995).

Materials

This research contained one independent variable which was gestures, which consisted of 3 levels (no gestures, beat gestures and iconic gestures).

The stimulus material consisted of three videos, one for each gesture condition. Each video started with a black screen with instructions about the video. In the videos, the participants saw an instructor who was a native speaker of Tamil and Dutch. Each of the three videos was constructed with the same words, languages (Dutch and Tamil) and instructor. To decide what the iconic gestures per word looked like, one researcher stated a word of the wordlist in table 1, and other researchers then produced an iconic gesture of what they thought was the most semantically connected to that word. In the no gesture condition video, the video was zoomed in more on the face of the instructor. In this condition video, it was more zoomed in on the face to cut out the hands and arms of the instructor. This was done to rule out the chance that participants got distracted by little unintended arm or hand movements. In the beat or iconic gesture condition, the same zoom frame was used which showed the upper part of the instructor's body. In each video, the instructor started by pronouncing a Dutch word, followed by a translation in Tamil. This was done twice. An example of a sentence was: *'Huis betekent vīṭu'. 'Huis betekent vīṭu'* (house means *vīṭu*, house means *vīṭu*). In the first video, the instructor pronounced the words in Tamil without making gestures. In the second video, the

instructor pronounced words in Tamil accompanied by beat gestures as performed in figure 2 *(figure 2 has been removed in the online version for privacy purposes).* Beat gestures were produced at the moment that the instructor pronounced the stressed syllable of the Tamil word. The beat gesture was a going up and down movement of the right hand, by touching the left hand when making the down movement. For the third video, the instructor pronounced words in Tamil together with an iconic gesture which corresponded with the word meaning. For example, for the sentence: *'Konijn betekent muyal'* (Rabbit means muyal), the instructor produced a gesture of rabbit ears, as visible in figure 3 *(figure 3 has been removed in the online version for privacy purposes).* This was repeated once, immediately after the first time. The production of the gesture took place at the same time as the word in Tamil was pronounced. For each video, 20 words were used. Table 1 shows the wordlist used for the material in Dutch, Tamil and a translation in English.

Figure 2. Instructor performing a beat gesture *(removed for privacy purposes)*

Figure 3. Instructor performing an iconic gesture for the word 'muyal' (rabbit) *(removed for privacy purposes)*

Table 1.   *Wordlist used for the material in Dutch, Tamil and English*

Words (in Dutch)	Tamil translation	English translation
Bril	Kaṇṇāṭi	Glasses
Boek	Puttakam	Book
Konijn	Muyal	Rabbit
Bal	Pantu	Ball
Driehoek	Mukkōṇam	Triangle
Huis	Vīṭu	House
Schaar	Kattarikkōl	Scissors
Hart	Itayam	Heart
Olifant	Yāṉai	Elephant
Krullen	Curuḷ	Curls
Vogel	Paṟavai	Bird
Hoed	Toppi	Hat
Gitaar	Kiṭṭār	Guitar
Kom	Kiṇṇam	Bowl
Fluit	Pullāṅkuḻal	Flute
Berg	Malai	Mountain
Regen	Maḻai	Rain
Plat	Piḷāṭ	Flat
Helling	Cāyvu	Slope
Snor	Mīcai	Moustache

Design

A between-subject design was used for this research, with gesture as an independent variable and the number of correctly memorized words as dependent variable. This independent variable had 3 levels (no gesture/iconic gesture/ beat gesture). A between- subject design was used because it did not give participants the opportunity to find out the purpose of the experiment beforehand, which could have been possible with the use of a within subjects design. Subjects were placed in one of the three different condition groups. Thirty participants were placed in the first condition, where speech was not accompanied by gesture. Thirty other participants have taken part in the second condition, where speech was accompanied by iconic gestures. Thirty subjects have taken part in the third condition, where speech was accompanied by beat gestures.

