Gestures in EFL and ESL environments in the context of satellite and verb-framed languages
## Contents

Abstract ........................................................................................................................................ 3

1. Introduction .................................................................................................................................. 3

2. Gesture and language in the process of meaning ......................................................................... 6
   2.1 Gestures as a fully integrated system ...................................................................................... 7
   2.2 Gesture and speech mismatch .................................................................................................. 9
   2.3 The conscious uses of gestures ............................................................................................... 10
   2.4 The use of Emblem gestures in South Italy ............................................................................. 12

3. Gestures in language acquisition .................................................................................................. 13
   3.1 Are gestures and speech acquired simultaneously? ................................................................. 13
   3.2 Gestures and communicative planning .................................................................................... 15
   3.3 Gestural instruction to students .............................................................................................. 16

4. Gesture and language in the acquisition of meaning .................................................................... 17
   4.1 How teachers can alter their gestures ...................................................................................... 19
   4.2 Gesture and speech mismatches ............................................................................................... 20
   4.3 Obligating students to gesture .................................................................................................. 22
   4.4 Observation of gestures by adults ........................................................................................... 23
   4.5 The control of gestures made by teachers ............................................................................... 24

5. Gestures in ESL ............................................................................................................................. 25
   5.1 Gestures as a repair mechanism ............................................................................................... 26
   5.2 Gestures in relation to proficiency ........................................................................................... 27
   5.3 Gesture and thought .................................................................................................................. 29

6. Distinctions in gestures between satellite-framed and verb-framed languages ............................. 31
   6.1 Differences between the two typological languages ............................................................... 31
   6.2 Occurrences between speakers of each typological language ................................................ 33

7. Acquisition of the target language gestures ................................................................................ 35
   7.1 Acquisition of different typological gesturing styles ............................................................... 36
   7.2 Gestures in memorizing lexical items ....................................................................................... 38

8. Conclusion ..................................................................................................................................... 39

References .......................................................................................................................................... 44
Abstract

It has been claimed that gesture and other non-verbal communication cues can have more of an effect on cognitive development than speech. The importance of gestures has already been acknowledged in English as a Second Language (otherwise known as ESL). Second language learners were shown to have adopted the gesturing style of the target language, provided that the learners were living in the second language’s environment.

This paper will review the most important selection of the gestures presented. Also, the contrast of the first and second language will be analysed through the typological descriptions of verb-framed and satellite languages, which have their own gesturing system. Using the contrast of the two typologies of languages, the possibility of purposely making either the teacher or student gesture in the style of the target language will be analysed, in order to see if it would lead to a more productive output. The motivation for focusing on non-verbal communication cues in an EFL is because so far, most literary worked on nonverbal communication in EFL has been overlooked and underdeveloped in favour of speech.

1. Introduction
It has been thought that gestures and speech are closely tied together; so what is said though speech is also said through gesture. Furthermore, a mismatch between the two would signify an error. It can also be assumed that different languages will have different gesturing systems. In an ESL environment, there remains the possibility that students will adapt to the target language’s gesturing style after a critical amount of the target language has been acquired.

The narrow focus of this research is to see the potential effect the controlled use of gestures can have specifically in an EFL environment. Much of the past literature used in this paper emphasis how cues in non-verbal communication have not been focused on. A great deal of the past literature also focuses on the potential benefits that a better understanding of non-verbal communication can bring.

The review of the literature will focus on the effect non-verbal communication can have on the process of meaning. This will include the relationship between gesture and speech and whether the two are tied together, or if they have completely different informatics systems, and thus display different information. Past research has focused on observing people’s reaction to gestures and then seeing how the information is interpreted. The review will also include an evaluation into the acquisition of a language, and this involves early child development. Research in first language development has illustrated how gestures and speech develop simultaneously in infants (between birth and three years of age). In addition, gestures in the acquisition of meaning (and the effectiveness that gestures have in a learning environment) which involves both students and teachers. The first three sections will clarify the significance of gestures within the context of meaning and how gestures could possibly be controlled and utilised.
After dealing with the importance of gestures in the context of meaning, focus will be placed on the use of gestures in the context of language acquisition in formal instructional contexts, starting with the effectiveness gestures have in an ESL environment by previous studies and researches. The categorisations of verb-based and satellite framed languages will be clarified, detailing what gestural patterns occur in each. This will finally lead to how different gesture patterns of these two categorisations of languages are acquired in an ESL environment, based on the assumption that language acquisition has been achieved once the typological language’s gesturing system has been acquired.

Before an analysis of gestures can be carried, the categorizations of gestural types need to be clarified. Such classification has been described as the following (Schegloff 1984)

- **Iconic gestures** – these depict content of speech, and describe an action or object in terms of physical characteristics; therefore they are closely tied to the semantic content. These are categorized as being either ‘kinetographic’ for a bodily action, such as two finger moving quickly to depict a person running, or they can be ‘pictographic’ that describe the shape of an object.

- **Metaphoric gestures** – Similar to iconic gestures, but they represent an abstract idea, using hands to represent a 3-dimensional shape to explain some kind of concept.

- **Emblems** – these gestures are culturally specific, such as the ‘thumbs-up’ to show a sign of approval which is used in some western countries.

- **Regulators** – these are used to control interactions between people, such as turn-taking.
• Affect displays – these are related to emotional states, such as maybe a blank stare that indicates confusion.
• Beat gestures – these are to do with the rhythmic timing which includes the beating of a finger, hand or arm.

(from Gesture types. retrieved 2012 September 06, from; http://changingminds.org/explanations/behaviors/body_language/gesture_type.htm)

These categorizations will have different relevance within different contexts. Therefore throughout this research, these categorizations will be used to indicate which ones are relevant in certain situations.

