



# Mouth Actions in Colombian Sign Language: A Study of Non-Manual Markers in Sports Communication Among Deaf Participants

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**Abstract:** This study explores the interaction of facial expressions in Colombian Sign Language (CSL) among deaf participants within selected sports domains. Previous studies on sports vocabulary in CSL did not consider the contribution of facial expressions (non-manual markers), which contribute to the linguistics of sign languages. Drawing inspiration from previous work,<sup>1</sup> the study specifically explores how facial expressions in CSL facilitate the communication of sports-related vocabulary and expressions. The research data from secondary sources consists of videos within sports domains. The findings unveil the presence of 10 Mouth Actions as Non-Manual Markers in CSL. These markers involved lip movements, tongue actions, cheek puffing, and mouth configurations, serving syntactic and semantic functions. The study enriches our understanding of how Mouth Actions enhance the linguistic dimensions of CSL. These insights hold significance for CSL users, offering avenues to improve communication in sports-related contexts.

**Keywords:** Colombian Sign Language, Mouth Actions, Non-Manual Markers, Deaf Sports, Deaf Athletes

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## Introduction

Sign Languages (SLs) have emerged as globally recognised and vital languages for Deaf communities, serving as a fundamental mode of communication. This linguistic evolution has involved the exploration of phonological patterns within SLs and their versatile role across various domains, including sports, warfare, economic activities, and social interactions. Colombian Sign Language (CSL) exemplifies this linguistic transformation. To comprehensively understand CSL's grammar, it is imperative to construct a linguistic model encompassing its non-manual components. While substantial progress has been made in documenting CSL's manual signs in the context of sports, there are still significant gaps in understanding the role of non-manual components. This study aims to investigate the use of non-manual markers within the sporting vocabulary of CSL by addressing the following research questions:

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<sup>1</sup> Cortés and Barreto, "Variación Sociolingüística," 149.

1. What are the types of non-manual markers in form and meaning?
2. To what extent do differences exist in non-manual markers in CSL across different sports?

CSL serves as the primary sign language for the Deaf community in Colombia, evolving as a complex visual-spatial language tailored to their needs.<sup>2</sup> CSL has been recognised for its grammar, syntax, and phonology. In addition to these linguistic elements, CSL incorporates various non-manual markers, including facial expressions and head movements, to convey meaning.<sup>3</sup>

Previous research has focused on using CSL in education. For instance, the use of CSL in higher education in Colombia revealed that CSL needed to be more utilised in this context due to more resources and trained teachers.<sup>4</sup> This study emphasised the need for universities to promote CSL and provide teacher training.

A recent M.A. thesis explored CSL, comparing participant references in American Sign Language (ASL) and CSL.<sup>5</sup> This work underscored the necessity for further grammatical analysis in CSL. While acknowledging the work of Cortés and Barreto as a substantial contribution to CSL discourse, it lamented the absence of research in this area.<sup>6</sup> Cortés and Barreto researched CSL, specifically eliciting sports vocabulary.<sup>7</sup> Deaf sports enjoy significant prominence in Colombia, leading to collaborative efforts by key stakeholders, including the National Association of Interpreters of CSL, the Colombian Paralympic Committee, and Tour Guides of Colombia. In 2010, they collaborated to develop a foundational sports vocabulary of 500 terms in CSL for sporting activities.<sup>8</sup> While Cortés and Barreto acknowledged the substantial role of non-manual markers in CSL's selected sports vocabulary, they did not provide a detailed analysis of their observations.<sup>9</sup>

Studies in sports communication have primarily focused on spoken languages.<sup>10,11,12,13</sup> Research on non-manual communication in sports has been limited to hearing athletes,<sup>14</sup> with no known study exploring non-manual communication among Deaf athletes. Despite efforts to standardise a sports vocabulary in CSL, an analytical study has yet to be conducted on the role of non-manuals, particularly facial expressions, in CSL sports vocabulary. As a result, the function of non-manuals in the sporting context of CSL remains largely uncharted, creating a significant gap in the existing literature.

This study aims to address this gap by investigating the role of facial expressions as non-manual markers within CSL, specifically focusing on their application in sports communication among Deaf participants. It seeks to explore the profound impact of facial expressions on the meanings conveyed through CSL, particularly within the dynamic arena of sports communication.

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<sup>2</sup> Gonzalez, "Communicative Perspective," 24.

<sup>3</sup> Bickford and Fraychineaud, "Mouth Morphemes in ASL", 32–47.

<sup>4</sup> Parra, Taborda and Ramírez, "Colombian Sign Language in Higher Education," 1.

<sup>5</sup> Gateley, "Colombian Sign Language Narrative," 15.

<sup>6</sup> Cortés and Barreto, "Variación Sociolingüística," 149–170.

<sup>7</sup> Cortés and Barreto, "Variación Sociolingüística," 149–170.

<sup>8</sup> Cortés and Barreto, "Variación Sociolingüística," 149–170.

<sup>9</sup> Cortés and Barreto, "Variación Sociolingüística," 149–170.

<sup>10</sup> Beard, *The Language of Sport*, 52.

<sup>11</sup> Challenger, *Soccer Vocabulary*, 22.

<sup>12</sup> Teruel Sáez, "Vocabulario de Fútbol," 7.

<sup>13</sup> Rojas, "Periodismo Deportivo de Calidad," 5.

<sup>14</sup> Zamfir, "Communication in Sport Environment," 99–106.

In summary, while CSL has been the subject of extensive research, especially regarding its linguistic features, the role of non-manual articulation, specifically facial expressions, in CSL sports vocabulary still needs to be explored. This research endeavours to bridge this gap, shedding light on how facial expressions, as non-manual markers, contribute to word acquisition and meaning creation in CSL, particularly within the context of sports communication among Deaf participants. Through this investigation, I aim to provide a comprehensive understanding of the linguistic intricacies of CSL, further enriching the linguistic landscape of sign languages.

## 2. Methods

This study employs a descriptive research design,<sup>15,16,17</sup> relying on secondary data, to investigate the use of non-manual markers in CSL within the context of sports, with a focus on Athletics, Football, and Table Tennis. The data, collected by Cortés and Barreto for the Colombian Paralympic Committee, the National Association of Interpreters of CSL, and the Tour Guides of Colombia, consists of 379 video clips representing various sports domains, including Chess, Athletics, Basketball, Bowling, Football, Indoor Football, General Sports, and Table Tennis.<sup>18</sup>

Access to the data involved obtaining permission, and the analysis focused on the three sports domains most likely to provoke non-manual interactions during the game. The dataset, amounting to a combined time length of 50 minutes, was examined to identify non-manual markers, particularly facial expressions, and understand their role in signed words and expressions.

The methodology aligns with previous research on mouth morphemes in American Sign Language (ASL) and adapts a framework to examine facial expressions and other non-manual markers in CSL.<sup>19</sup> The descriptive analysis categorizes the identified non-manual markers by sport, reference names, forms, frequency, and usage context. The results are presented in tables, providing an overview of non-manual markers observed within the three selected sports domains and their characteristics.

