

The Numerical Systems in Hausa Sign Language

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Abstract

Hausa sign language is human language whose forms consist of sequences of movements and configurations of hands and part of the body which include of arms as well as face and upper torso. The term Hausa sign language is to refer to the language which consist variety of signs such as iconicity, indexical, arbitrary and gesture etc. The paper intends and examines numeration of Hausa sign language (HSL) which processed through the use of hand configuration and perceived in visual/gestural modality. However, the paper describes numeral system of Hausa sign language (HSL) via illustrate of unit, tenth, hundred and thousand categorically. The main objective of the paper is demonstrated the functions of sign parameters (handshape, movement, location and orientation) in the production of sign numeration in Hausa Sign Language.

Keywords: Hausa sign language, Parameters, Numerical system.

Introduction

Since the beginning of human life on earth, man needed to express countable multiplicity so he created the symbolic language of numbers known as numerical systems. Throughout time quite a few numerical systems have been developed. Mathematicians studying these numerical systems of spoken languages and categorized them into three (3) types: cumulative or merely cumulative or additive, positional and mixed numerical systems. Socially- constituted gestures embody form- meaning mappings that have been conventionalized within a linguistic community (Müller and Posner 2004, Kendon 2004). Many signs in sign languages are derived from such socially constituted gestures (Newport and Supalla 2000). For example, the Nicaraguan Sign Language (NSL), an indigenous sign language that has emerged from the Nicaraguan Deaf community, has many lexical items that are very similar to common gesture forms used by hearing Nicaraguans (Senghas 1994, Senghas, Özyürek, and Kita. 2002).

Still, there notable scholars who write of numeral system of different sign languages in the world such as Orié (2013), Schmaling, 2000, Pfau & Steinbach (2006), Soyee. and Lájuyigbé (1993), Kourbetis & Girtis (2004), Xeroudakis (2005) and Papadopetrakis (2002 and 2003). Broadly, form the issue we can says that there are two types of languages in the world namely sign and spoken languages. Every language has its own way of counting things such as monies, houses, fruits (oranges, mangoes etc), cars etc. Most of the numeration in spoken languages are produce through the uses of vocal tract and recognize audibly whereas sign languages numeration produces through manually parameters and perceive visually. The numeral systems in Hausa sign language are derived in an often very bulky and complicated manner which involving multiplication, addition and subtraction of some parameters (handshape, movement, place of articulation (body and neutral space) and orientation (finger (s) selection and palm facing). Traditionally, Hausa sign numeral systems have structures as regards to unit, tenth, hundred, thousand and million. These structures are formed as a result of sign parameters function.

Parameters Use in Hausa Sign Language Numeration

The parameters employ in Hausa sign language numerical systems are including the following: Handshapes Location, Hand movement, Neutral space/Body and Orientation

Methods of Gathering Data

This research examines daily conversation among Hausa deaf in the Tudun Maliki Special School, and some learning centers of Hausa deaf as well as their dailies gathering centers respectively. On the aspect of examining numeral signs in Hausa language, data were collected through participatory observation. Also signs on numeral systems were systematically collected with a number of deaf people. However, numerals words in spoken Hausa were presented to them and they were asked to produce the corresponding sign in their native language (Hausa sign language), On the other hand, signs were presented to them in context and they were asked to demonstrate their meanings. Photographs were taken and sketch them by artists for detailed and easier analysis. Written documents on sign languages are also used. Finally, substantial information was collected via participant observation as well as taking part in casual conversation in the

following places: Informal (daily meetings of the deaf at different places:- Tukuntawa, Kwanar jaba, Fagge, Gwammaja and Qoqi center of deaf as well as every day conversation with my neighbor deaf friends.