2. Gesture and language in the process of meaning

The significance of gestures in the field of meaning is that gestures can express cognitive process of the (Goldin-Meadow 2000). Susan Goldin-Meadow claims that gestures reveal what an infant wants to say but is unable to, which demonstrates the importance of gestures as a method of communication. As for adults, gestures are spontaneous creations of the user’s unique way of speaking (McNeill 2002), which in turn could go against the view that hand gesture movement is something which just merely accompanies oral speech. Research has shown that gestures do not only display what the speaker is trying to say, but they also display the speaker’s cognitive process. As a consequence, the study of gesture has been affirmed as being an illuminating tool
of research for the future. As verbal communication cues attains the attention of research, the additional uses of non-verbal communication cues need to be acknowledged to a greater extent (Lazaraton 2004). The following sections illustrates that gesture is a unitary system that does not simply accompany speech.

2.1 Gestures as a fully integrated system

Investigations into the significance of gesture and the role it plays alongside speech concluded that gestures can be produced independently from speech with its own fully integrated system (Goldin-Meadow 2006). Research which focused on the gestures made by 14 deaf children (10 of which were American, and 4 were Thai) with speaking parents showed that the structures of the gestures were very similar to the structure of natural language, whilst different world languages have different linguistic structures. The treatment of this research involves deaf children, and the mothers of deaf children who wanted their children to talk. The mothers were asked to explain mathematical problems to the child, once using gesture with speech, and then a second time using just gesture and no sound. The results were that the mothers always gestured as they talked, even though the gestures sometimes did not resemble spoken language. Children managed to receive instruction successfully most of the time when gestures were used. The outcome is that their gestures were always in some way inter-connected with spoken speech. The findings of Goldin-Meadow also demonstrate that the gestures of deaf children from different language backgrounds have similar gesture structures in relation to each other.
Though this research does not detail how the children gesture, much of the other work of the Goldin-Meadow laboratory also focuses on the cross-cultural aspects of spontaneous gestures. These were cited as being a mixture of deictic gestures (which includes pointing to indicate an object) and characterising signs (such as holding a bobbed fist near the mouth to indicate the eating of something) (Goldin-Meadow, Mylander 1983). These were used to transcribe utterances that were either categorised as being a transitive actor utterance (E.G ‘the mouse eats the cheese’), a patient (E.G.’ the cheese’) or an intransitive actor utterance (E.G ‘the mouse goes into the hole’) in a study on Chinese and American mothers and deaf children (Goldin Meadow, Mylander 1998). Gestures were recorded from mother and child interactions, and both their gestures were recorded, and resulted that while both Chinese and American mothers varied with their gestures, the children all bore a similar structure.

A further study with how Chinese and American deaf children narrated a story also concluded that their spontaneous gesture “cuts across diverse socio-cultural traditions” and “flourishes even when an explicit model for narration is not provided”

The uses of gestures in Goldin-Meadow’s study were described as “sharing the burden of communication with that speech, as it takes on an un-segmented, imagistic form” (Goldin Meadow (2006) pg 34 paragraph 1). Additionally, whilst gestures are an additional source of information, they can also contain entirely new information, as they often convey information that is not found in speech. As a result, gestures are regarded as giving extra information on cognitive processes of the speaker, and furthermore, gesture can then be seen as giving information of the state of acquisition. This same paper also displays the need for speech and gesture to be treated separately because of the fact that
“gesture and speech employ such different forms of representation; the two modalities rarely contribute identical information to a message (page 36 paragraph 2)”. In terms of the type of gesture being used, most examples bear recumbence to iconic gestures, as they seem to represent a shape.

Gestures are also cited as functioning in a different style, as “speech conveys meaning discretely, relying on codified words and grammatical devices, and gesture that accompanies speech conveys meaning holistically, relying on visual and mimetic imagery (page 36 paragraph 2)”. In terms of the receptive benefits of gestures, it is understood that gestures have the potential of functioning as a mechanism of change through its communicative effects. As listeners (in the case of Goldin-Meadow’s study; the parents) can acknowledge the speakers non-verbal communication, and alter their own output accordingly. The concluded from this research is that there is a bulk of information that gestures have, and therefore it is not just a mere attachment to speech.

2.2 Gesture and speech mismatch

In order to find a further relationship between gesture and speech, a study was conducted in which a Piagetian conservation task is given to a group of children, and both gestures and speech were recorded in order to see the relation between the two (Goldin-Meadow & Church 1986). The research involves two experiments with a total of 80 American children aged from 5-8-years-old. The subjects were then shown a conservation task where 2 differently shaped containers were filled with water and the children were then asked if the containers held the same amount of water, and why. Their speech and gestures were then recorded for analysis.
Results show that occurrences where gesture and speech conveyed different information also displayed other forms of inconsistency. Most gestures were iconic, as they depicted shapes that depicted the containers and the amount of liquid. This also proved that as well as speech, cues in non-verbal communication provide an insight into the speaker’s mental representation. As a result, this further illustrated that a synergy between the two displays a better understanding of a concept by the speaker. Though this still supports the notion of gestures being their own fully-integrated system which helps in the communicative process, it also illustrates that gesture and speech have to work in a synchronised way.

2.3 The conscious uses of gestures

As well as giving insight into cognitive processes a second language speaker undergoes, gestures are shown as being “multifunctional, and fulfil substantive, interactive and discourse functions simultaneously” (Brookes (2003) Page2044). This study involves recordings of natural interaction among black urban South Africans, and observations were made where gesture is used to regulate interactions between members of the group. The research focuses on special regional emblem gestures, and the whole paper explains the complex use of these gestures mixed with speech in a huge variety of different contexts to express different meanings.

It proposed that speech and gesture work together as a unitary system, even though task types, student characteristics and social conditions each have an effect on the communicative interaction between members of the same social group. The concluding
comments state that the control of gestures can affect cognitive progress. Brookes’ task also concluded that the student’s understanding of the significance of gestures would benefit them in “meaning making” (Steven G McCafferty 2008). Therefore, communicative competence should include gesture awareness and how to optimise this, especially in group oral interaction.