## 3. Results

In the dataset, 65 distinct mouth actions were identified, with 13 stemming from the Athletic data, 30 from the Football data, and 22 from the Table Tennis data. The distribution of these mouth actions across the sports domains is presented in **Table 1** below, including the respective percentages. Notably, the frequency of mouth actions corresponds to the number of video clips for each sport, reflecting the prevalence of these actions in the dataset.

Sport Domain	# of Video clip		# of identified mouth action	
Athletic	33	17.2%	13	20%
Table Tennis	59	30.7%	22	34%

<sup>15</sup> Nyst, "Size and Shape in Gestures," 156–191.

<sup>16</sup> Steinbach, "Plurality," 112–136.

<sup>17</sup> Corballis, "Gestural Origins," 2–7.

<sup>18</sup> Cortés and Barreto, "Variación Sociolingüística," 149–170.

<sup>19</sup> Bickford and Fraychineaud, "Mouth Morphemes," 40–45.

Football	100	52.1%	30	46%
<b>Total</b>	<b>192</b>	<b>100%</b>	<b>65</b>	<b>100%</b>


**Table 1.** Summary of the datasets under study

Among the distinct mouth actions, ten unique non-manual markers were identified, each significant in conveying meaning beyond the manual signs used in communication. These non-manual markers contribute to the rich linguistic and cultural aspects of CSL, particularly within the deaf community. The ten identified non-manual markers are as follows:

1. Bilabial plosive/lip explode
2. Cheeks Puffed
3. PuffedBlow
4. Lip Sucked-In
5. Mouth Shrug
6. Tongue Protruding
7. Lip flattened
8. Lip protruding
9. Mouth round
10. Lip twisted

These markers were systematically analysed and described based on their reference, form, number of occurrences, meaning, grammar, and relevant comments. The subsequent tables provide detailed insights into each non-manual marker, ensuring a structured and organised presentation of the findings. This approach facilitates a clear understanding of the role and significance of these markers in CSL during sports communication.

### 3.1. Bilabial Plosive/ lip explodes

Reference	No reference available	
Form	<p>The cheeks are puffed with the mouth closed. Air pressure builds up in the mouth and is released suddenly by opening the lips. The eyes are closed quite slightly, raising the eyebrows to some extent. The tongue is pulled out slightly between the lips and still makes the red part of the lips visible.</p>	
Number	21 (6 = Football data); (13 = Table Tennis data); (2 = Athletics data)	
Meaning	<p>Action, active, kick to set in motion.</p> <p>Mostly articulated after a Lip sucked-in and occasionally with protruding lips. It can also be articulated without other mouth morphemes</p>	
Grammar	<p>Articulated with action verbs.</p> <p>PUT ON KICK SHOT</p>	
Comments	<p>For <i>PuffedBlow</i> in Bickford &amp; Fraychineaud,<sup>29</sup> the "air leaks out through a small opening", but in this case, the air leaks with an explosive sound and a wider opening</p>	


**Table 2.** Category Bilabial plosive/ Lip Explodes

The bilabial plosive in CSL emphasises the importance of lip movement in producing clear and accurate signs. **Figure 1** depicts a signer using their lips to produce a bilabial plosive in CSL. The signer's face is shown in close-up, with their lips forming a small round shape, similar to the shape made when pronouncing the letter "P" in spoken language. The image highlights the importance of the lips in producing this particular sign, as the bilabial plosive requires the use of both lips to create a distinctive sound. The signer had the bilabial plosive when signing HIT with his hands, which is made by bringing the flat handshape down.



**Figure 1.** Example from the dataset: Table Tennis: TOP SPIN EFFECT. (Efecto top spin (Forma 3)\_Table Tennis)

### 3.2. Cheeks Puffed

Reference	<i>Puffed cheeks.</i> <sup>20</sup> <i>Puffed.</i> <sup>21</sup>	
Form	<p>The mouth is closed.                  Cheeks are inflated, but the air is not released.                  The cheeks winded make the cheek have a round, swollen appearance.                  The eyebrows are almost joined because the eyelashes are raised slightly higher, and the eyes are relatively closed.                  The face looks a bit squeezed, making a face look narrow.</p>	
Number	12 (2 = Table Tennis data); (3 = Football data); (7 = Athletics data)	
Meaning	The marker indicates an entity to be in motion or Indicating that two or more entities are together	

<sup>20</sup> Kaneko, "Onomatopoeic Mouth Gestures," 467–490.

<sup>21</sup> Bickford and Fraychineaud, "Mouth Morphemes," 40–45.

Grammar	Articulated with action verbs
Comments	In comparison, bilabial plosive cheeks puffed build up more air in the mouth than articulating a bilabial plosive. Most cheek puffs in athletics were related to running or the long jump

**Table 3.** Category Cheeks Puffed

In CSL, signers could employ facial expressions, particularly the subtle puffing of cheeks, to enhance the visual cues within the language. **Figure 2** depicts a signer using their cheeks to create a visual cue in CSL. The signer's face is shown in close-up, with their cheeks puffed out slightly, creating a bulge on either side of their mouth during his sign for RELAY. The image highlights the importance of facial expressions in CSL, as the puffed cheeks provide a visual cue that adds meaning to the sign being made. The signer's fingers form a sign while the cheeks are puffed, indicating that the visual cue conveys additional information about the sign. The image provides a clear example of how facial expressions can enhance the meaning of signs in sign language. It emphasises the importance of understanding the role of non-manual markers in communication.



