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Decomposition of Numbers: An Ethnomathematics Perspective in Sundanese Language Systems for Elementary School Mathematics Learning

Descomposición de números: una perspectiva etnomatemática en los sistemas lingüísticos sundaneses para el aprendizaje de las matemáticas en la escuela primaria

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Abstract ∞ The current study aimed at describing the form of ethnomathematics in the language system used by the Sundanese people. The study employed phenomenographic and ethnomethodological through a realist ethnographic research design. Data collection techniques were used, including participatory observation and in-depth interviews. Meanwhile, the study employed content analysis, triangulation, and pattern determination to analyse the data obtained. The results indicate that the decomposition of numbers used by the community is a multiple of 25 and contains unique numbers peculiar to numbers 21 to 29. Therefore, the community's concept of decoding numbers is relevant to be adopted into elementary school mathematics learning.

Keywords ∞ Decomposition of numbers; Ethnomathematics; Culture; Language systems; Indigenous mathematics

Resumen ∞ Esta investigación se realizó para describir la forma de las etnomatemáticas en el sistema lingüístico utilizado por el pueblo sundanés. El enfoque de investigación utilizado es un enfoque fenomenográfico y etnometodológico, con un diseño de investigación etnográfico realista. Las técnicas de recolección de datos se basan en la observación participante y entrevistas en profundidad, mientras que en el análisis de datos se llevó a cabo con un análisis de contenido, técnicas de triangulación y determinación de patrones. Los resultados indican que la descomposición de los números utilizados por la comunidad es un múltiplo de 25 y contienen números especiales que son las peculiaridades de los números del 21 al 29. El concepto de decodificación de números realizado por la comunidad tiene relevancia para ser adoptado en la enseñanza de las matemáticas en la escuela de educación.

Palabras clave ∞ Descomposición de números; Etnomatemáticas; Cultura; Sistemas lingüísticos; Matemáticas indígenas

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1. Introduction

Ethnomathematics is a study that can be used to study cultural and mathematical aspects carried out by a cultural group (Rosa & Orey, 2016) through the discovery of unique mathematical ideas, characteristics, procedures, and practices (Rosa & Orey, 2013), thereby providing insight into the social role of mathematics (Orey, 2000). It is a part of the research program that demonstrates its ability to study the application of mathematics in people's lives, which was introduced by D'Ambrosio in 1985 (D'Ambrosio & D'Ambrosio, 2013) or conceptually and practically defined as a piece of mathematics and modeling it with cultural anthropology (Orey & Rosa, 2006). An essential basis for thinking about ethnomathematics lies in the concept of mathematics and culture as a conceptual way of thinking and the results of thinking in the cognitive structure of individuals in cultural groups (Umbara et al., 2019), which can be broadly understood as the study of the relationship between mathematics and culture (Johnson, 2022).

Ethnomathematics views various mathematical knowledge as interrelated with the context of community knowledge. In this respect, ethnomathematics exploits the potential of culture in providing tools for reconceptualization by reconfiguring the political, epistemological, and practical dimensions of mathematics (Chahine, 2020). In short, ethnomathematics studies the philosophical relationships of different types of mathematics in culture (Sunzuma, & Maharaj, 2020). It is interested in the relationship between the abstract mathematical world and everyday life (Rodríguez-Nieto & Alsina, 2022). Based on this, ethnomathematics studies are a technical step in exploring the forms of mathematics a cultural group uses based on their local wisdom.

Ethnomathematics is the knowledge of mathematics that develops in the culture of a country (Verner et al., 2019). It combines anthropology, history, pedagogy, linguistics, and the philosophy of mathematics in a different sociocultural setting (Rosa & Gavarrete, 2017). In other words, ethnomathematics researches the multifaceted relationships and interconnections between mathematical ideas and other cultural elements such as construction, crafts, arts, education, and even language (Gerdes, 2009). For this reason, knowledge of mathematics used in a culture can be found in traditional rituals, houses, games, arts, clothing, crafts, and language.