There are listed examples of how these iconic gestures mixed with otherwise unrelated speech produce a new semantic meaning. The money gesture (Brookes (2003) page 2056 para 7) is one such example which involves rubbing the index finger and the thumb, while the fingers are closed and the palm facing upwards (very similar to the same gesture which is used in western society). This gesture is mixed with the spoken dialogue “we play...and the other team? (Brookes, H (2003) page 2059 in example (16))” to indicate there was money involved in the game they were playing. There are later examples of gestures being used at a certain time of a spoken discourse to create new semantic meanings.

Fig. 2. The Money Gesture.

An example of the money gesture.( H. Brookes (2005) )
It has been remarked that gesture is entirely a phenomenon in speaker interaction (Schegloff 1984), and Lazeraton (2004) claims that “There is an underlying unity of speech and gesture; they are synchronous as well as semantically and pragmatically co-expressive” (Lazeraton page 83). Neu (1990) also showed that learners can stretch their linguistic competence using non-verbal behaviour.

2.4 The use of Emblem gestures in South Italy

Consideration also needs to be taken into the cognition of language, as gestures are considered a spontaneous action, forceful gestures may or may not have any effect. Kendon’s (1995) claim that gestures are spontaneous without requiring thought would mean that occurrences of the target language’s gestures would mean acquisition of the cognitive process of that target language.

This is a general study that was carried out in southern Italy, where gestures are generally culturally prominent and conventional. This involves pragmatic gestures that with speech create a speech act. The study was done by observing a collection of videotapes. This is very similar to the previous study on urban South Africans (Brookes 2005), though here the aim of the paper is to display how gesture is combined with speech within certain contexts to create a new semantic meaning.

One exception in this study is that it focused on emblems and stylized gestures, whilst illustrator and regulator gestures may be more relevant in a cross-linguistic analysis. Regardless, the emblem gestures appeared at specific instants of the discourse, meaning that the speakers were focusing on the structure of the language. This proves that
gestures are tied to the language, and that the combination of the two can create a speech-act, and creating a more detailed meaning to the discourse.

3. Gestures in language acquisition

Research has shown that the various roles gestures can have in different linguistic areas need to be analysed. For first language acquisition and early child cognitive development, the time frame in which gestures appear will have a significant role, as gestures can signal when speech development will occur (Özçalışkan. S & Goldin-Meadow. S 2004). Thus the use of gestures can assist in that build-up of the speech repertoire. Following Goldin-Meadow’s claim that gestures give insight into cognitive state, gestures help teachers who need to observe such development. Research further in this section will show ordinary people’s ability to recognize and acquire gestures, which in turn will assist in turn teachers in correctly appointing child’s present development, by means of providing a second source of feedback other than speech. As well as assisting in the acquisition of a language, gestures have also been proven to lighten the load that is placed on speech, or as Goldin-Meadow describes as “sharing the bourdon of speech”.

3.1 Are gestures and speech acquired simultaneously?

In much of the reviewed literature, gestures are seen as being highly relevant in first language acquisition, as the child learns to communicate through gestures before they learn to communicate through speech (Iverson & Goldin-Meadow 2005). This
introduced the question of whether gestures are separate linguistic phenomenon that precedes speech, or if they are tied to speech in a unified system. Even though it has already been proved that gestures and speech should be treated differently as it is its own fully integrated system, the treatment of speech and gesture in the field of language acquisition needs to be clarified as it shows how gestures can facilitate acquisition. Research conducted into early child development (from the age of 5 – 23 months) clarified when and how gestures occurred, and how they accompanied speech. The research involves 40 monolingual children from the USA during a free-play recorded exercise. The research included arm movements as gestures, and onomatopoeic sounds (e.g. “meow” for a cat) for speech. The research concluded that gesture **precedes language development** and is also **closely tied to it**. This is because two-word utterances were made by one word and one gesture combinations, such as pointing to a bird and saying “nap” to indicate the bird is napping. There is the contrast made between one-word and one-gesture combinations that were either complementary, meaning that the gesture and speech referred to the same object (pointing to a cat and saying ‘cat’), and ones which were supplementary, where they referred to different objects or concepts. The findings from this were that supplementary combinations became frequent with age, while complimentary combinations were more scattered. In this sense gestures can help language development by learning and expressing new meanings, such as pointing to an object, and adults can also become aware of the child’s development. More importantly, gestures are proven to aid first language development by allowing children to express what they cannot say verbally, meaning that gesture is closely tied to language acquisition.
3.2 Gestures and communicative planning

Though it has been established that gestures do not simply assist speech, their significance is intensified by the claim that they take on different functions depending on the communicative demand. Research done with older children with a higher vocabulary bank proved that gestures synchronise with speech to form a communicative plan (Esposito and Esposito, 2010). This deals with the work of paralinguistic and extra-linguistic body-to-body communication, as human beings convey meanings and display their cognitive state in other ways than words. Humans use gestures to transmit a message which is beyond verbal modality, but also gesture can alter itself depending on the communicative demand. The need to understand gestures exists because people are aware of how they communicate verbally but not much non-verbally.

The study involves aged between three and nine reciting a cartoon they had just watched, while gestures and speech pauses were analysed. Frequencies of speech pauses and holds in order to see how synchronized they are in relation to their speech. An example of where there is no synchronisation is if a speech pause and a hold overlap, meaning that the synchrony between gesture and speech had been broken. The results showed that speech and gesture are synchronised to a certain degree, and the observation from pauses led to the conclusion that speech and gesture reflect a unified planning process which is implanted in their thinking time. It is also concluded that the frequency with speech pauses are very similar to the results of a similar study carried out on adults.

Although the gestures do not seem to relate to any of the categorised gestures mentioned before, results from this study showed that speech and gesture together formed a unified communicative planning process in the production of utterances.
Esposito et al. also emphasizes the areas of non-verbal communication which have not yet been researched, including the relevance of body action for speakers and listeners in guiding dialogues.