RACE



RELAY

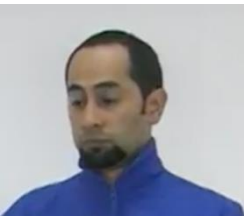
Cheeks Puffed

**Figure 2.** Example from dataset: RELAY RACE. (Carrera de relevos (Former 1) \_ Athletics data)

### 3.3. PuffedBlow

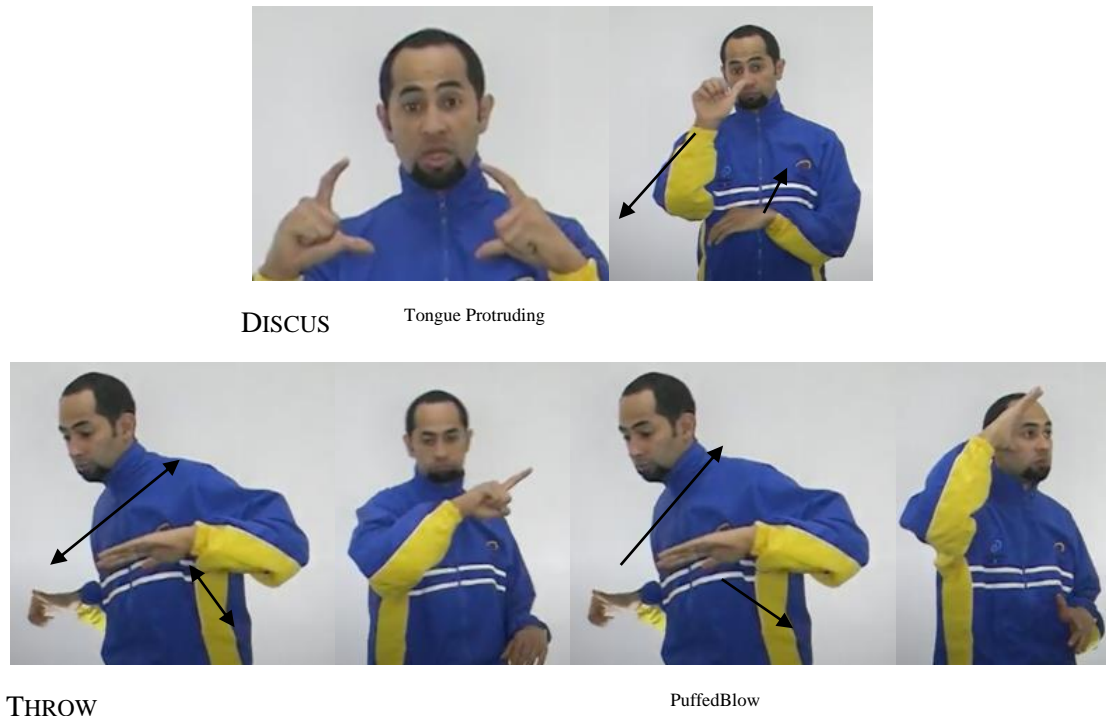
Reference	Bickford & Fraychineaud. <sup>22</sup>
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<sup>22</sup> Bickford and Fraychineaud, "Mouth Morphemes," 40–45.

Form	The mouth is closed. Cheeks are slightly inflated, and the air is allowed to leak out slowly via a small opening within the lips, creating a lip quivering (shaking with a slight, rapid motion) The face is turned to the right-hand side. The nose is quite opened a bit, and the eyes opened	
Number	2 (2=Athletics)	
Meaning	Used to indicate a rapid movement of an entity	
Grammar	It was always used in association with RUNNING	
Comments	This mouth action is also found in Bickford and Fraychineaud. <sup>23</sup> Compared to Cheeks Puffed, this action allows the air to leak out of the mouth, while cheeks puffed, the air is not released.	

**Table 4.** Category PuffedBlow

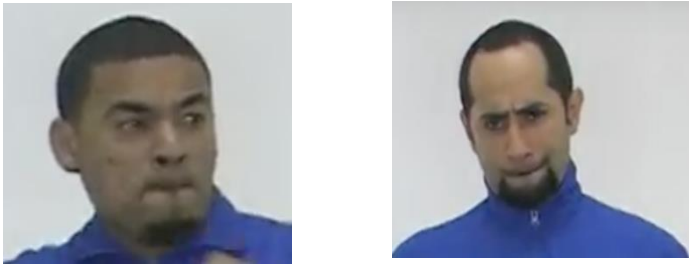
The study also observed that signers could employ a forceful burst of air, conveyed through puffed cheeks, to create a distinctive sign. **Figure 3** depicts a signer using a puffed blow to create a specific sign in sign language. The signer's face is shown in close-up, with their cheeks puffed out as they exhale a quick, forceful burst of air. The image highlights the importance of breath control in sign language, as the puffed blow creates a distinct sound that adds meaning to the sign. The signer's hands form a sign for THROW while the puffed blow is produced, indicating that the sound is an integral part of the sign. The image clearly shows how breath control and non-manual markers can create specific signs in CSL. It emphasises the importance of understanding the role of non-manual markers in communication.



**Figure 3.** Example from dataset: DISCUS THROW (Lanzamiento de disco\_ Athletics data)

<sup>23</sup> Bickford and Fraychineaud, "Mouth Morphemes," 40–45.

### 3.4. Lip Sucked-In

Reference	No reference available
Form	The lips are folded or pulled into the mouth, leaving the lips' red part hidden. The lips or chin may quiver, and the edges of the mouth are often turned down. It also makes the mouth close moderately, with the lips disappearing  
Number	19 (10= Table Tennis); (7=Football); (2=Athletics)
Meaning	Used for endurance, initiation, or firmness of an entity
Grammar	Sometimes, the lip sucked-in proceeds Bilabial plosive/ lip explode. Associating with signs like RUNNING, UNIFORM, KICK, BARS
Comments	Not found in Bickford and Fraychineaud. <sup>24</sup>

**Table 5.** Category Lip Sucked-In

Emphasising the crucial role of nonmanual marking in CSL, signers do employ a unique lip-sucked-in movement to convey a specific meaning with a manual sign with the hands. **Figure 4** depicts a signer using a lip-sucked-in movement with the sign SHORT SLEEVE. The lips pursed together and then quickly sucked inwards. The image highlights the importance of lip movements in CSL, as the lip sucked-in motion creates a distinct visual cue that adds meaning to the sign being made. The hands form a sign whenever the lip sucked-in motion is produced, indicating that the visual cue is integral to the sign. The image provides a clear example of how non-manual markers, such as lip movements, can create firmness of an entity in CSL.



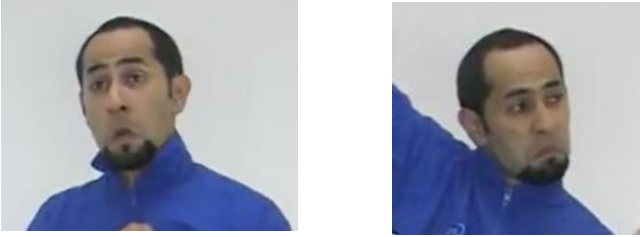
TROUSE LIP Sucked-In TOP Lip Sucked-In SHORT SLEEVE Lip Sucked-In

**Figure 4.** Example from dataset: UNIFORM (Uniforme\_ Athletics data)

<sup>24</sup> Bickford and Fraychineaud, "Mouth Morphemes," 40–45.



### 3.5. Mouth Shrug

Reference	<i>Chinraise</i> . <sup>25</sup>
Form	The mouth is raised lightly and momentarily to express surprise. It also qualifies as a recurrent gesture. The manual gesture is associated with inaction, normally expressing that one has nothing to offer. Eyes are widely opened as well. Eyebrows are also raised quite fairly: 
Number	6 (4=Football); (2=Athletics)
Meaning	Used when one wants to express expectation or prediction (Anticipation)
Grammar	Associated with a sign like RUN
Comments	Not found in Bickford and Fraychineaud. <sup>26</sup>

**Table 6.** Category Mouth Shrug

The study also discovered that singers deftly incorporate a mouth shrug into the movement of specific signs, shedding light on the pivotal role of facial expressions in CSL. **Figure 5** illustrates how a signer uses a mouth shrug with a specific sign (i.e., BALL) movement in CSL. The signer's mouth was slightly open, and their lips pulled back in a shrugging motion. The image highlights the importance of facial expressions in sign language, as the mouth shrug is used to create a distinct visual cue that adds the meaning of anticipation to the movement of the ball.