Ethnomathematical research examining traditional rituals has been conducted by several researchers, including the Dayak wedding tradition (Hodiyanto et al., 2022) and the traditional ceremony of *Tedhak Siten* (Wiryanto et al., 2022). Ethnomathematics research exploring traditional houses has been studied, including the Balinese traditional house (Suharta et al., 2017), the traditional house of the *Sasak* tribe in West Nusa Tenggara (Fauzi, 2022), the *Rejang Lebong* traditional house in Bengkulu (Herawaty, 2018), and traditional houses in North Central Timor District (Tlonaen, 2021). Ethnomathematics research exploring traditional games has also been carried out, including the local game of *tong along ji* (Turmudi et al., 2021), folklore games (Fouze & Amit, 2017), and traditional game *rimu*, *ligu*, and *guli* (Roza et al., 2020). Other ethnomathematics research has explored art,

including dance, singing, and music, for instance, *gandrung jejer jaran dawuk* dance (Hariastuti et al., 2021), *pendet* dance in Balinese (Radiusman, 2021), and *reog ponorogo* art (Sugianto, 2019). Finally, there is ethnomathematical research that has explored traditional clothing and crafts, such as Balinese *batik* (Irawan, 2019), Jogja *batik* (Prahmana & D'Ambrosio, 2020), and *time nggoli*, traditional woven cloth (Sowanto & Mulyadin, 2019).

Meanwhile, ethnomathematics research that explores language is still rare, apart from those conducted by Meaney et al. (2008) and Knijnik (2007). Trinick focuses on the impact of using language as an introduction to ethnomathematics practice in New Zealand (Meaney et al., 2008). Meanwhile, Knijnik focuses on the existence of a different mathematical language game between Western school mathematics and that of the Brazilian landless peasants (Knijnik, 2007). In other words, studies on ethnomathematics practices focusing on native languages are still rare. This paper will focus on the study of the Sundanese people, especially the Cigugur indigenous people, which is a sub-culture of the Sundanese tribe in recognizing and operating numbers based on the language that is communicated in daily activities. It is undeniable that ethnomathematics is related to language, given that ethnomathematics is related to mathematics practised by specific cultural groups (Meaney et al., 2008).

Mathematical systems and language are closely related; both develop simultaneously in a culture. Language is directly related to "explaining," one of the fundamental mathematical activities that Bishop defines (Albanese et al., 2016). Basic mathematics is a language understood globally as an approach to being, engaging, connecting, and understanding the structure of our world (Namukasa, 2004). Through language, a mathematical system is created so that mathematics is a sociocultural product (Albanese et al., 2016) that emerges from communication (Barton, 2008). Mathematics has been considered a language in everyday life and communication for many years. However, practitioners have pondered whether the process of learning mathematics is the same as learning other second languages so that ignorance of linguistic problems in mathematics can lead to communication disorders and serious mathematical misunderstandings (Kenney, 2005).

Based on these facts, mathematics and language have a position that is interrelated with one another. Mathematics, as a form of language created by humans to discuss abstract concepts of numbers and space, has the power to allow scientists to build metaphors known as mathematical models (Bullock, 1994). Language helps people focus and solve problems, communicate ideas coherently, organize ideas and structural arguments, broaden their thinking and knowledge to include other perspectives and experiences, understand their problems, solve other people's thinking processes and experiences, and develop flexibility in representing and interpreting ideas (Martinez & Martinez, 2001).

This relates to some counting situations carried out by the community. Counting situations are related to objects in the environment: humans (body parts), trees, animals, water, food, and others. The numeric situation is closely related to the numerical situation. Numerical situations consist of generative,

interpretive, and decision situations (Gal & Stoudt, 1998). Generative situations require people to count and manipulate numbers, quantities, objects, or visual elements. Interpretive situations require people to understand verbal or text messages that do not require number manipulation. In contrast, decision situations are situations that require people to be able to find and consider various information to determine actions based on representations.