### 3.3 Gestural instruction to students

As well as with spoken instruction for comprehension, conscious gesturing for productive spoken proficiency has also been clarified to work (Broaders et al 2007). The study involves 106 children who were given instruction to either gesture or not for solving a set of mathematical equivalence problems, and then all the children were given an actual lesson in mathematical equivalence. Not gesturing meant being asked to keep their hands still while looking at the problem presented on a large board. The results showed a difference of 80% where children instructed to gesture added correct strategies to their mental repertoire, compared to the children who were instructed not to gesture.

Results from the study show the advantage of incorporating gestures in the classroom as children told to gesture added more strategies to their repertoires. “Children told to gesture showed more improvement on the post-test than children told not to gesture” (Goldin-Meadow (2011) page 600 paragraph 3). On the topic of acquiring new information, the need is put forward to engineer learners hand movements so learners can instantiate information that is not yet in their repertoires. The outcome from this study proved the advantage of the control of student’s gesturing. The gestures seemed to resemble simple metaphoric gestures as they included pointing to resemble a hypothetical idea.
A graph showing the huge difference in results from children told and told not to gesture. (Goldin Meadows (2011) Page 543)

This image from the Goldin Meadow lab experiment shows a student creating the correct gesture to a math problem where the sum of one side of numbers equals the other side of numbers.

4. Gesture and language in the acquisition of meaning

This section deals with the responsibility of the teacher in a learning environment and how they control their body and hand movements, as well as whether they can
distinguish the student’s gestures. This section has more focus on the outcome from the 
teacher’s non-verbal behaviour, in comparison to solely the student’s non-verbal 
behaviour. Many teachers have known about the importance of gestures in the 
classroom as gestures relieve the workload for both the student and the teacher (Goldin-
Meadow et al. 2001), and it is assumed that teachers who do not use any will have less 
productive output from their students. Nonetheless, there has so far been very little 
research done in the manner that the teacher can control their non-verbal 
communication in lessons, and a great deal of research only concentrates on cultural 
aspects of the language (Saitz 1966). Also, a great deal of non-verbal communication 
cues involve facial expressions and emotions, such as is expressed by Argyle’s (2002) ‘five primary functions of non-verbal behaviour’ which all contain different functions 
for different purposes. These include;

- Expression of emotion – emotions are expressed mainly through the face, body 
  and voice.
- Communication of interpersonal attitudes – the establishment and maintenance 
  of relationships if often done through several nonverbal signs (tone of voice, 
  gaze, touch etc).
- Accompany and support speech – vocalization and nonverbal behaviours are 
  synchronized with speech in conversation (nodding one’s head or using phrases 
  like “uh huh” when another is talking).
- Self-presentation – presenting oneself to another through non-verbal attributes 
  like appearance.
- Rituals – the use of handshakes, greetings and other rituals.
The importance of these functions of non-verbal behaviour is that they are prominent in the acquisition of meaning and the acquisition of language, and are thus mentioned through-out this research paper.

Also, as well as the way in which teachers can control their gestures, past research has also focused on how receptive students are to those gestures, and in return how teachers can comprehend the gestures made by students.

4.1 How teachers can alter their gestures

The way a teacher teaches in a classroom is also proven to have an effect on the learning environment when guiding or misleading children with the right or wrong solution to a mathematical problem. This is proven in a study that included teachers and children (Goldin Meadow, Kim, Singer 1999) where observations were made of teachers using gestures when explaining how to solve mathematical problems. Such as the research which observed the student’s gestures in solving a mathematical problem, the gestures of the teacher again resembled metaphoric gestures to illustrate abstract ideas.

The study involves a total of 8 experienced American math teachers teaching 49 children aged between 8-11 years of age. The teachers presented a set of mathematical problems to the children, and presented them with various strategies to solve them, those which hear only speech, those that use matching gestural strategies (by pointing to...
the correct areas of the board when explaining how to solve a mathematical problem), and those with mismatching strategies (by pointing to the wrong area of the board). The findings suggested that children frequently followed strategies when the teacher made a mismatch of the gesture component, and that they also reiterated most of pure gesture instructions into speech. This led to the conclusion that that at times, learners were more receptive to gestures than they were to speech. Furthermore, students were more likely to make an error when the speech matched the correct strategy, but the teacher’s gesture did not. Further conclusions of this study were that not only do teachers produce gestures that express task-relevant information, but their students also take notice of them. Given that gesture is an un-avoidable part of classroom activity, teachers may increase their awareness of the way they and their students use their hands. The most significant outcome from this study is that as well as gestures being a natural occurrence of language development, gestures are more effective in acquisition within student-to-teacher interaction.

4.2 Gesture and speech mismatches

Gestures can also have some deeper cognitive meaning, particularly with how people’s gestures represent their mental cognition (Alibali M, Bassok M, Solomon K, Syc S and Goldin-Meadow S1999). In a study that focused on how gestures represent given problems, adults were asked to describe word problems about constant change of various kinds.

The experiment involves 20 adults who were presented with 6 word problems, who were then asked to give a solution to the problems to each other. Explanations resembled metaphoric gestures to explain abstract ideas to each other. Verbal cues for
either continuous or discrete change were looked for. An example of a verbal cue of continuous change would be if the participant mentioned values in the problem by using rate-like units such as “it starts with 10 chairs in a row, then goes up by 5 every time”. Gesture like features was also searched for, such as smooth movements of the arms in order to present continuous change.

The result is that information in their speech and gesture is not always the same. When gesture reinforced the representation expressed in the spoken description, participants were very likely to solve the problem using a strategy presentable in the representation. Therefore, this experiment led to the conclusion that gestures and speech together provide a better index of mental representation than speech alone. More importantly, when the participant didn’t solve the problem correctly, it was more common that their gestures represented the right strategy, but their speech does not, leading to the conclusion that gestures give greater insight to cognitive process.