Instruments

The number of words that was correctly memorized was the dependent variable. A WRT (Word Recall Test) measured the number of words that was correctly memorized. The WRT task in this research was based on the WRT (Word Recognition Task) used by Kelly et al. (2009). The WRT consisted of a video with the same instructor based as used in the stimulus material videos. The instructor pronounced the twenty words in Tamil without a Dutch translation, and without producing any gestures. Moreover, the word order was randomized as compared to the word order used in the material. After pronouncing each word, the subjects had 15 seconds to provide the Dutch translation of that word on an answer form. On the answer form, subjects had to fill in their name, age, gender and the Dutch translations of the 20 Tamil words. Each translation was coded as to whether it was correct or incorrect. The Dutch translation was coded as correct when this semantic meaning was similar to the Dutch translation of the word in Tamil as mentioned in the stimulus material. Spelling errors in Dutch were not taken into account, only if they affected the meaning of a Dutch word.

Procedure

Subjects had to watch one of the three videos individually. All participants got an instruction file and, after reading the instructions, could start the video. The participants had to start the video. All instructions were in Dutch. After the first ten words of the stimulus material, the subjects had to do the first part of the WRT. Participants then viewed the Dutch words with their Tamil translations for the final ten words, followed by a second part of the WRT. The participants were not informed about the purpose of this study after the experiment, to make sure that the participants could not tell the purpose of the experiment to others. Subjects could leave their e-mail address, in order to be debriefed after the experiment about the purpose and some results.

Statistical treatment

To answer the hypotheses, a one-way ANOVA test was used to check for significant differences between the means of the dependent variable (number of correctly memorized words in Tamil) for all three conditions.

Results

This study was set up to provide insight in the effect of different gesture types for word learning in SLA. A one-way ANOVA showed a significant effect of type of gesture on the number of correct memorized words (F (2, 88) = 4.521, p = .014). Participants in the iconic gesture condition (M = 11.4, SD = 3.20) showed statistically significantly higher results than participants in the beat gesture condition (M = 9.2 SD = 2.64, p = 0.15 Bonferroni-correction). There was no statistically significant difference on the number of correct memorized words between participants in the no gesture condition and beat gesture condition (p = 1 Bonferroni- correction) or between participants in the no gesture condition and in the iconic gesture condition (p = .095 Bonferroni- correction).

Table 2. *Means and standard deviations (between brackets) for the number of correctly memorized words in the no gesture, beat gesture and iconic gesture condition (min = 0, max = 20)*

Condition	M (SD)
No gesture (N = 31)	9.74 (2.86)
Beat gesture (N = 30)	9.20 (2.64)
Iconic gesture (N = 30)	11.37 (3.20)

Table 3. *Number of correctly memorized words on an item level in all gesture conditions (percentage)*

Word in Dutch	Number (percentage)
Hart	45
Schaar	53
Huis	59
Driehoek	11
Krullen	48
Olifant	45
Bal	42
Konijn	20
Boek	19
Bril	19
Berg	47
Fluit	51

Kom	58
Gitaar	100
Snor	46
Helling	51
Plat	95
Regen	95
Hoed	37
Vogel	93

Discussion

Based on the outcomes of this study, several conclusions. The first hypothesis of this study indicated that gesture should facilitate the memorization of words in a second language compared to no gestures. The results of this current study were not in line with this hypothesis. There was no significant difference between the no gesture condition and the iconic gesture condition or beat gesture condition. In other words, participants in the beat or iconic condition did not have a significant higher number of correct words in the word memorization task than participants in the no gesture condition. This finding was not in line with previous studies on gestures performed by Goodrich and Hudson Kam (2009), Kelly et al. (2009) and Kusch and Prieto Vives (2016). A possible explanation for this result can be the position of the camera. The camera in the no gesture condition video was more zoomed in on the experimenter's face compared to other condition videos. Consequently, it was possible to focus more intensively on lip reading and articulation for participants in the no gesture condition compared to other participants. Both videos in the beat and iconic gesture condition were less zoomed in on the instructor's face, since the arms and hands of the instructor had to be visible for the production of gestures. This zoom effect can have influenced the number of correctly memorized words. The possibility to focus on lip reading and articulation could have been favorable for word memorization. This can be explained by *The McGurk effect*. *The McGurk effect* found by McGurk and McDonald (1976) demonstrates that the visibility of articulatory gestures for an audience influences the perception of speech. It is likely that the visibility of articulations was effective to distinguish sounds. As a result, it could have been easier to correctly memorize words that have a similar sound.