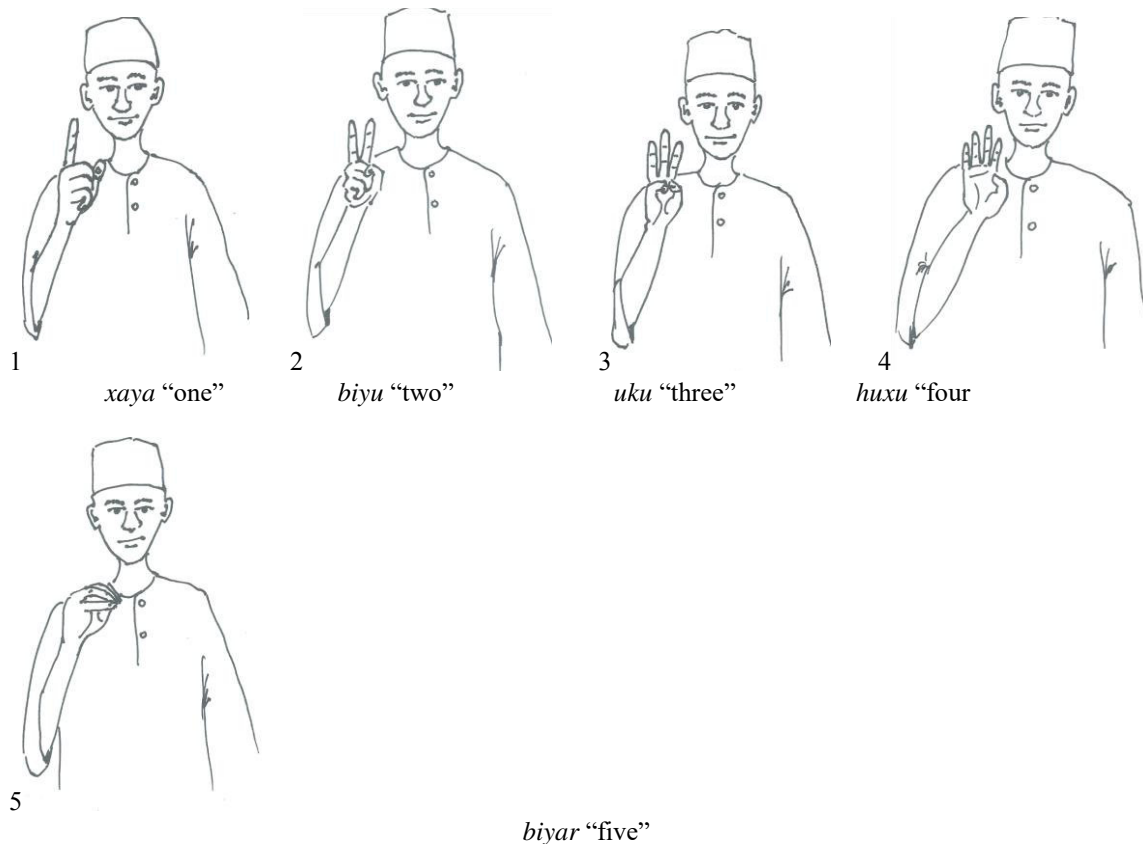
Numeral System in Hausa Sign Language

In Hausa sign language, numeration can be forms through manually or manually and non-manual parameters. Manual parameter comprises handshape, movement, space location and orientation (HMSO), whereas manual and non-manual includes HMSO and body location. The numeral systems of Hausa sign language are structured into unit, tenth, hundred and thousand etc.

Unit Numerical in Hausa Sign Language

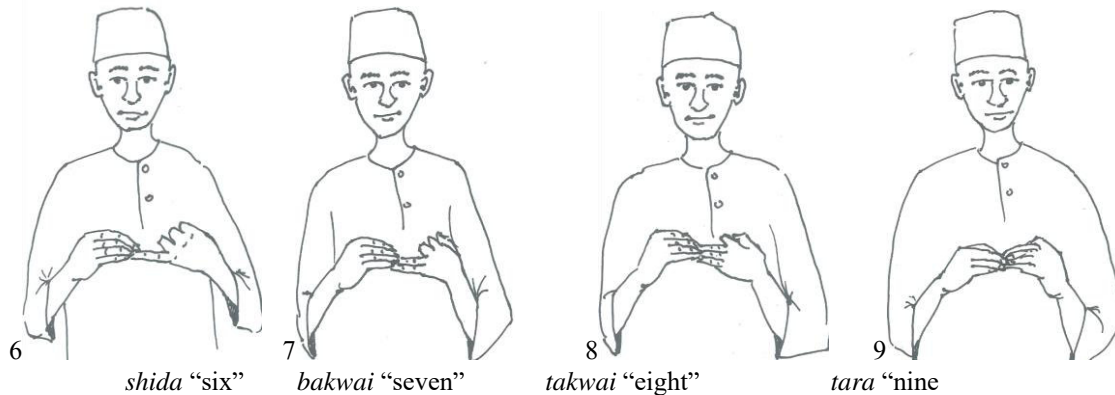
The unit numeral systems in Hausa sign language is produced in two processes, first process of numeral structure begins from one to five (1-5). These signs of unit numerical structure produce with one hand. The sign numeration involves handshape with single movement in neutral space with an extension of finger (s) up as well as palm facing away from signer. All signs share the same handshape, movement, space as well as palm facing but differ for finger (s) selection.