Gestures of the hand can be used to assess problem solving strategies, but gestures can also reveal problem-solving strategies that speech does not. One thing that must be noted from this experiment is that gestures are almost always produced in the context of speech and not alone, so gestures must accompany speech. In principle, gesture can reflect a representation that either matches or mismatches the representation reflected in the speech it accompanies. While gesture is reliant on speech, the synergy between the two is often no way near perfect. The findings demonstrated once again that spontaneous gestures reveal important information about people’s mental representations of problems, hence highlighting the importance of gesture in mental thought required in language acquisition. Speech and gesture together also provided a more complete preview of solution strategies. Overall, as well as with the acquisition of
young learners, gestures have a similar effect on adults, with them being just as receptive to gestures in the acquisition of meaning.

“For a lecture, 10 rows of chairs have been arranged in a lecture hall. The chairs have been set up such that the number of chairs in each row increases by a constant from the number of chairs in the previous row. If there are 25 chairs in the first row and 115 chairs in the 10th row, how many chairs total are there in the lecture hall?”

An example of a word problem describing ‘discrete change’ adapted from Bassok & Olseth (1995)

4.3 Obligating students to gesture

A more narrow focused research was conducted with the hypothesis that Gestures reveal information that cannot be found in speech (Broaders et al. 2010). The research is carried out within the context of an interview, with the hypothesis that the way in which interviewers frame their questions influences the accuracy of the interviewees’ response.

This study involves 39 children aged between five and six, who all watched the same video of a man playing an instrument, and are then interviewed in an unscripted interview about what they just saw. The treatment involved the interviewers having two interviewing stages, one with only speech, and the other with speech and gesture. The results were that there were more responses of details from the movie when speech was accompanied by iconic and metaphoric gestures, especially in the case of ‘non-occurring events’. These ‘non-occurring events’ involved the interviewer asking for details and hinting through the use of gestures that did not actually exist in the original
interview. This refers back to the previous approach of mis-leading through the use of
gesture, and a similar result occurred of children being more sensitive gestures. In terms
of gestures revealing information not found in speech, the children often revealed
information from the video through use of gesture and not speech. These were mainly
iconic gestures, or emblems, and are not specific to the syntactic structure of the
language. The study has a similar conclusion to the other studies of Goldin-Meadow,
that there should be more awareness of the use of gestures within the context of a
learning environment.

4.4 Observation of gestures by adults

It is possible to assess the level of understanding a child learner has of a particular task
by assessing their non-verbal behaviour. This will help the teacher assess the child’s
knowledge of a problem (Goldin-Meadow, Wein and Chang 1992). An experiment was
created to assess how adults interpreted and responded to children’s gestures, which led
to the conclusion that adults can form impressions of children’s knowledge based on
their hands.

The study involves 20 adult school teachers who were at first familiarized with the
Piagetian task conservation task. The teachers were then shown videotaped vignettes of
children trying to solve the same task and the teachers were then asked to repeat the task
based on the children’s gestures, as well as assess the overall competence of the child by
means of just a general comment. Though it is unmentioned, it appears that like the
other tasks of a similar nature, the gestures are either metaphoric to explain an abstract
idea, or iconic to represent given actions and objects.
It must also be noted again that the adults are untrained, so the ability to interpret gestures is a natural occurrence to other first-language speakers. Even though much of the non-verbal behaviour mentioned in this experiment includes body action that relates to the child’s emotional state, the significance of this experiment is that it details how information can be perceived solely through gestures that are not just related to the speaker’s emotional state. People who observe the gestures do not just mimic them; they also attain information from them. This phenomenon is affirmed by the fact that none of the subjects were aware that they were observing gestures, or that their own gestures were being observed. This also confirms that specific training may not have to be applied in order to interpret gestures.

4.5 The control of gestures made by teachers

Research was carried out to display how teachers can intentionally alter their instructional gestures (Hostetter, at al. 2006) for the benefit of the student. The study included 6 American math teachers being presented with a math problem, and being asked to pretend that they were explaining the math problem to a group of children. The purpose is to observe the number of gestures that they produced, and the kind of gestures that they were.

The experiment included an algebra problem that the teachers have to explain to an imaginary class. Then they instructed on how to correctly gesture and asked to teach the lesson a second time. He third time the teacher was asked to not use gestures at all. The gestures were split into three categorisations; iconic, pointing and writing (which involves actual writing on a whiteboard). Results show that pointing was the most frequent of all these gestures, becoming the most frequent during the instruction stage,
then the least frequent during the restricted stage when they were asked to refrain from gesturing.

One crucial outcome from this study was the conclusion that teachers who adjusted their gestures can lead to more productive outputs in children when solving mathematical algebra problems, using simple metaphoric gestures to point to correct areas of a board for the students to use. This further expanded the need for teachers to utilize their gestures in the classroom, with the more gestures being used the better. A reason for teachers to be aware of their gesturing in the classroom is put forward by Hostetter el al that as teachers were going to bring gestures into the classroom anyway, they may as well learn how to utilize them for effective instruction. Such as with the experiments prediction, it proved that high awareness could lead to the controlling of their gestures extensively. In the context of the teacher’s instructions to the students, gestures can ground abstract ideas in the real world and make connections between ideas, and therefore gestures have a very important role in the classroom.

5. Gestures in ESL

After a deep analysis of the use of the use of gestures with teachers and students on the acquisition of meaning, the next section will specifically focus on gestures within the context of second language acquisition. The disparity that plays a critical role here is between learning English as a foreign language (otherwise known as EFL) and learning English as a Secondary Language (otherwise known as ESL). The contrast between EFL and ESL is that ESL involves living in the country of the target language, while EFL does not. Therefore, any acquisition of target-language’s gesture may be a result of
ESL students imitating what they see in their everyday environment, or it could be because of actual language acquisition. Research in this section details the synergy between gesture and speech with the beginner and advanced language groups. This section also details the frequency of gestures and how they assist the learning environment.

5.1 Gestures as a repair mechanism

Other than acquisition, studies show that gesturing can contain other useful features for an ESL environment (Mi-Suk Seo & Koshik; 2008). The study involves observing 23 one-hour videos of ESL lessons, based with the hypothesis that gestures does not only display puzzlement, but that they also systematically produce actions that produce particular kinds of responses.