Mathematics is one of the constituents of various components of individual abilities that focus on mathematical activities, including various calculations (Petocz & Reid, 2003). Counting activities as activities carried out by humans in everyday life are mathematical activities. Mathematical ideas, thoughts, and concepts can be understood if someone can communicate them through language, both oral and written. Communication disorders and mathematical misunderstandings at a shallow level can occur when a person is not familiar with numbers or arithmetic situations often used by the public. In this regard, it is essential to understand how the community carries out arithmetic situations in various situations. Based on this, making an ethnomathematics connection to language is important. Ethnomathematics is embedded in cultural language (Meaney et al., 2008), because ethnomathematics is the mathematical knowledge of a particular sociocultural group expressed in a language code (Borba, 1990).

Based on this, this research focuses on ethnomathematics connected to language. Characteristic features of language can be recognized by paying attention to abstraction, formalization, and exposure to the relationship between several phenomena (Bishop, 1999) through an understanding of environmental phenomena (Albanese et al., 2016). Therefore, this research aims to show community activities in operating numbers in counting and measuring activities. The introduction of numbers and their operations can trigger the emergence of other more complex abilities, so the question that will guide this research is: Is there a unique arrangement of the number system used by society? If there is a unique arrangement of the number system used by the community, can this concept be used in teaching mathematics at school?

2. Methods

The research approach is phenomenography and ethnomethodology. Ethnomethodology focuses on observing community social activities. It describes reality through studies carried out continuously in social interactions with the environment based on ideas and social interactions. Ethnomethodology proponents examine how people apply abstract rules and common sense understandings in routine, explainable, ambiguous situations and actions used to interpret (Bogdan & Taylor, 1975) the reflexively linked towards the context (Garfinkel, 2005). Thus, these principles are relevant to sociological descriptions (Francis & Hester, 2004).

This ethnographic research design explores ethnomathematics in the Sundanese community, especially the Cigugur Indigenous community. Therefore, in this study, the realist ethnographic category is used. Realist ethnography is an objective report written in the third person of a situation and information learned

from participants on site (Creswell, 2012). The exploration of ethnomathematics in this study uses six basic dimensions of universal mathematical activities (Bishop, 1988). Our research procedure adopted a realist ethnographic category so that the setting of the research subject was natural (no treatment), but the researcher performed participant observation. This process is carried out to know and analyse the traditions they practice in everyday life so that we can find new ideas that are heard and felt.

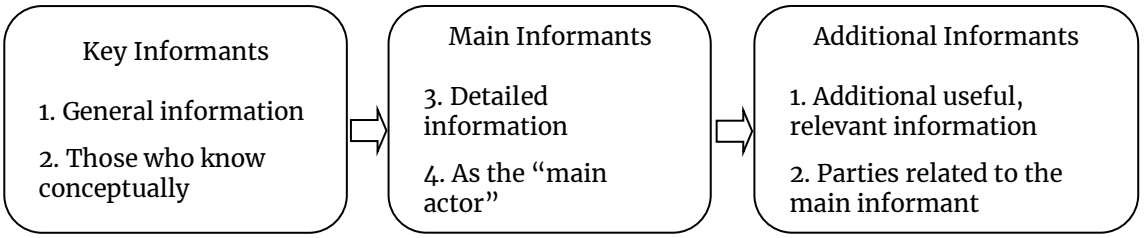
2.1. Data collection technique

In data collection, the author employs participatory observation and in-depth interviews aligned with an ethnographic design. The researcher carried out the participatory observation through direct participation in the situations or settings observed. It was conducted with the Cigugur indigenous people regarding their habits of using unique numbers. In addition, the interviews were also conducted according to the type of informant that had been determined. It aimed to explore the respondents' ideas, opinions, and experiences based on what they think, feel, and do. Moreover, it completes the results of observations that have been made.

2.2. Participants

The participants were key, main, and additional informants (Figure 1).

Figure 1. Types of Informants



The use of these three types of informants allows us to cross-check the information (data validity). The selection of informants was based on the following criteria.

1. The informants were community members who often interacted with fellow members of the Cigugur Indigenous community.
2. The informants were community members who were frequently and intensely involved in various activities carried out by the Cigugur Indigenous community.
3. The informants understand the culture, customs, and habits of the Cigugur Adat community.
4. The informants are willing to become informants and have sufficient time to provide information whenever needed.