In sign of *xaya* (one), only an index finger is extended up, sign of *biyu* (two) produces with an extension of index and the middle fingers whereas, sign of *uku* (three) forms by an extension of index, middle and ring fingers. However, in sign of *huxu* (four) index middle, ring and little fingers are extended up. Finally, in sign of *biyar* (five) all the five fingers (T, I, M, R, L) are extended up. The palm of the hand in sign 1-5 is facing away from the signer. Observe from figures 1-5;



However, second process of the unit numeral system is proceeding from six to nine (6 - 9). In this category, numerical sign numbers are produced by double hand in the neutral space as well as the palm facing each other. All the fingers of the dominant hand (thumb, index, middle, ring and little) which are wrinkle attaches with finger (s) of the non-dominant hand to produce a numerical signs within this category. As in the sign of *shida* (six), a little finger of the non-dominant hand attaches with fingers of dominant hand. And when little and ring fingers of the non-dominant hand merges with fingers of the dominant hand, the sign of *bakwai*

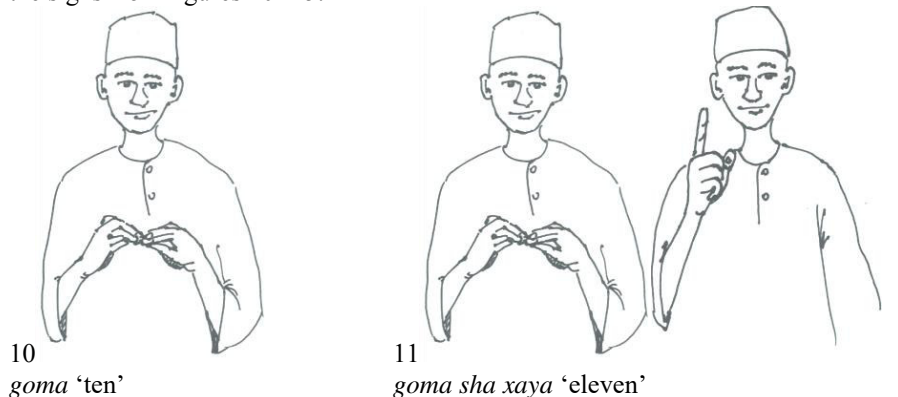
(seven) is produced, and if fingers of dominant hand are attaches with little, ring and middle fingers of the non-dominant, the sign of *takwas* (eight) is produced. While, fingers of active hand if are attached with little, ring, middle and index, the sign of *tara* (nine) is produced. Figures below show the numerical signs of 6-9;

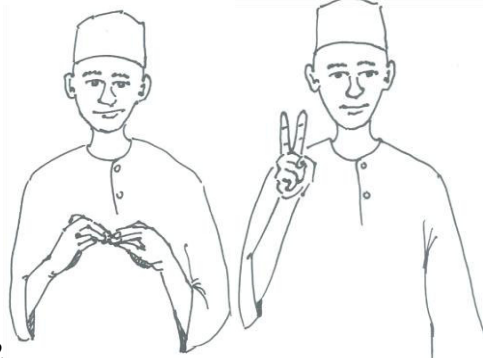


Finally, there is a sign of *goma* (ten) which produces by both dominant and non-dominant hands with the same handshape, movement, location and orientation. The sign is either to be in unit or tenth class via regards to two conditions proposes by Battison (1974), namely, the Symmetry Condition and Dominance Condition. The Symmetry Condition applies to the signs where both hands move; it specifies that the handshapes and movements for both hands must be identical and that the orientations and movements for both hands must be identical or polar opposites (mirror images). On the other hand the Dominant Condition which applies to two-handed signs in which the handshapes are not identical specifies that the non-dominant hand must remain static while the dominant hand produces the sign. Hence, two hands play different roles. In some numeral system of HSL, there are situation whereby both hands are articulators or the non-dominant hand copies the dominant hand in some way to produce a number. In other numerical signs, the non-dominant hand functions as place of articulation.