Alternatively to the view of gestures filling the gaps of verbal knowledge, a videotaped session of an ESL class proved that gestures can be used as a repairing mechanism in an ESL environment. For instance, the constant use of ‘head poking’ for clarification that is used across languages is used in this experiment by tutors and tutees, which in turn leads on to the tutors ability to repair student’s utterances. These resemble regulating gestures in order to control interactions between people. For student comprehension, gestures can also help determine when errors occur due to either linguistic competence or slips of the tongue. The conclusion clarified that there are a large range of gestures to show different cognitive states, such as the tutor’s recognition of an incorrect utterance, a lack of understanding or the need of clarification. The prior view of gestures merely assisting speech can be rejected by the concluding fact that for a majority of
time these gestures indicate problems prior to speech. The whole process of capturing gestures through video-recording is showed as being far more relevant as to only having the audio/oral speech as it can capture and describe the communication more accurately.

Here is an example of a tutor using a head-tilt and head poke gesture along with eyegazing in order to create a repair initiation.

(From Seo and Koshik (2008) page 2235)

5.2 Gestures in relation to proficiency

The results into a study of rates of gestures (Gan & Davison; 2011) showed that the advanced classes in ESL schools gestured more frequently and were more organized with their gestures, in comparison to the lower-levelled groups. This included being well synchronized with the flow of speech, turn-taking, as well as with other nonverbal behaviour such as eye contact and facial expression, which again involves regulating gestures to control group interactions. This is based on the concept of gesture being linked to speech to create a **zone of proximal development (ZPD)** for second language learning and teaching (McCafferty 2002: 192).
The study involves secondary school ESL students, with a large collection of data from over 15 schools. Different levels were chosen, in which the classes had to complete a task in small groups; an example of one being; discussing what to buy as a gift for a fictional character from a movie that the students had just watched.

This led to the conclusion that verbal and nonverbal behaviour is integrated during interaction. Although whether the gestures that the students use lead to the general language proficiency is unclear, it is obvious that a high rate of gestures means high proficiency. Higher performing students also contained more diverse styles of gesture by expressing para-narrative (to express certain attitudes and feelings), metanarrative (explicit references about a story) and narrative level gestures, whilst the lower levels showed only the narrative level.

This example we see one student’s use of a beat gesture to help introduce new information.

(Gan and Davidson (2011) Page 105)
5.3 Gesture and thought

Leading on from the general concept of speech and gesture being different entities, further studies display that speech and gesture production do not always juxtapose, and that the speech and cognitive thought do not always match (Goldin-Meadows 2003). One contributor to this fact is that second language acquisition is not a smooth linear process (McNeill et al 2007). Therefore, instead of only relying on speech, the use of gestures can give an insight into the mental process in order to see cognitive development for a second language speaker.

A study focused on the concept of a growth point, which is an initial unit of thinking for speaking in which a dynamic process of organisation occurs (McNeill et al. 2003). A growth point occurs to add mental imagery of an action or event. This involves a micro-level analysis of speech synchronized with gestures in order to offer a new window into languages and the mental process that are alongside them. Though the aim of the paper is not to explain in great detail what a growth-point is, it details the structure of gesture and speech within a certain language in order to display the thought processes behind it. Depicting peoples gestures as they recite a cartoon that they have just watched, participants gestures were recorded to see exactly where their gesture occurs. In the example of “and Tweety Bird runs and gets a bowling ball and drops it down the drainpipe”, the growth point is focused on ‘it’ and ‘ball’, instead on the verb ‘drop’, as the utterance is describing what the ball does, instead of the subject, Tweety. The significance of this study is that it depicts the kind of gesture (in this case iconic), which also acts as a beat gesture, as where it occurs is also highly significant.
Here is an example of a growth point which is a minimal unit of image-language dialectic, which is a unit of thinking and speaking. “and Tweety Bird runs and gets a bowling ball and drops it down the drainpipe.” Speech was accompanied by a gesture in which the two hands thrust downward at chest level, the palms curved and angled inward and downward, as if curved over the top of the bowling ball (see Figure 2). At the left bracket, the hands started to move up from the speaker’s lap to prepare for the downward thrust. Then a pre strike hold at the very end of “drops,”; next the gesture stroke—the downward thrust itself—timed exactly with “it down” (boldface). Movement proper ceased in the middle of “down,” a post stroke hold until the word finished (the second underlining). The two holds and the continuing preparation phase through “drops” reveal that the downward thrust was targeted precisely at “it down”: the downward thrust was withheld until the speech fragment could begin and was maintained, despite a lack of movement, until the fragment was completed. Significantly, even though the gesture depicted downward thrusting, the stroke onset bypassed the very verb that describes this motion. The fragment, “it down,” plus the image of a downward thrust, was the GP.

(McNeill et al (2007): example taken from page 3)
6. Distinctions in gestures between satellite-framed and verb-framed languages

To create a target gesturing system for target-language students to achieve, the differences between satellite and verb-framed languages will be established. This refers to how path and manner of motion are packaged within a certain language. These typological categorisations are the work of Talmy, who categorises Romance, Japanese and Korean as verb-framed languages, and Chinese and Indo-European languages which are not Romance as Satellite languages. As Romance languages are verb framed, with the focus, and therefore gesture, is placed on the verb, whilst satellite languages such as Germanic languages like English or German place focus on other components such as adjectives, adverbs and prepositions. This will be the focus of the sentence, thus this will be where the gesture falls. A more detailed analysis of these different typologies of languages will lead to an understanding of what occurrences need to be looked for when analysing an ESL or EFL environment, so that a student’s acquisition of a language can be correctly evaluated which is not just dependent on the speech that they produce.