5. The informants can convey complete information in their native language (Sundanese) or the Indonesian language (Bahasa).

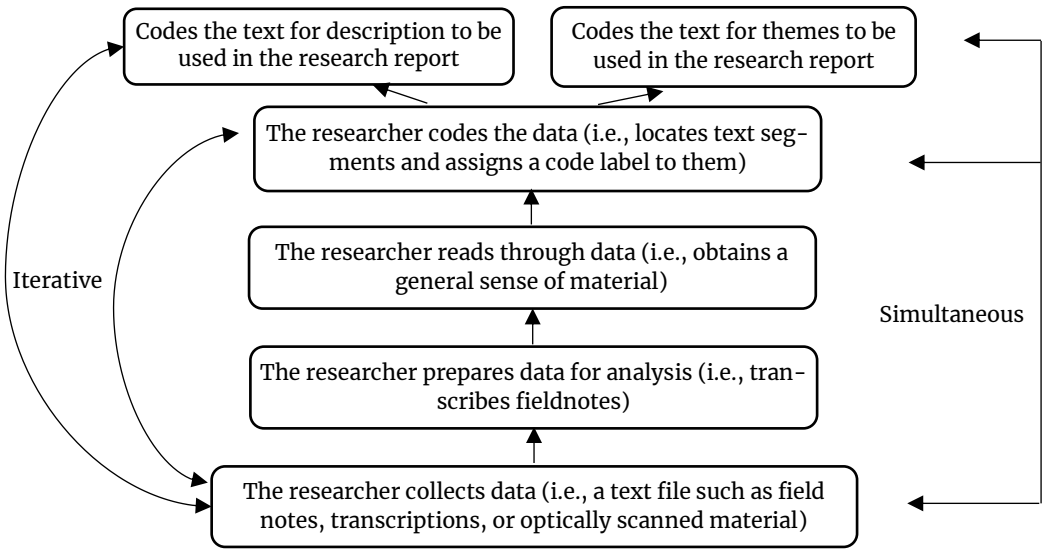
Based on these criteria, the researcher selected five informants: the Head of the Cigugur Indigenous Community as a key informant, two traditional elders or *Ais Pangampih* as main informants, and two community members who can communicate and use unique numbers in their daily lives as additional informants. It should be noted that unique numbers are usually communicated by certain people only. Interviews were conducted systematically based on the informant type to ensure the data's validity.

2.3. Data analysis

The data analysis techniques used in this study are content analysis, triangulation, and pattern-finding techniques. Content analysis techniques present detailed, valid data about the subject's culture and habits (Cohen et al., 2013). Triangulation techniques were used to determine the validity of an ethnographer's observations, including examining what a person hears and sees. This is done by comparing sources of information through cross-examining sources of information, while pattern setting is a way to check ethnographic reliability to reveal data consistency (Fraenkel et al., 2011).

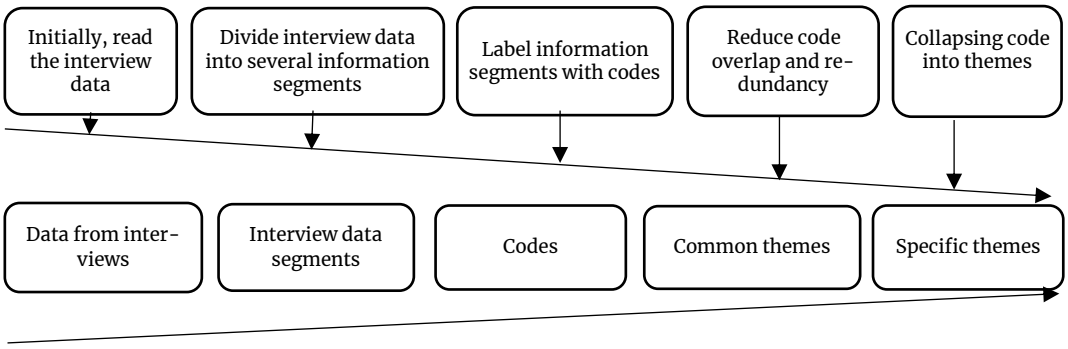
Researchers can guarantee the validity and reliability of research data based on these three analytical techniques. The data analysis process is shown in Figure 2. Interviews were transcribed and analysed following the coding process of Figure 3. In this coding process, when the researcher found differences in ideas and mathematical activities from the three types of informants, the researcher cross-checked the data based on the other information sources using a triangulation technique. Finally, the researcher can arrange categories by finding patterns (themes).