BALL MOVEMENT

Mouth Shrug

<sup>25</sup> Saeed, Mahmood and Daanial. "Facial Expression Recognition Techniques," 425–443.




<sup>26</sup> Bickford and Fraychineaud, "Mouth Morphemes," 40–45.






WHISTLING

Figure 5. Example from dataset: WHISTLING AN OUT OF PLACE. (Pitando un fuera de lugar\_Football)

### 3.6. Tongue Protruding

Reference	No reference available
Form	<p>The tongue is pushed out of the mouth to be made visible.                  The tongue is sticking out with the eyebrow raised fleetingly.                  The tongue is pulled out slightly or wholly depending on the communicated gesture.                  Five different forms of tongue protruding were identified without the teeth showing:</p> <ol style="list-style-type: none"> <li>1. Tongue twist: the tongue is protruded through and pressed against the side of the commissure of the lips.                      </li> <li>2. Rolled tongue: the tongue is brought out of the lips with the edges moved to keep a tube shape.                      </li> <li>3. Tongue curled: the tongue is pulled out and bent at the tip.                      </li> </ol>

	<p>4. Tongue pointed: a small mouth opening is made only to have the tip of the tongue visibly protruding.</p> <p>5. Straight tongue: This is a neutral or normal tongue position when pulled out. The tongue does not assume any shape or special position.</p>	  
Number	14 (6= Table Tennis); (7=Football); (1=Athletics)	
Meaning	To indicate the Shape or position of an entity	
Grammar	Used when indicating a form	
Comments	Not found in Bickford and Fraychineaud. <sup>27</sup> Flipping of the tongue was once used to indicate (mesh) weakness	

**Table 7.** Category Tongue Protruding

It is worth noting that there are five different types of tongue protruding movements in the data set. These include the straight tongue, tongue pointed, tongue down, rolled tongue, and tongue twist. Each of the tongue’s protruding movements is used to indicate the position or the shape of an entity being referred to by the manual sign with the hand. **Figure 6**, illustrated below, depicts the tongue twist type, in which the tongue is slightly curled and twisted to one side of the mouth. This specific tongue protruding motion is used in CSL to create a visual cue that adds meaning to the Shape or position of an entity being made. By highlighting the tongue twist type, the image emphasises the complexity and diversity of non-manual markers in CSL. It underscores the importance of understanding the nuances of these movements for effective communication.



TABLE


SERVE-A-BALL

<sup>27</sup> Bickford and Fraychineaud, “Mouth Morphemes,” 40–45.



**Figure 6.** Example from dataset: CORRECT WAY TO GET A SERVICE. (Forma correcta de sacar un servicio\_ Table Tennis)

### 3.8. Lip flattened

Reference	<i>Pressed.</i> <sup>28</sup>
Form	<p>The lips are not swallowed into the mouth but are flattened together. In other words, the lips are kept horizontal but squeezed flat.</p> <p>The flattened lips make the red part of the lips hidden.</p> <p>Air pressure builds up in the mouth slowly but is not released, which makes cheeks puff slightly.</p> <p>Eyebrows are raised squarely</p> 
Number	(1=Football)
Meaning	To indicate the quality of being adequate or correct (exactness)
Grammar	Used with the sign RULE

**Table 8.** Category Lip flattened

Lip-flattening motion in conjunction with the manual sign is one of the nonmanual markers discovered in CSL. From the dataset, they are mostly used to signal an affirmation of a referent. **Figure 7** depicts a signer using a lip-flattening motion with the manual sign REGULATION. The signer's lips are pressed together and flattened out, emphasising the importance of lip movements. The image illustrates how non-manual markers, such as lip movements, create meaning of the exactness of the manual information being provided.

In **Figure 7**, the signer's hands are also shown, forming the signs FOUR, FIVE, and MINUTES REGULATION; however, non-manual markers were integrated with one particular manual

<sup>28</sup> Bickford and Fraychineaud, "Mouth Morphemes," 40–45.

sign. This integration is a critical aspect of effective communication in sign language, as non-manual markers can modify or clarify the meaning of a sign.



FOUR FIVE MINUTES REGULATION Lip flattened

**Figure 7.** Example from dataset: REGULATION TIME OF 45 MINUTES. (Tiempo reglamentario de 45 minutos\_Football data)

### 3.9. Lip Protruding

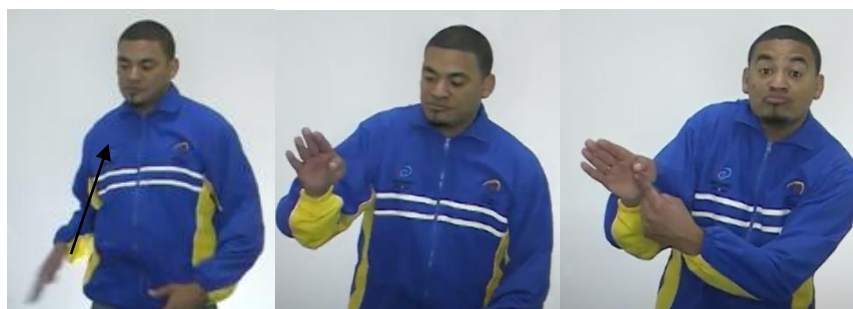
Reference	No reference available	
Form	<p>The lips are pushed out, making the reddish part of the lips visible.</p> <p>The forward position of the upper and lower teeth forces the lips to protrude out.</p> <p>Both upper and lower lips lean forward or stick outward. The nose looks flattened and leans towards the protruding lips.</p> <p>The eyebrows are widely raised, too:</p>	
Number	9 (2= Table Tennis); (7=Football)	
Meaning	Used to indicate the proximity of an entity	
Grammar	<p>Go with the sign NEAR,</p> <p>It was always used when the referee wanted to show a card to a player.</p> <p>It is also used when a player is observing a tool</p>	
Comments	This is very close to what Bickford and Fraychineaud describe as "mmm" nonmanual. <sup>29</sup>	

**Table 9.** Category Lip Protruding

The lip protruding motion, closely aligned with tongue protruding movements, serves as a means to communicate the proximity of a specific entity. **Figure 8** depicts a signer using a lip protruding motion to indicate the proximity of an entity in CSL. The signer's lips pushed forward and slightly pouted. This specific lip motion is used to signify the presence of an object or entity in close proximity. The image highlights the importance of non-manual markers, such as lip protrusion, in conveying meaning in sign language. In this case, the lip protrusion motion adds meaning to the sign, indicating the proximity of the referenced entity. Overall, the image

<sup>29</sup> Bickford and Fraychineaud, "Mouth Morphemes," 40–45.

provides a clear example of how non-manual markers convey meaning, particularly regarding spatial relationships, and underscores the importance of understanding the role of non-manual markers in effective communication.