6.1 Differences between the two typological languages

The gestural differences between verb framed and satellite languages has been a topic of past research. The languages were researched to show how different language
verbalized motion events, and in relation to gestures, these two typologies of languages “should reflect by the constituents with which gestures coincide” (Lian Van Hoof. (2010) page 218 paragraph 1). The work of Lian Van Hoof described the typologies as having the following components;

**English (satellite);** the cat (figure) walks (motion and manner) up (path) the stairs (ground)

**French (Verb-framed);** Jean (figure) traverse (motion and path) la flueve (ground) en nageant (manner) (john crosses the river by swimming)

(Lian Van Hoof page 220 examples (3) and (4))

In these examples, the ‘figure’ refers to the object or person which is the moving entity of the sentence in relation to another object, which is the ‘ground’. The ‘path’ represents the direction of the movement, whilst the ‘motion’ refers to the particular style that the ‘figure’ moves. Another difference is that satellite will put more information into one clause, whilst verb framed languages will spread this data across different clauses.

The distinction of a ‘satellite’ is that it is “a certain immediate constituent of a verb other than inflections, auxiliaries or nominal arguments”, “these include English particles such as ‘run out’” (Talmy.L 2000 page 102), and this is where the focus will be. As this study will focus on the difference between Spanish (verb-framed) and English (satellite), the focus will be on whether Spanish leaners of English can switch from a Spanish style of gesturing to the satellite style English system. The need to gesture is vital in each of these languages as **humans need to draw from their mental lexicon and grammar rules to produce a clear utterance**, as human beings rarely say the same thing twice.
6.2 Occurrences between speakers of each typological language

Other research in these two typological categorizations of language was done in order to have a factual and in depth understanding of the structure of the language and the corresponding gesturing systems. (Hickmann, Hendriks & Gullberg, 2011).

The research included groups of French and English adults and children who produced more than 4 gestures in the pre-test. All were shown a short cartoon that depicted motion, and were then asked to describe the cartoon afterwards.

These experiments were done by showing a cartoon to young children, and then have them describe it afterwards. A good example of how each language would encode manner and path is shown below.

(1) *Oscar runs* [Manner] *into* [Path] *the kitchen.*

(2) *Oscar entre* [Path] *dans la cuisine* (*en courant* [Manner]).

‘Oscar enters in[to] the kitchen ([by] running).’

(From Hichmann et al (2011). Page 130 example (1) and (2))

This distinction occurs whenever there is a “changes of location, whether gradual (e.g. upward/downward motion) or categorical (e.g. boundary crossing), rather than when they take place within a general location”.

The speech analysis of French and English speakers was that English speakers are more likely to include manner and path in an utterance, while French speakers were likely only mention the path component, even though manner and path was not uncommon with adults. On the subject of gestures, results were nearly the same, as both languages focused most gestures on mainly the path. Also English speakers provide less information on path via gesture, and provide more on manner and path together via
speech, whilst French speakers give additional information on manner via speech, and path via gesture. It also showed that Gestures in learning English are much more systematic.

(24) English MP speech (clause) with P gesture exactly aligned with P speech (adult, S-Add)
He just jogs like st[rait acro]ss the street.
[Gesture: both hands open palms facing each other moving laterally from the speaker’s left to right]

(22) French P speech with P gesture (adult, Match)
Il [monte sur] l’arbre.
‘He [ascends on] the tree.’
[Gesture: right hand open palm facing left moving upwards]

An example of where the gesture would occur in English and in French

(Hickmann et al. (2011) page 135)

On the subject of the type of gesture that occurred, most gestures represent ones which are either iconic or metaphoric as they depict an action or a spatial property, what is important is the time frame that they occur in. What was cited in the article is that the gesture must occur whilst most of the given word is spoken, so if the gesture occurs only at the very end of the spoken word, then it is not recorded as being synchronised with that word. Although no pictures are provided with this article, many of the gestures and speech resemble the ones in the research by McNeill et al (2003) in section 5.3, such as with a second example given below;
The given components; a directed path (“up”) plus the idea of interiority (“through”) (McNeill (2003) page 2)

7. Acquisition of the target language gestures

So far, research has clarified the significance of gestures as a linguistic phenomenon that is not just simply attached to the speech; it also contains information that reveals cognitive development of the speaker. Gestures have also been proven to assist in a learning environment, as teachers who gesture have more productive outputs from the leaner’s, and untrained adults are able to understand and utilize gestures produced by children. With the comparison of the effectiveness of speech and gesture, certain aspects of completed research concluded that learners were more sensitive to gesture in terms of learning new information. The following research is to see how effective gestures are in an ESL environment. Taking into regard the two typological languages that exist and the structure and gesturing systems that each one has, the following research asks if these gesturing systems can be acquired in an ESL environment.
7.1 Acquisition of different typological gesturing styles

From the contrast of verb-based and satellite languages, the transition from one gesturing style to another by second-language students could give insight to their cognitive development, and clarify if the language in question has been fully acquired. Another significant study which looked at gestures as a cognitive process is performed to see how second language learners can acquire the target language gesturing system. This involves observing Spanish learners of English to see if they fully acquired the second language through means of gestures (Gale Stam, 2006).

The study involves students who were too shown a cartoon that depicted motion, and were then asked to describe it afterwards. The Spanish speakers of English were all student living in Illinois, USA and were therefore living in the speaking environment.

The hypothesis is that the replication of the native-English gesturing system by the second-language learners would mean the students would have cognitive process of the target language, even if their speech is not perfect. Speech and gestures is looked at separately, with groups of native English, native Spanish and Spanish learners of English being observed in the study, in order to create the perfect contrast. Spanish speakers’ gesture of the ‘path’ tends to occur together with the verb, whilst English speakers’ gestures tend to occur with either satellites, or verbs and satellites together. But then the question that Stam’s paper addresses is what happens when Spanish speakers learn English; where do their gestures occur, and what do their gestures tell us that their speech does not?
In this example it can be seen that the Spanish speaker places the gesture on the path verb ‘sale’ (‘to leave’) whilst the English speaker gestured on either the verb and satellite or just the satellite.