Figure 2. The Process of Data Analysis



Source: Creswell, 2012

Figure 3. The Process of Data Analysis



3. Results

Language is the primary communication tool humans use to build communication with one another. One form of ethnomathematics in language systems can be explored by describing the number system. The number is a mathematical concept used for calculation, measurement, and even enumeration activities. The number is an abstract idea that will provide information about the number of a collection of objects. Ordinary number symbols are denoted in written form as numerals. Specific procedures that take a number as input and produce another as output are called numerical operations.

The study results show that people use multiples in their daily communication. Cigugur Indigenous people use the term *lawe*, which means 25, for the multiples used. The community uses *salawe* to mean 25 based on the emic. This means that the term *sa* denotes one (1). Other terms used are *tilu lawe* and *lima lawe*. The term *tilu* indicates a multiple of 3 out of 25, while the term *lima* shows a multiple of 5 out of 25. The composition of multiples of 25 that is often used in the daily communication of the Cigugur indigenous people is shown in Table 2.

Table 1. The Element of Multiples in Number Pronunciation and Pronunciation

Number symbol	Pronunciation	In English
25	*Salawe*	Twenty-five
75	*Tilu lawe*	Seventy-five
125	*Lima lawe*	One hundred twenty-five

A multiple is a number displayed with the same pronunciation to indicate a change in magnitude. However, the term *lawe* is only used by the Indigenous Cigugur people to describe odd numbers.

Furthermore, our results indicate that the Cigugur indigenous people use a number that we call a unique number. The unique numbers in this study are

numbers that have a unique structure and sequence with certain limitations and conditions. The unique number limit is from 21 to 29, except for 25 which has certain conditions. These unique numbers are usually used to describe a person's date and age (Table 3).

Table 2. Unique Numbers with a Specific Regularity

Number symbol	Pronunciation	In English
21	*Salikur*	Twenty-one
22	*Dua likur*	Twenty-two
23	*Tilu likur*	Twenty-three
24	*Opat likur*	Twenty-four
25	*Lima likur/salawe*	Twenty-five
26	*Genep likur*	Twenty-six
27	*Tujuh likur*	Twenty-seven
28	*Dalapan likur*	Twenty-eight
29	*Salapan likur*	Twenty-nine

In the series of unique numbers (Table 4) the sum of all the numbers (21+22+23+24+25+26+27+28+29) is equal to the number of numbers (9) multiplied by 25 (the number in the middle).

Table 3. Series of unique numbers

Numbers into									
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Amount
21	22	23	24	**25**	26	27	28	29	225
25	25	25	25	**25**	25	25	25	25	225

According to etic, the sequence of unique numbers above can be formulated into $\sum_{i=1}^{9} n_i = n_1 + n_2 + \cdots n_9$. The rows form a row 21 + 22 + 23 + 24 + 25 + 26 + 27 + 28 + 29 = 225. This result equals 9 x 25, so the number 25 is the balance point in the sequence of numbers. In Sundanese and Javanese society, the *Likur* unit is an acronym for *LIngguh KURsi* and means sitting in a chair (having a position/position in a job). This means that at the age of 21 to 29, humans generally get a seat, whether in the form of a job, profession, or position, which will be pursued in their life. Meanwhile, the number 25, which is the center of the number sequence, has a special designation, namely *Salawe/Selawe*. *Selawe* is an acronym for *SEneng-senenge LAnang lan WEdok* (in Javanese, but it is familiar to the Sundanese people). *SEneng-senenge LAnang lan WEdok* means a man who is interested in women. In other words, it is the peak of love for a man and a woman, which will be in a marriage. At that age, generally, a man will soon start a household. Indeed, not everyone is married at that age, but most are married between the ages of 21-29. At that

age, on average, they have a position (permanent job), so that's when someone is ready to marry and have a family.