HIT-BALL

Indexing

Lip protruding

Figure 8. Example from dataset: RACKET. (Raqueta (Forma 2) \_Table Tennis)

### 3.10. Mouth Round

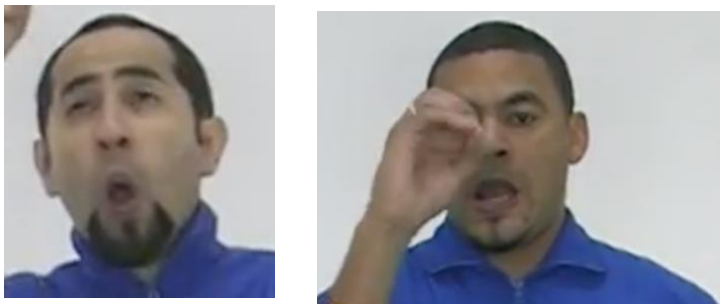
Reference	No reference available
Form	The mouth is shaped in a circular form. Open eyes and a large round mouth cause the red part of the mouth to be shown, keeping the tongue in the mouth. 
Number	5 (4=Football) (1= Table Tennis)
Meaning	1. Used to express excitement (see <b>Figure 9B</b> ) 2. Used to express the Shape of an entity (see <b>Figure 9A</b> )
Grammar	Occurs with manual signs that can express excitement (e.g., goal, gunshot) or Shape (e.g., round)
Comments	Not found in Bickford and Fraychineaud. <sup>30</sup> If used for Shape, may consider it as a <i>synesthetic mouth gesture</i> , <sup>31</sup> or may also be considered as a Non-manual CHA. <sup>32</sup>

Table 10. Category Mouth Round

The examination of non-manual marking in CSL revealed that the mouth serves two distinct functions, contingent on the context. It is employed either to convey excitement or to depict the shape of a given entity. **Figure 9** shows two examples of the use of the mouth round motion. In

<sup>30</sup> Bickford and Fraychineaud, "Mouth Morphemes," 40–45.

<sup>31</sup> Kaneko, "Onomatopoeic Mouth Gestures," 470.

<sup>32</sup> Schnepf, Wolfe, McDonald and Jorge, "Facial Nonmanual Signals," 407.

the first example (**Figure 9A**), the signer's mouth is rounded to express the shape of an object or entity. The signer is shown with their lips pursed and rounded, creating a circular shape with their mouth. This sign is commonly used to convey information about the shape or contour of an object, such as a ball or a circular plate.

The same mouth-round motion indicates excitement or enthusiasm in the second example (**Figure 9B**). The signer's mouth is again shown pursed and rounded, but with a more exaggerated and dynamic motion. The mouth round motion is used with other non-manual markers, such as widened eyes or raised eyebrows, to convey a sense of excitement, energy, or enthusiasm.

This image highlights the versatility of non-manual markers in CSL and the ways in which the same basic motion can be used to convey different meanings depending on the context and accompanying non-manual and manual signs.



BALL Mouth round

A: (Pelota (Forma 1) \_Table Tennis)



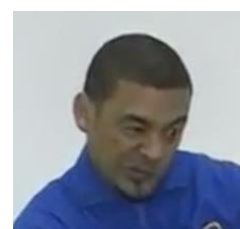
GOAL Mouth round

B: (Gol (Forma 2) \_Football)

**Figure 9.** Example from dataset: Mouth articulations

### 3.11. Lip Twisted

Reference	<i>Iconic mouth gesture.</i> <sup>33</sup>
Form	The lips are twisted. The lips are turned or coiled in the opposite direction from the other. This is making one eye slightly closed against the other. The eyebrows are raised. The mouth is also twisted. The right cheek is swollen a bit against the right eye and is relatively closed:
Number	1 (1= Table Tennis)
Meaning	Iconic: used to indicate how twisted an entity was synonymous to the mouth action
Grammar	Imitating how the hands are used to tighten a screw
Comments	Not found in Bickford and Fraychineaud. <sup>34</sup> mimicking the hand movement



**Table 11.** Category Lip Twisted

<sup>33</sup> Kaneko, "Onomatopoeic Mouth Gestures," 470.

<sup>34</sup> Bickford and Fraychineaud, "Mouth Morphemes," 40–45.

It was further revealed that signers possess the ability to employ non-manual markers to mirror the corresponding manual sign, as observed in the case of the Lip Twisted marker. In this scenario, the signer adeptly utilizes a twisted lip motion to augment and refine the formation of the manual sign. **Figure 10** shows a signer using the non-manual marker of a twisted lip during the formation of the sign SCREWED-AT-EACH-ENDS. The twisted lip is used in an iconic way to convey information about how twisted or contorted an entity is. The signer is shown twisting their lip with their hands, mimicking the contorted shape of the described entity.

This non-manual marker is used in conjunction with signs for twisted or contorted entities, such as a twisted rope or a contorted tree branch, to add additional information about the shape or state of the entity. By twisting their lip this way, the signer can create a more vivid and nuanced representation of the described entity.

This image demonstrates the creative and expressive possibilities of non-manual markers in CSL and the ways in which they can be used to convey subtle nuances of meaning that might not be immediately apparent from the sign alone. It also underscores the importance of non-manual markers as an integral part of the language and the need for language learners to develop a deep understanding of the language's manual and non-manual aspects.



**Figure 10.** Example from dataset: MESH SUPPORT. (Soporte de malla\_Table Tennis)

## 4. Discussion

This section aims to examine the interplay of mouth actions within CSL for each domain and determine which facial features are employed within these domains. The analysis involves a thorough observation and examination of the video data collected. As a result, dedicated analysis sections have been created for Athletics, Indoor Football, and Table Tennis. Furthermore, this section compares and contrasts the analyses of these domains to reveal which sporting activity utilises more mouth actions when discussing activities or concepts within the domain. By delving into these aspects, we aim to enhance our understanding of the role of non-manual mouth actions in CSL and their significance in sports communication.

### 4.1. Non-manual actions in Colombian Sign Language

Non-manual actions in sign language play a crucial role in facilitating communication. As highlighted by Elliott and Jacobs,<sup>35</sup> facial and head movements are utilised across various

<sup>35</sup> Elliot and Jacobs, "Facial Expressions," 2.



linguistic structures in sign languages, including CSL. The analysis of the result data revealed a substantial use of head movements and facial gestures in conveying vocabulary and expressions. These non-manual actions were particularly observed to aid in communicating events or activities to the participants involved.

For instance, while examining video data from the Athletics domain, it became evident that a wide range of facial gestures were employed. These facial signs conveyed the intended message to the participants engaged in the communication activity. Without these non-manual actions, comprehension and accurate feedback would be considerably challenging. Using non-manual actions by signers provides a clear visual representation of the expressed content, offering insights and crucial cues that convey the emotional elements inherent in the signing process.