(Gale Stam (2006) pages 160 and 162)

The analysis on speech showed that native-English speakers express path and motion in the same clause, whilst Spanish speakers who expressed more clauses always expressed each separately. Spanish speakers also express the path with the verb whilst English speakers did so with satellites or prepositions. This details the different patterns of thinking in each language. Such as with the other study into the typological differences between two languages, iconic gestures again seem to be used in a way that is specific to the time frame it occurs to represent the syntactic structure of a language.
With the study of Spanish learners of English, the context of speech showed that they produced fewer clauses, but still expressed path on the verb, rather than on other components, proving that only some of the pattern of thinking had been acquired. But contrary to the results in speech; the results in gestures showed that Spanish learners of English have a gesturing system resembling more the native English speaking system, by gesturing other components such as satellites and preposition, rather than just the verb. This also clarifies that gestures show the acquisition of a language that speech does not, and that students really have acquired the language even though they are not able to express it through speech. This clarifies the significant role that gestures have in such a process.

### 7.2 Gestures in memorizing lexical items

There is also the impact that gestures have to help young learners memorize vocabulary items (Marion 2009). This is in a paper that also emphasizes that few studies have concentrated on the subject of gestures so far.

This study involves 42 French children aged between 5-7 years-old, who were divided into 4 groups. The groups were shown different videotapes with the aim to remember vocabulary items. Some groups had only oral instruction in the video, and others had oral and gestural instruction. The post-test observed how much of the vocabulary the children could remember.

Although this study works with the use of iconic gestures, it still displayed that the use of gesture assisted for the memorization of vocabulary items, as it helped students keep
the item in their repertoire. These were specific gestures that do not appear in everyday usage, but only in a language classroom, which meant that the use of gestures would only successfully operate in a controlled environment. This paper showed the importance of using these iconic gestures as these are a major contributor to a child’s acquisition of a language. Also, these iconic gestures are just as important as speech in the acquisition of a language because they both rely on the other in order to have meaning. If the speech is expressed in a classroom, the corresponding gesture should be expressed alongside it. Also, just as the speech in a lesson would be un-naturally slow for the benefit of the student, so should the gestures be overly expressed. At certain times, gestures are regarded as being more important than speech, as students rely on them for comprehension when the speech is not understood. In the context of memorizing words, the repetition of gestures have a greater impact than the repetition of words, as the repetition of words did not have much of an effect on actually memorizing the word. Also, simply repeating the word is shown as producing a mechanic and unemotional response from the students, whereas gesturing created a much more emotional and responsive feedback. In certain aspects, the use of gesture in an ESL environment proved to be more effective than speech.

8. Conclusion

A recurring theme in this literature review is how gestures are its own fully integrated system that does not just simply accompany speech. Gestures would of course be crucial in a learning environment, as a teacher who would not gesture at all would
obviously be less effective. The use of gestures has also proven to help when communicating in a second language. This may explain the difficulty when trying to make a telephone call in a foreign language where there is no possibility of gestures. What has been revealed is the full extent of how relevant gestures are in any kind of acquisition.

An analysis into the role of gestures in the process of meaning displayed the need for gesture to be treated separately from speech. Research into deaf children showed that gestures of people from different linguistic backgrounds have a unified system, meaning that gesture is a separate integrated system. A piagetian conservation task displays how gestures can give insight to a Child's cognitive awareness, displaying the need to observe a student’s gestures within a learning environment. The study into urban South Africans displayed the complexity of gesture mixed with speech in order to produce a deeper semantic meaning.

Gestures were proven to have a significant role in first language acquisition. Gestures played different roles at different stages of language acquisition, first with the development of two-word utterances, and then later to develop a communicative plan.

Gestures produced by a teacher are also proven to have a highly significant role. Young learners are at times more receptive to gesture than they are to speech. A synergy between gesture and speech signifies a better understanding of a concept. Being restrained from gesturing blocked cognitive process and lead to a less productive output. Information can be attained from gesture alone, with participants being able to attain information from only hand movements. The most important aspect of teachers and gesturing is that the focus upon how they use their non-verbal communication
within the context of learning proves to lead to a higher cognitive output from the learners.

Narrow focusing into the field of second language acquisition, observation of groups of learners resulted that there is more synergy between speech and gesture with more advanced classes. Gesture can assist acquisition where ever there is a problem with speech, and gesture works with speech to create a ‘speech act’ to add more meaningful content to the discourse.

A hypothetical target gesturing system is created by the typological difference between verb-framed and satellite languages. If someone is a native speaker of a verb-framed language such as Spanish, and they can adapt to the second language’s gesturing system of a satellite language such as English, then this may mean that they have acquired the language cognitively. Such a concept was proven to happen with a class of English learners living in the United States, though this may be a result of them imitating their everyday environment, as opposed to cognitively acquiring the target language. This section also narrow focuses the type of gestures that relate to the syntactic structure of the language, such as beat gestures. What is unfortunate about this study is that it does not state hw long they have been living in an English speaking context environment, as this may be an important factor for acquisition of a gesturing system.

In terms of the types of gestures being used, although iconic and metaphoric gestures are used to represent actions, objects and hypothetical concepts, the same gestures are used to represent syntactic properties of the language as well.

As a result, I propose that the following areas in the field of gestures and language acquisition need to be researched;
1. Do EFL students acquire the target language’s gesturing system in the same way as ESL students? Results of this could establish the fact that it is the acquisition of the language that led to the acquisition of the gesturing style, rather than exposure to the environment. Even though ESL students would naturally have more exposure to the target language, occurrences in an EFL environment would clarify the answer to this question.

2. Would an EFL teacher’s controlled gesturing of the typological language type lead to the students imitating the gesturing style and/or a higher acquisition of the language? The need for teachers to engineer their hand movements has already been expressed with occurrences of students imitating the teacher’s gestures, but would the teacher’s deliberate over gesturing in the style of satellite or verb-based languages have any substantial effect?

3. Would obligating students to gesture to the typological style of the language (i.e. satellite or verb-based) lead to a higher acquisition of language? This would involve the same approach as the second idea of further research, but the students would be made to gesture instead of the teacher, as past research has shown that outside the context of language acquisition, forcing children to gesture led to higher acquisition, but would there be similar results inside the context of language acquisition?

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