The results in the multiplication number system show the word *lawe*, which symbolically represents the number 25. Pronunciations for multiples of 25 begin with the word *sa,* which means one, and the next sequence is a sequence of odd numbers (3 and 5). Here, it appears that it is not used for even numbers. Decomposition of the numbers 2 and 4 are not used with the term *lawe.* The reason is that they call it 50 (*lima puluh*) and 100 (*saratus*) instead of *dua lawe* and *opat lawe*, as seen in table 1, the term is only used for odd number series (1, 3, and 5). The results also show that there are unique special numbers, namely the use of the term *likur* for the numbers 21 to 29. This is a decomposition between 21 (*salikur*) with the next number up to 29 (*salapan likur*) but does not apply to numbers. 25 (*salawe*) which is indicated because it has a position as the median of the number interval.

4. Discussion

The results of the study show that people use multiples and unique numbers in their daily communication. The use of multiples and unique numbers is a form of the number system that exists in their midst. These results extend the study of the use of symbolic measurements based on Sundanese people's daily communication (Umbara et al., 2021b) and the Eskaya tribe numbering system (Janiola & De los Santos, 2021). Furthermore, our results are consistent with the etymology of ethnomathematics conveyed by D'Ambrosio that the prefix ethno refers to the sociocultural context and one of them includes language (Umbara et al., 2021a), at least to help Indigenous people revive their language and culture (Trinick & Meaney, 2020).

The number system appears in everyday communication and represents mathematical symbols and operations that are classified as informal expressions. The structures in this distinctive number system contrast to elegant expressions of formalism, such as the English numeric expressions. There are special words for the numbers 11 to 19 and decades numbers from 20 to 90 (Kenney, 2005). The decomposition of *likur* with other numbers is similar to the decomposition of the number 12 according to Wylde and Partridge, which is done by combining two meaning units derived from the Latin and Greek expressions for "two" with the Indo-European root meaning "leave" (Kenney, 2005). Therefore, an effective approach is needed to extract ideas, beliefs, motivations, and practices from other people's minds by using logic, original selection, and mathematical modelling (Henrich, 2015).

However, this number structure has the potential to confuse because it has different symbolic representations. Mathematics has both formal and informal expressions (Usiskin, 1996). In reading mathematical texts one has to decode and understand not only words but also signs and symbols which involve different skills, especially skills related to words and decoding which involve the relationship between sounds into alphabetic symbols or letters (Barton & Heidema, 2002). This means that mathematics is concerned with understanding the quantitative,

spatial, and relational aspects of the world — the language used to understand it better (Albanese et al., 2017).

The study results show that the ethnomathematics forms belonging to the language system in terms of cultural elements are the elaboration of the nomenclature of the number system and units of measure for something symbolic. Ethnomathematics studies examine various ideas, including traditions, numerical patterns (Trinick et al., 2017), and mathematical modelling, which plays a role as a powerful tool for analysing and appreciating the mathematical thinking of the cultural group studied (Albanese et al., 2016). This is by previous researchers who stated that the language system has a strategic role in the production and development of mathematical ideas (Umbara et al., 2021b) which is based on two things, namely insight into knowledge of mathematics and language (Earp & Tanner, 1980). In particular, the use of the unit *Likur* for a unique number sequence with the term *Lawe* which symbolically represents the number 25 contains a philosophical and symbolic meaning. The need to develop philosophical thinking to recognize the existence of various mathematics is one of the critical points for which ethnomathematics is responsible (Knijnik, 2012).

The results are strengthened by previous research, which states that the Sundanese people are accustomed to using symbolic mathematical calculations related to their daily activities (Abdullah, 2017). Indigenous people from various parts of the world have developed registers to describe and perform mathematical activities in their own languages (Parra & Trinick, 2018). Roberts (1998) stated that the mathematical register is consistent to grammatical words and expressions used to explain mathematical ideas (Meaney et al., 2008). Mathematical signs and symbols may be pictorial or refer to operations or expressions (Kenney, 2005). The description of the pronunciation of the number system is also based on philosophical values that show the nobility and richness of culture and show the existence of informal mathematical expressions used by society.