While manual markers contribute to the overall communication process, the non-manual actions distinctly and remarkably signal the activity's nature. **Figure 11** provides illustrative examples of these non-manual actions, highlighting their importance in CSL communication. By examining and analysing these non-manual actions, we aim to gain a deeper understanding of their significance in conveying meaning and enhancing the expressive capabilities of CSL.



**Figure 11.** Sign for “Running in a Curve Lane” in CSL

The images in **Figure 11** depict a left-to-right sequence illustrating the signer's use of head movements and facial expressions to convey the activity of "running a curve" in CSL (Canadian Sign Language). The raised eyebrows, partial eye closure, various head movements, and facial expressions, including squinted faces and puffed cheeks, are intentionally employed to convey the emotional and physical aspects of running, particularly in a curved path. These illustrations highlight the visual nature of sign language, emphasizing the importance of observing facial features to discern emotions and physicality associated with the signed concept.

The data analysis indicates that the face plays a prominent role in expressing concepts and vocabulary across selected sports domains. Eyes, eyebrows, cheeks, lips, and mouth consistently contribute to conveying expressions, underscoring the crucial role of the face as a component of sign language. This observation reinforces the relevance of non-manual actions in CSL.

While CSL incorporates manual markers like hand movements and classifiers, the data suggests that non-manual actions are essential for comprehending and appreciating described or expressed activities. The illustration of curving the body and hand signs alone, without accompanying facial expressions, is insufficient for understanding and interpreting the signed expression. This emphasizes that manual markers do not operate in isolation in CSL, even though they can convey specific words.

Another example showcasing the application of non-manual actions in CSL is illustrated in **Figure 12**, representing the expression "Expulsión de jugador" (expelling a player) used to

address offenders or participants during a race. The data reveals that this expression is employed after a prior warning to participants, serving as a means to communicate the decision to remove a participant from the race and provide an explanation for such action. This illustration further demonstrates how facial expressions are used in CSL to facilitate communication within the context of sports.



**Figure 12.** Sign for “Expelling a Player” in CSL

In Table Tennis within CSL, non-manual actions play a significant role alongside manual markers in communicating words and concepts, as illustrated in **Figure 13** depicting the sign for "Table Tennis net fixed." These images vividly display various facial expressions, including eyebrow movements and mouth shaping, emphasizing the extensive use of non-manual actions. These actions serve as crucial channels of information, enabling a comprehensive understanding of the signed expressions related to sporting activities.

The data indicates that non-manual actions are prevalent in CSL, particularly when communicating concepts, words, and significant details in various sports domains. However, there is a distinction noted when signing vocabulary items or individual words. In such cases, manual markers, predominantly hand signs, are more prominently used, while non-manual actions are employed to a lesser extent. This observation is particularly evident when signing words related to numbers, though the reasons for this disparity remain unclear. Nevertheless, it underscores the active use of non-manual actions by the deaf community when discussing sports activities in CSL.

Recognizing the significance of non-manual actions in the context of sports communication allows for a better understanding of the dynamic nature of CSL and how these actions enrich the expressive capabilities of sign language users.





**Figure 13.** Sign for “Table Tennis net fixed” in CSL

The analysis revealed ten unique non-manual markers used in CSL for sports communication. **Table 12** presents an overview of these markers, including their frequency of occurrence:

MARKER	FREQUENCY			
	Athletics	Football	Table Tennis	
Bilabial plosive/ lip explodes	2	6	13	<b>21</b>
Cheeks Puffed	7	3	2	<b>12</b>
PuffedBlow	2	0	0	<b>2</b>
Lip Sucked-In	2	7	10	<b>19</b>
Mouth Shrug	2	4	0	<b>6</b>
Tongue Protruding	1	7	6	<b>14</b>
Lip flattened	0	1	0	<b>1</b>
Lip protruding	0	7	2	<b>9</b>
Mouth round	0	4	1	<b>5</b>
Lip twisted	0	0	1	<b>1</b>
<b>TOTAL</b>	16	39	35	<b>90</b>

**Table 12.** Non-Manual Markers in CSL for Sports Communication

The findings of this study highlight the significance of non-manual markers in CSL for conveying meaning beyond manual signs in sports communication. The identified markers, such as Bilabial plosive/lip Explode, Cheeks Puffed, and Lip Sucked-In, contribute to the expressive capabilities of CSL users when discussing sports-related concepts and activities. These non-manual markers provide additional layers of meaning, including emotional elements and physicality, enhancing the communicative power of CSL. The results support the notion that non-manual markers are essential components of CSL and contribute to the unique language and culture of the deaf community.

#### 4.2. Comparison of Mouth Actions within Selected Domains

This study explores the role of non-manual markers in enhancing the expressiveness and precision of signed expressions in Athletics, particularly those related to track activities in CSL. The analysis reveals that incorporating non-manual markers alongside manual markers adds depth to signed expressions, conveying more nuanced information. Facial features, including eyebrow movements, facial expressions, and eye movements, are strategically combined to evoke emotions that complement manual markers, facilitating interpretation. The data demonstrates extensive and purposeful use of non-manual markers in the Athletics domain, with specific markers chosen based on the context of the signed word or expression. The study

provides a detailed examination of the sign for "final acceleration" in CSL, illustrating the effective use of raised eyebrows (see **Figure 14**) in the initial stage and a combination of facial elements, such as mouth shape and cheek puffing, in the concluding part (see **Figure 15**). The findings emphasise that non-manual markers operate in various dimensions of signing in CSL, contributing significantly to precise and contextually appropriate communication in the sports domain.



**Figure 14.** Sign for "final acceleration" in CSL



**Figure 15.** Example from dataset: Sign for "final acceleration" in CSL

Within the context of Indoor Football in CSL, the data strongly supports the significant role of non-manual markers, particularly involving eye movements, facial squinting, and mouth actions, in conveying expressions within the emotional nature of Football. The shaping and movement of the mouth, though potentially peculiar to non-signers, are crucial cues for comprehending signed elements, working in conjunction with other facial features at specific moments.

The sign for "cañonazo" (meaning "powerful shot") exemplifies how non-manual markers, including facial expressions, intensify the communication of the shot's forcefulness and direction. The study provides visual examples in **Figure 16**, illustrating the importance of facial expressions in conveying the intensity of actions related to Indoor Football.

The data also highlights the use of facial expressions by coaches of deaf teams during Football matches, emphasizing the extensive use of facial expressions in CSL sports domains, particularly in the emotionally charged context of Football. Various facial features, including eyebrows, mouth, cheeks, and lips, are identified as crucial non-manual markers that enhance communication among deaf individuals within the Indoor Football domain.

The examination of ninety words and expressions within the Football domain reveals that each signed form incorporates at least one facial feature, with a predominant use of the eyes and eyebrows. This aligns with the understanding that eyes and eyebrows convey a wide range of emotions and sentiments in facial expressions, further emphasizing the integral role of non-manual markers in CSL communication within the deaf community.