Tenth Numerical in Hausa Sign Language

The tenth class of numerical system in Hausa sign language contain two processes, first process begins from eleven to ninety (11-19). Signs under this category possess two movements. As we can see in sign of *goma* (ten) which forms with double hand and one movement and for the signs of *sha xaya* (eleven) to *sha tara* (ninety), the sign of *goma* (ten) is produced first and follows with unit sign of number as from 1-9. Observe the signs from figures 10- 15.

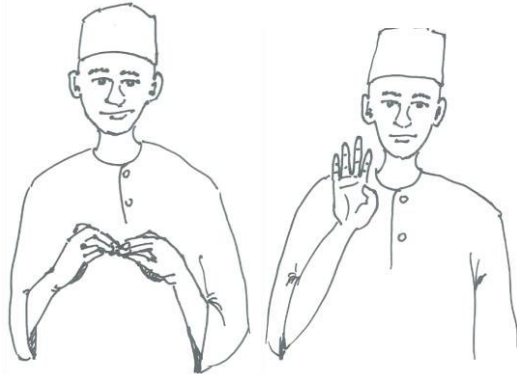




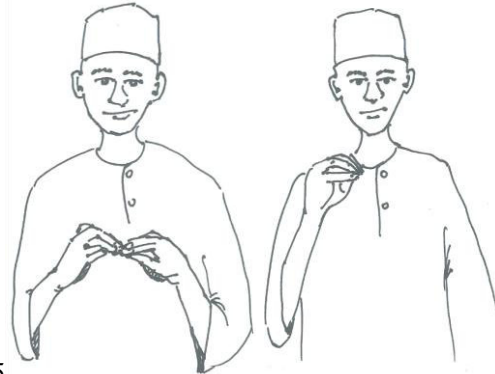
12
goma sha biyu 'twelve'



13
goma sha uku 'thirteen'



14
goma sha huxu 'fourteen'



15
goma sha biyar 'fifteen'

In addition to this category of tenth, the second procedure of tenth numeracal system in Hausa Sign Language begins from 20- 90. Numerical signs for this group are produce via manual and non manual parameters and also contain two movement. Observe from figures 20-90;



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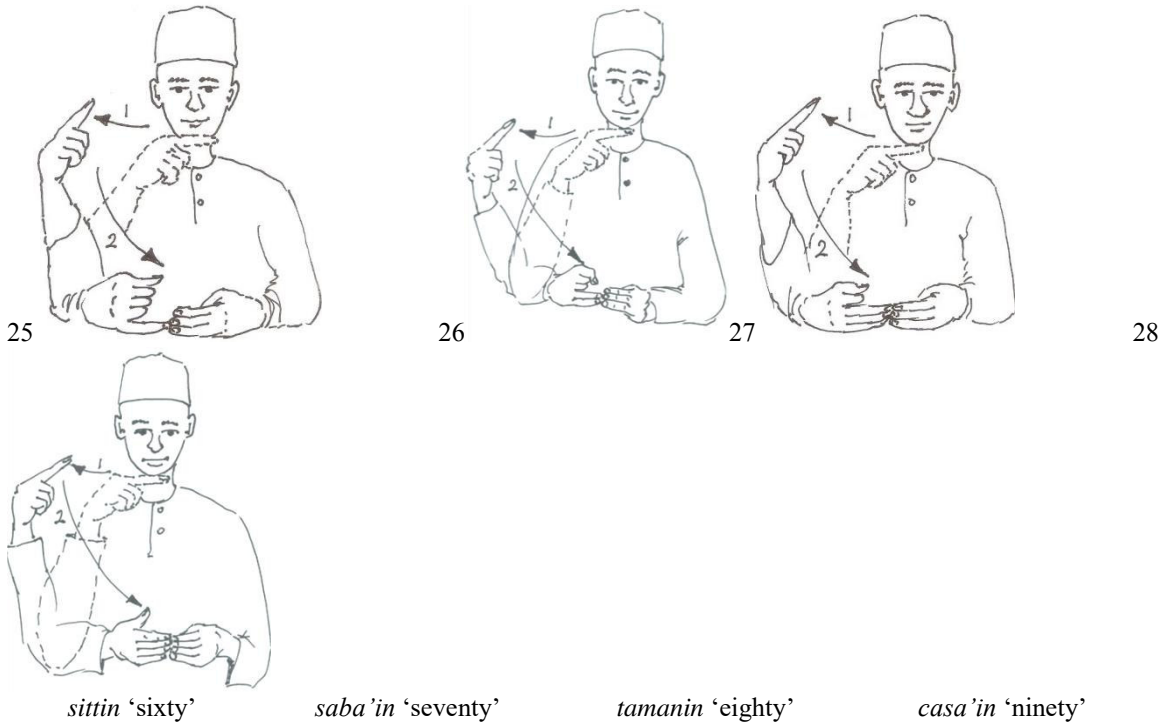
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ashirin 'twenty' *talatin* 'thirty'