Informal mathematical expressions can be seen in the pronunciation of number operations and arithmetic units used by the community. This informal expression of mathematics is a symbolic measurement tool and operation because it only applies specifically to specific communities, which is different from the formal measuring instruments that apply internationally. The Sundanese people, especially those who live in villages, habitually use symbolic measuring instruments through the use of limbs, household tools, grouping objects, grouping some plants, and using other simple tools (Abdullah, 2017). *The Balanced Assessment Program at the Harvard Graduate School of Education* shows that a way of thinking about a mathematical noun or object as a number, measurement, shape, space, function, pattern, data, and arrangement of a section mapped into generally accepted strings of mathematical content (Schwartz & Kenney, 1995) so that we may understand that there is more than one rationality, which means that different grammars and logics can coexist in life (Knijnik, 2012).

Number thinking in the language system, which is a mathematical object, is a belief in the principle that mathematics is an abstraction of the human mind

which can be used as a problem-solving tool with a mathematical idealism value as the essence of a reality that exists in society. The language system is important in influencing the human ability to build traditions, create an understanding of social phenomena symbolically, and pass them on to future generations (Keesing, 1965). Thus, language occupies an essential portion in the analysis of human culture and has a central role in the development of civilization and culture of an ethnic group, including in carrying out mathematical activities and procedures through expressing ideas. This "construction" will enable language to articulate itself in a form of life and choose which reason will show us what we must accept (Knijnik, 2012). The interesting similarities between mathematics and language lie in the relationship between literary works and their utility value (Kenney, 2005). Therefore, mathematics and language as an integrated unit can be an interesting research focus, especially if viewed based on ethnomathematics as a study of the use of mathematical concepts in everyday life.

Overall, the results of the study show that the Sundanese people can recognize the potential for conceptual confusion and bias formed by symbolic representations through the language system as a form and way of communicating that is very elegant and understood by almost all members of society. The language system used by the community to communicate mathematical ideas and procedures serves to clarify and solve the problems they face. Mathematical work involving more writing will be able to emphasize its conceptual power to make it easier to solve computational difficulties (Kenney, 2005). In the end, the research results support the understanding that students, teachers, and their minds are not a floating ahistorical entity, free from culture and social structure (Planas, 2021). However, the integration between culture and mathematics has excellent potential to continue and continue to be developed for the progress of learning mathematics.

Based on the previous explanation, it can be concluded that the unique arrangement of the number system used by the community can be adopted in elementary school mathematics learning concepts relevant to this study's results, including the concept of multiple number patterns and descriptive statistics. If ethnomathematics is to help the decolonization of cultural knowledge, it must acknowledge that cultural factors are just as significant as mathematical ones (Trinick et al., 2017). If elementary school teachers understand this, then the need to awaken them to integrate ethnomathematics into teaching mathematics, especially in language settings, must be an undeniable priority. It is undeniable that school mathematics is closely related to the culture in which it is taught (Seah & Bishop, 2003) because mathematical knowledge and education are inextricably linked to historical context, social context, and students' world-views (Gwekwerere, 2016).

Several studies have shown that ethnomathematics can be integrated into mathematics learning, such as the use of Mozambican Art (Gerdes, 2011), Maldivian Art (Adam, 2004), the use of traditional woven fabrics (Sowanto & Mulyadin, 2019), and the use of local games (Turmudi et al., 2021). The most important benefit resulting from these studies is to make learning more meaningful, motivated, and better knowledge acquisition for students. These studies have shown that

students can access mathematics because the mathematical concepts learned are connected with various experiences and cultural activities outside the classroom (Sunzuma & Maharaj, 2021). Based on this, researchers believe that integrating ethnomathematics into mathematics learning will have constructivist implications.