**Figure 16.** Example from dataset: Sign for “powerful shot” in CSL

Within the domain of Table Tennis, the data reveals a strong correlation between non-manual markers and CSL, emphasising their significant contribution to conveying expressions and vocabulary items. The analysis demonstrates the extensive use of non-manual markers, including eye movements and mouth actions, to sign expressions in Table Tennis, enhancing the communication of complex ideas and nuanced meanings.

Coaches in Table Tennis, despite being unable to communicate directly with players during the game, rely on facial expressions as non-manual markers to convey ideas and emotions, facilitating feedback, gameplay adjustments, and maintaining composure. The comprehensive data analysis indicates that non-manual markers are deeply embedded in every aspect of communication within the Table Tennis domain, emphasising their importance in conveying intended messages and enhancing overall understanding.

Concrete examples, illustrated in **Figure 17**, showcase how non-manual markers convey emotions, intensity, and contextual details related to Table Tennis, particularly in the sign for "address of a service." The analysis of these images provides clear evidence of the use of non-manual markers to express focus and track the movement of the serving hand, indicating the speed and direction of the served ball.

Moreover, the study highlights the role of non-manual markers in addressing mistakes in Table Tennis, as evidenced in the sign for "mistake at reception" (**Figure 18**). The analysis reveals significant use of non-manual markers in conveying sports concepts and addressing errors, emphasising their importance in CSL for expressing sports-related concepts, ideas, and vocabulary.

While a distinction is noted between the use of non-manual markers in vocabulary items and expressions, both demonstrate their consistent presence, underscoring the significant utilisation of non-manual markers in conveying concepts in Table Tennis through CSL. In summary, the study provides compelling evidence that non-manual markers are highly employed in CSL to communicate sports concepts and address mistakes in Table Tennis, reinforcing their significance in conveying movement, intensity, and nuances in sports-related communication.



**Figure 17.** Example from dataset: Sign for “address of a service” in CSL



**Figure 18.** Example from dataset: Sign for “mistake at reception” in CSL

The data analysis within each domain reveals interesting trends and patterns in using specific non-manual markers in Athletics, Football, and Table Tennis (see **Figure 19** and **Figure 20**). These markers play a significant role in conveying meaning and enhancing communication within each sport.