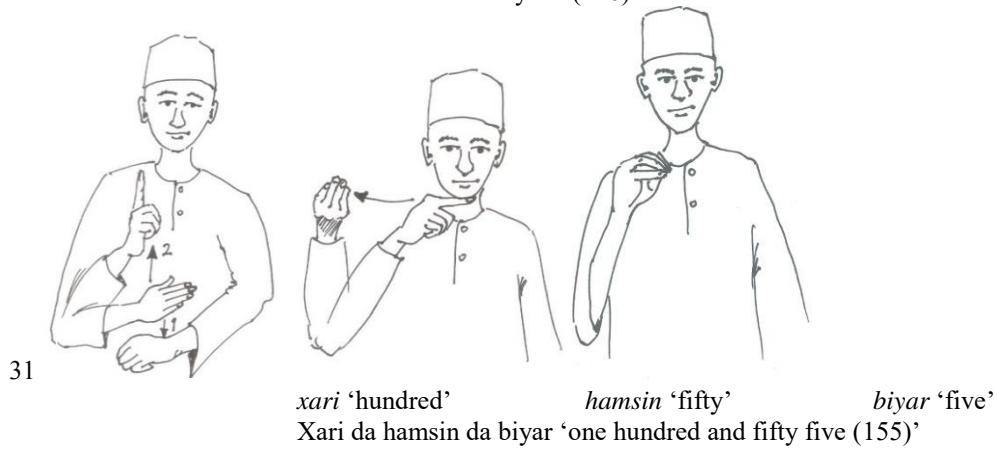
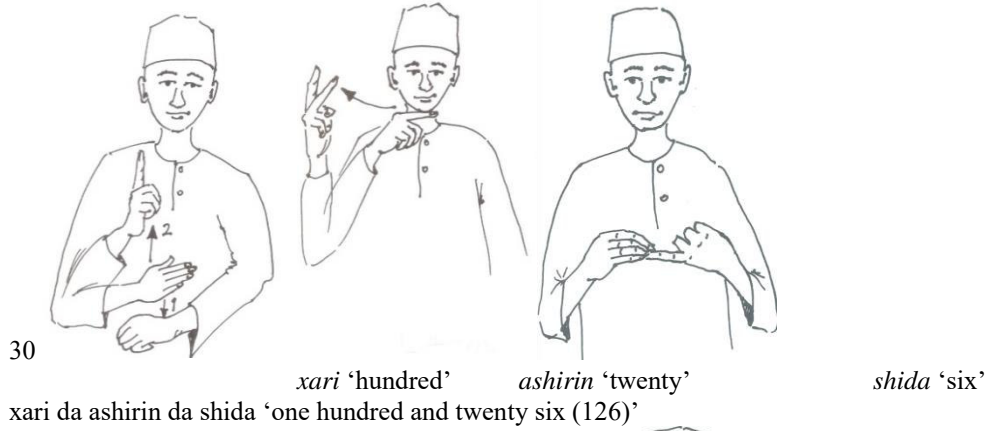
arba'in 'fourty' *hamsin* 'fifty'



From figures 20- 24 of numerical system of HSL share the same structure in term of these parameters (handshape, movement, location and orientation) but differ in term of number of finger (s) that are selected and extended. For instance in sign of *ashirin* (twenty), the dominant hand with an index finger extension and the remain fingers are in fist move to the location of non-manual parameter known as chin and palm facing the ground, then, the dominant hand also makes the second movement in the space with an index and middle fingers extension as well as palm facing towards signer to produces the sign of *biyu* (two). However, signs 25-28, are differ in term of structure of the handshape, movement, and location of produce sign (s) as well as orientation. For instance, the sign of *sittin* (sixty) produces by employing the dominant hand with an index finger extension and the remain fingers are in fist moved to the chin location as well as palm facing the ground, then, it moves again in neutral space, finally both dominant hand (active) and non-dominant hand (non-active) are moved to the neutral space by dominant condition.