5. Conclusion

Language systems have a strategic role in producing and developing mathematical ideas. The language system cannot be separated from mathematics as a vehicle for communication in the social life of society, as well as in communicating matters relating to mathematical concepts. The research results show that the decomposition of numbers that exist, develop, and continue to be used by people in everyday communication. The decoding of these numbers can be learned through multiples and unique numbers. The multiples used are 25, while the unique numbers used are numbers starting from 21 to 29. The results can be followed up by exploring ethnomathematics forms in other language systems to open up more comprehensive opportunities to integrate them with learning mathematics.

Recognizing symbols or notations is very important in learning and understanding mathematics. Symbols are the most prominent feature of mathematics. A set of symbols or notations in mathematics has specific rules for its use and thus has an artificial nature; that is, it will only have meaning after being given meaning. Based on this, reading and writing mathematical symbols is a series of complex activities that help someone understand the information contained in the symbols or mathematical symbols presented. The ability to understand mathematical symbols can be used as a basis for someone to construct the meaning of a situation and facts from mathematical symbols, solve a mathematical problem, and interpret it in written or spoken language. This is reinforced by the argument that ethnomathematics cannot be separated from the language in which they are developed, so language has a vital role in ethnomathematics (Meaney et al., 2008).

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Descomposición de números: una perspectiva etnomatemática en los sistemas lingüísticos sundaneses para el aprendizaje de las matemáticas en la escuela primaria

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La investigación se llevó a cabo para describir la forma en que la etnomatemática está presente en el sistema lingüístico utilizado por el pueblo sundanés. El sistema lingüístico desempeña un papel estratégico en la producción y el desarrollo de ideas matemáticas. Esta investigación se basa en la estrecha relación entre las matemáticas y los sistemas lingüísticos, que se desarrollan simultáneamente dentro de una cultura. Las matemáticas y el lenguaje tienen una relación mutuamente dependiente. Las ideas, pensamientos y conceptos matemáticos pueden ser comprendidos si se pueden comunicar a través del lenguaje, ya sea de forma verbal o escrita. Sin embargo, las investigaciones sobre prácticas etnomatemáticas que se centran en la lengua materna son todavía escasas. Por lo tanto, este artículo se centra en el estudio de la sociedad sundanesa, en particular, en la comunidad indígena de Cigugur, que es una subcultura de la tribu sundanesa. Se estudiará el reconocimiento y uso de los números a través del lenguaje que se usa en las actividades cotidianas.

El enfoque de la investigación utilizado es fenomenográfico y etnometodológico, con un diseño de investigación etnográfico realista. Este enfoque de investigación implica que el entorno del sujeto de investigación se deja en su estado natural (sin intervención), mientras que el investigador actúa como observador participante. Este enfoque se lleva a cabo para conocer y analizar las tradiciones que se siguen en la vida diaria, de modo que puedan encontrarse nuevas ideas que puedan ser escuchadas y sentidas. La técnica de recolección de datos fue la entrevista, mientras que para analizar los datos se utilizaron técnicas de análisis de contenido, triangulación e identificación de patrones.

Los resultados muestran que las formas de etnomatemática incluidas en el sistema lingüístico, en términos de elementos culturales, son una elaboración de la nomenclatura del sistema numérico y de las unidades de medida para algo simbólico, lo que da lugar a mediciones simbólicas utilizadas por la sociedad en su vida diaria. Se muestra que las personas están acostumbradas a utilizar múltiplos y números únicos en la comunicación cotidiana. Los sistemas numéricos aparecen en la comunicación diaria representando símbolos y operaciones matemáticas que se incluyen en expresiones informales, libres de reglas estándar. La descomposición de los números utilizados por la sociedad son múltiplos de 25 y números únicos, que comprenden los números del 21 al 29. La estructura de este sistema numérico único difiere de las expresiones numéricas en inglés. Las expresiones sobre el uso de múltiplos y los números únicos muestran que hay expresiones matemáticas informales utilizadas por la sociedad. El concepto de descomposición de números utilizado por la sociedad es relevante para ser adoptado en la enseñanza de matemáticas en la escuela primaria.