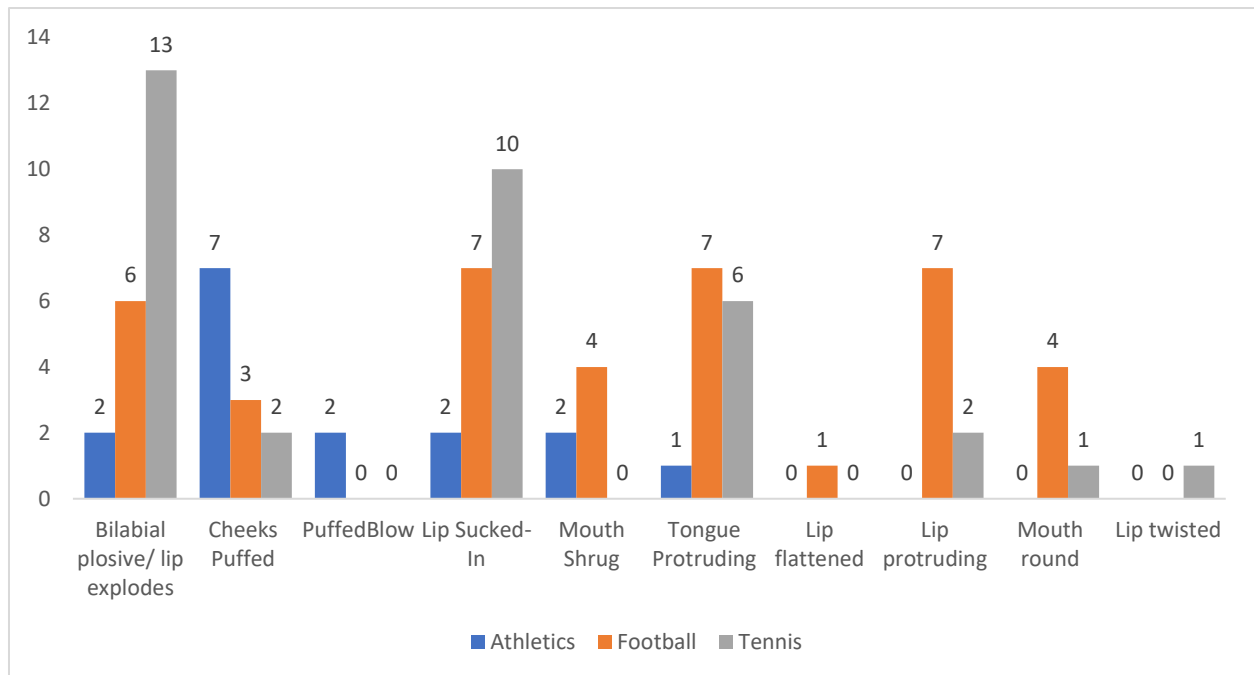


Figure 19. Distribution of the mouth actions

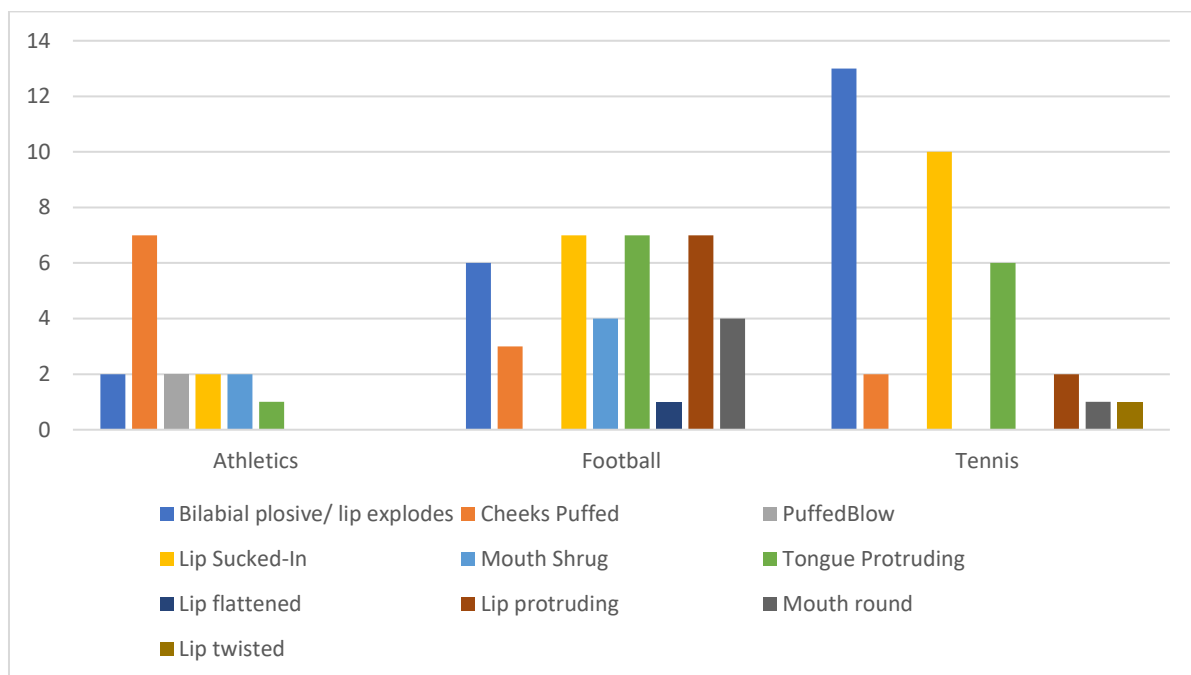


Figure 20. Representation of the mouth actions in each sport domain

In Athletics, the marker "Cheeks Puffed" has the highest frequency, suggesting its importance in expressing motion or the presence of entities. Conversely, markers such as "Lip flattened," "Lip protruding," "Mouth round," and "Lip twisted" show no occurrences, implying limited usage or potential irrelevance in Athletics.

In Football, markers like "Lip Sucked-In," "Lip protruding," and "Tongue protruding" have higher frequencies, indicating their significance in conveying aspects related to motion, proximity, and shape. "PuffedBlow" and "Lip Twisted" show no occurrences, suggesting their limited usage or possible irrelevance in Football.

In Table Tennis, "Bilabial plosive/lip explodes" has the highest frequency, aligning with the sport's fast-paced nature. "Lip Sucked-In" is considerable, indicating its role in expressing endurance, initiation, or firmness. "Tongue Protruding" with a moderate frequency is used to indicate the shape or position of an entity. Certain markers like "Cheeks Puffed," "Lip protruding," "Lip twisted," and "Mouth round" have lower frequencies, suggesting their relatively less frequent use in Table Tennis-related expressions.

Analysing specific mouth actions across sports reveals shared markers like "Lip Sucked-In," "Tongue Protruding," "Cheeks Puffed," and "Bilabial plosive/lip explodes," indicating commonalities in conveying concepts related to movement and shape. However, variations in marker frequency highlight sport-specific usage. For example, "Cheeks Puffed" is prominent in Athletics, while "Bilabial plosive/lip explodes" is prevalent in Table Tennis.

Unique markers like "PuffedBlow" are specific to Athletics, and "Mouth Shrug" is found in Athletics and Football but absent in Table Tennis. Limited occurrences of markers such as "Lip flattened," "Lip protruding," "Mouth round," and "Lip twisted" suggest their lesser roles or different interpretations within the specific sports.

These findings underscore both similarities and differences in non-manual marker usage across the three sports, highlighting the sport-specific nature of these markers and their role in expressing various aspects within each sport. Recognising and interpreting these markers are crucial for effective communication, enhancing comprehension and conveying meaning accurately within each sporting context. Further investigations in different sports and contexts would contribute to a comprehensive understanding of the role of non-manual markers in CSL within sporting activities.

#### 4.3. Roles of Mouth Actions in CSL within Sports

The analysis of mouth actions in CSL across various sports domains, including Athletics, Indoor Football, and Table Tennis, underscores their substantial linguistic and communicative roles. Mouth actions contribute significantly to the overall meaning of signed expressions, aiding in the interpretation and decoding process.

One primary role of mouth actions is their semantic contribution, complementing sign forms and creating meaning within CSL. Facial expressions, encompassing eyes, eyebrows, cheeks, lips, and mouth, play a crucial role in conveying intended messages and ensuring accurate interpretation. While not every word or expression in CSL may utilize facial expressions, the data analysis suggests that most signed forms and expressions in the selected domains incorporate facial features to encode meaning, highlighting their importance in meaningful communication.

Facial expressions in CSL also serve a syntactic role by completing the signing of words and expressions, enhancing communication. The data from Table Tennis demonstrates how facial expressions, particularly in **Figure 19**, complement manual markers, ensuring the completeness of expression structures. Without these facial expressions, the signing process would be incomplete and challenging to interpret, emphasizing their vital role in conveying meaning.





**Figure 19.** Example from dataset: Sign for “defend” in CSL

Regarding semantic relevance, facial expressions are observed to be semantically relevant to the signing of expressions and words across various sports domains. These expressions assist in decoding and interpreting concepts, ideas, and expressions for communicative purposes. Facial expressions are viewed as indispensable in CSL, performing roles that include creating and disintegrating meaning for understanding and feedback. The data supports the notion that facial expressions are semantically relevant, aiding in the expression of concepts and ideas in different sports domains.

The semantic relevance of facial expressions is further delineated in their ability to create semantic cues, eliciting the evocation of emotions. These cues, embedded in CSL, assist in interpreting expressions involving hidden or embedded emotions, contributing to the uniqueness of expressions. Facial features like eyebrows, cheeks, and lips are employed to evoke semantic cues in expressions that convey emotions.

Additionally, facial expressions aid in decoding the meanings of signed words and expressions, providing visual cues to understand the intended meaning comprehensively. The absence of facial features would make understanding expressions in CSL difficult, and these expressions play a crucial role in conveying emotive appeals and channeling emotions effectively, particularly in sports with significant emotional significance for participants. The movement of eyes, eyebrows, shaping of the mouth, and other facial features contribute to making facial expressions semantically relevant in CSL.

## Conclusion

This study provides a thorough analysis of the role of mouth actions as non-manual markers in CSL within the sports domain. Examining Athletics, Indoor Football, and Table Tennis, the research reveals the pivotal significance of mouth actions in conveying sports-related concepts, ideas, and vocabulary in CSL. Various mouth actions, including Bilabial plosive/lip explodes, Cheeks Puffed, PuffedBlow, Lip Sucked-In, Mouth Shrug, Tongue Protruding, Lip flattened, Lip protruding, Mouth round, and Lip twisted, were extensively employed to express emotions, convey vocabulary, and facilitate communication among deaf individuals engaged in sports dialogues.

The study emphasizes the syntactic and semantic functions of mouth actions in CSL, highlighting their substantial contribution to the structure of signed expressions and the creation of meaning within sports contexts. The prevalence of mouth actions is consistent across all sports domains, with Indoor Football and Table Tennis exhibiting particularly high usage. In conclusion, the research underscores the integral nature of mouth actions in CSL for effective communication in sports. While recognizing the semantic relevance and indispensability of these actions, the study calls for further research to deepen understanding and explore additional

facets of how mouth actions intersect with CSL within diverse sports contexts. The practical implications extend to promoting inclusivity and accessibility for the deaf community in sports settings, emphasizing the importance of recognizing the linguistic richness of mouth actions in CSL for educators, interpreters, and sports facilitators. The study hopes to inspire further exploration of non-manual markers in sign languages, contributing to broader efforts to enhance linguistic and social inclusivity for the deaf community.

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