The second hypothesis expected iconic gestures to facilitate the memorization of words in a second language compared to beat gestures. A significant difference has been

found between participants in the iconic gesture condition compared to others in the beat gesture condition. To put it in another way, it has been shown that the number of correct words in the WRT was significantly higher for participants who saw the instructor pronouncing words accompanied by iconic gestures than others who saw words accompanied by beat gestures. This result was in line with our expectations and can be explained by previous literature based on the classifications of beats and iconic gestures. Beat gestures are connected with pragmatic aspects of speech and language such as prosodic peaks or stressed syllables (Leonard and Cummins 2011, Roustan and Dohen 2010, McClave 1994). In the beat gesture condition, the instructor demonstrated beat gestures during stressed syllables in the Tamil words. The instructor's iconic gestures in the iconic gesture condition were related to the semantic meaning of Tamil words. This makes sense, as McNeill and Levy (1982) highlighted the close connection between iconic gestures and semantic meaning in language. For the WRT task in this experiment, participants had to give a Dutch translation of a Tamil word. Iconic gestures performed in this experiment related directly to the semantic word meaning in Tamil while beat gestures did not have this relationship to the Tamil words. As mentioned in So at al. (2012), words accompanied by meaning-related gestures are useful for the acquisition of a L2 as they facilitate word-meaning associations. For the current study, the semantic word meaning was more relevant for word memorization than prosodic speech aspects because words in the WRT were counted as correctly based on their correctness to the semantic meaning mentioned in the stimulus videos. This explains why participants in the iconic gesture condition had a significant higher number of correct words compared to participants in de beats condition.

It is noteworthy to mention some descriptive findings on an item level. As visible in table 3, specific words such as 'kiṭṭār' and 'curuḷ' were often memorized correctly. It was independent of the condition in which they were presented. This can be explained by the origin of these words, namely the fact that they are loanwords in Tamil from the English language. 'Kiṭṭār' and 'curuḷ' are also very similar to the Dutch translations for these words ('gitaar' and 'krullen') which also originate from the English language. The Tamil word 'piḷāt' is also very similar to the Dutch translation (plat), and it shows similarities with the English translation 'flat'. Therefore, the use of some loanwords is likely to be the reason for the relative high number of participants who recalled these words correctly. Future research could study the effect of loanwords on SLA more in detail.

Other words in Tamil such as 'malai' (mountain) and 'maḻai' (rain) were sometimes translated incorrectly into Dutch because people confused these two words. Participants noted

very often 'regen' (rain) as answer for 'malai' which should be 'berg' (mountain) and 'berg' (mountain) for 'malai' while the correct answers were the opposites. This confusion makes sense given that the pronunciation of these words is very similar in Tamil, it seems like this caused some difficulties for the participants.

These descriptive findings on an item level demonstrate that there might be differences in the number of correct answers between several items. Loan words in Tamil might have been easier to memorize, and it was more difficult to recall words in Tamil with a very similar pronunciation. However, that is something that is assumed but which has not been tested or analyzed. Future research should thus carry out a pretest to prevent these potential differences in difficulties between items. An example of a pretest could be to test the similarity between Dutch and Tamil words. In order to test this, participants could have been presented a list with the Tamil words. They could have been instructed to guess and write down the meaning of the Tamil words in Dutch. Furthermore, they could have been instructed to rate the similarity of Tamil words on a scale from 1 to 7. If specific words were rated as very similar to each other or to Dutch words, these words could have been left out of the experiment.

Given these findings, a final conclusion can be drawn. In this study, there is no evidence that gesture production facilitates word memorization in SLA compared to not producing gestures. However, it has been shown that if people gesture, it is more useful to make iconic gestures instead of beat gestures for word memorization in SLA. In general, people do gesture often while speaking. Therefore, this outcome can be relevant for people in second language acquisition processes. Especially for types of learners who acquire new information through sight or movement, the use of iconic gestures can facilitate word learning aspects in SLA processes. The favorability for iconic gestures compared to beats is something to keep in mind for second language teachers. If teachers gesture, it is more relevant to produce iconic gestures than beats for word learning in SLA processes.

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