Hundred Numerical in Hausa Sign Language

In this system, the three digit of different signs are formed, the digit of signs are included hundred, tenth, and unit groups. Each of the sign has its own handshape, movement, location and orientation. The first digit sign of *xari* (hundred) is formed when dominant hand moves to non-dominant hand location with an extension of all fingers of dominant hand and the palm facing the left side of the signer as well as a slight moving of an active hand with an index finger extension. The second sign of *ashirin* (twenty), the dominant hand with an index finger extension and the remain fingers are in fist move to the location of non-manual parameter known as chin and palm facing the ground, then, the dominant hand also makes the second movement in the space with an index and middle fingers extension as well as palm facing towards signer to produces the sign of *biyu* (two). As we can see below;



Thousand Numerical in Hausa Sign Language

The thousand numerical systems in Hausa Sign Language are produce with multiple of parameters such as handshape, movement, body and neutral space location as well as orientation (finger (s) selection and palm facing). This system of Hausa numerical has four digits of sign of number. The digits comprise of thousand, hundred, ten and unit. As we can observe below;



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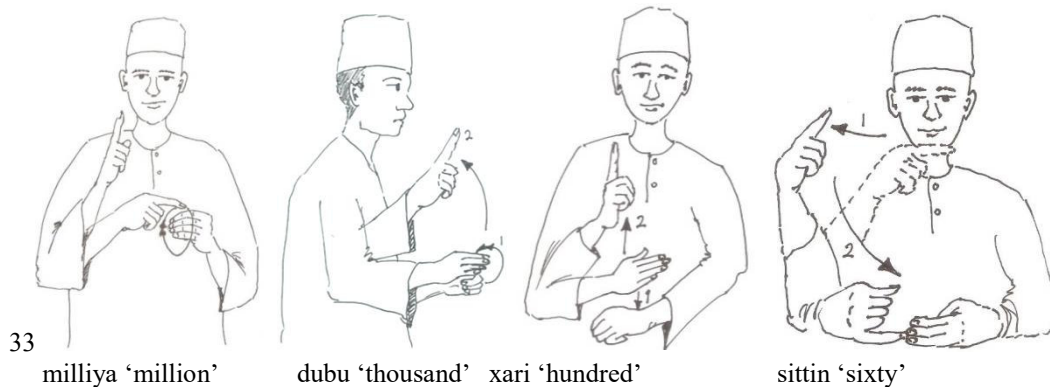
dubu 'thousand' *xari* 'hundred'

casa'in 'ninety' *biyar* 'five'

dubu xaya da xari xaya da casa'in da biyar 'one million one hundred and ninety five' (1,195)

Million Numerical in Hausa Sign Language

Million numerical systems in Hausa Sign Language consist of multiple handshapes, movement, location as well as orientation (fingers selection and palm facing). Numerical signs in this category comprises of digits of *milliyan* (milliom), *dubu* (thousand), *xari* (hundred), *goma* (tenth) and *xaya/tilo* (unit). Therefore, numerical system of million categories consists of multiple handshape, movement (arc, straight, round), locations (body and neutral space) and orientation (selection of finger (s) and palm facing 'down/up, right/left, towards signer or away from signer'). See examples below;



33

milliya 'million'

dubu 'thousand' *xari* 'hundred'

sittin 'sixty'



biyar 'five'

miliyan xaya da dubu xaya da xari da sittin da biyar 'one million one thousand one hundred and sixty five' (1,001,165)

Conclusion

Results of this research on numeral system of Hausa sign language indicated that the numerical system of HSL is a mixed numerical system. All signs that give the numbers are formed via manual and non-manual parameters. Each sign represents a number that has a specific position, movement and orientation. The pictures of sign numeration in HSL describe how a unit, a tenth, a hundred, a thousand as well as million are produced. This particular distinction is given by the combination of handshape position, movement and orientation of the signs. However, paper contributes toward communication system development among hearing and non-hearing (deaf) people. It also states that Hausa sign language has numeral system which is contrary to others languages such as spoken and sign languages in the world

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