



Mathematics in seltok: a Banyuwangi traditional game

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Abstract: *Seltok* is one of the traditional games of the Banyuwangi community in East Java. This game is attempted to be preserved by the “Kampoeng Batara”, a traditional game community located in the Papring, Kalipuro District, Banyuwangi. It is important to preserve traditional games, one of which is because the games contain learning concepts, such as mathematics. Unfortunately, these mathematical concepts have not been fully identified. The exploration of the *seltok* game in Kampoeng Batara aims to identify the mathematical concepts in the game. The research informants were one manager and two members of Kampoeng Batara community. Data collection was carried out by participatory observation, in-depth interviews, and cultural documentation. The data obtained were analyzed qualitatively. The identification results show the existence of mathematical concepts: measurement with non-standard units, geometry (circle and tube), set, relation, combination, and probability in the *seltok* game.

Keywords: *Seltok*; traditional games; Banyuwangi; ethnomathematics.

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INTRODUCTION

The times, especially in digitalization, have influenced people's habits in various fields. Traditional games are one of the people's habits that are carried out in activities either independently or in groups, indoors or outdoors. Games are something or items used to play, whereas traditionally are defined as behavior, ways of thinking, and doing something guided by the norms and customs passed down from generation to generation (Ulya, 2017).

Technological sophistication made traditional games begin to be abandoned and switched to games with electronic devices, without or with internet networks (online). Nowadays, online games have become a habit played by all ages. DSM-5 stated that the game negatively affects its users because it is generally filled with adult content and makes the players individualistic, causing addiction to the player (Anggarani 2015).

Several cases due to the negative effects of online games were found in various countries. In Indonesia, ten children in Banyumas were diagnosed with mental disorders due to addiction to playing online games throughout 2018, with 7 out of 10 children being elementary and junior high school students (Aziz, 2018). Another case described by Wirawan (2019) is about a child who hit, held a knife, and shouted at his mother for refusing orders not to play online games. In South Korea, a 28 year old youth died of alleged exhaustion after playing *Starcraft* for 50 hours continuously (Anggarani, 2015). These cases show that



playing through digital media can be addictive, making users negligent and endangering the health and safety of themselves and others.

[Saragih \(2017\)](#) states that currently, the taste for modern games in children is increasingly entering a high level, affecting children's habits and behavior. The impact is very concerning, namely the effect on learning achievement, causing a character crisis in children, making children behave aggressively, even subjecting children to crimes such as theft and rape, and causing children to experience multiple personalities, leading to death. Some of the effects of these online games should be of particular concern to the public to find solutions to problems that occur. One solution that can be done is to return online games to traditional games.

Traditional games can be performed according to the categorization of playing patterns, including playing and singing, and/or dialogue; play and think, as well as playing and competing for agility ([Dharmamulya, et al., 2008](#)). These various categorization patterns cause the players to always move and bring up activity so that the player does not just sit or lie down, which has an adverse effect on health.

Traditional games have many advantages, including: they do not require money, can train creativity, develop social and emotional intelligence, bring children closer to nature, as a learning medium for values, develop children's motor skills, benefit health, optimize cognitive abilities, provide joy and fun, can be played across ages, hone children's sensitivity ([Hariastuti, 2016](#)), and can develop children's basic abilities such as kinesthetic, linguistic, logical-mathematical, visual-spatial, musical, natural, intrapersonal, and spiritual intelligence ([Saputra & Ekawati, 2017](#)). These opinions indicate that traditional games are not just a process of playing but have advantages including having a good influence on children's physical, mental and intellectual development; able to train children to interact socially; and can develop cultural knowledge and other sciences.

The process of moving and thinking in traditional games will make children learn many things and develop knowledge from their games. Among the concepts of knowledge contained in traditional games are: mathematics, science, social studies, languages, sports, and even religion ([Hariastuti, 2016](#)). However, an exploration process in traditional games is needed to be used as part of learning according to the concepts that can be identified from the game.

Traditional games have a big role in developing science, one of which is mathematics. The existence of traditional games in mathematics learning can positively affect students, especially to help students understand abstract mathematical concepts. There is a concept of addition and multiplication of whole numbers in the mangosteen guessing game, and there are concepts of measurement, comparison, addition, multiplication, and direction in the *Patil lele* game ([Hariastuti, 2016](#); [Hariastuti, 2017](#)). *Kubuk, Kubuk Manuk, Dhukter, Macanan*, and *Jeg-Jegan* games have mathematical concepts, such as: number operations, shapes, similarities, congruence, number comparisons, and relations ([Risdiyanti & Pramana, 2018](#)). The *engklek* game contains elements of shapes, reflections, congruence, nets, and counting ([Aprilia, et al.,](#)

2019). Meanwhile, in the marbles game, there are mathematical concepts: spherical geometry, circular shapes, and counting operations (Febriyanti, et al., 2019).

The results of previous research indicate that traditional games can be an interesting part of learning mathematics through the exploration of mathematical concepts contained therein. Traditional games are part of the culture, namely, habits carried out in a group of people formed from an agreement and became knowledge passed down from generation to generation. Mathematical concepts contained in culture are known as ethnomathematics.

Ethnomathematics is mathematics that is practiced among cultural groups that can be identified in groups of workers, groups of children of certain ages, workers, and children of the professional class (D'Ambrosio, 2001). Ethnomathematics is a study resource that describes mathematical ideas and activities given based on cultural contexts (Budiarto & Setianingsih, 2019). Ethnomathematics became an interesting discussion because every region in the world has a different culture in terms of naming, although perhaps in practice many things are similar (Hariastuti, 2019). And it is considered important to explore ethnomathematics from various cultures around us, and then make the results of the exploration as interesting contextual learning materials.

Traditional games are part of culture in various communities, one of which in Banyuwangi. In Banyuwangi, there is a community that has special attention to preserving traditional games, called "Kampoeng Batara". This community is in Papring, kalipuro District, Banyuwangi. *Kampoeng Batara* is a community whose goal is to foster children's interest in reading and the community with basic material on the introduction and preservation of traditional games as an effort to reduce gadget addiction for children.

Various traditional games are taught to children around *Kampoeng Batara* or children from outside Papring neighborhood, who are interested in learning traditional games. Observations made in *Kampoeng Batara* show that there are several traditional games taught and developed in *Kampoeng Batara*, namely: *petheng dudu*, *seltok*, *egrang batok*, *leker* or *temeker*, *tembung bikel*, *pelencatan*, *yoyo*, *kitiran*, *gasing jajang*, *wooden gasing*, *dakon*, *kuartet Using*, *kucing-tikus*, *unclang jajang*, and *dhar-dhar*.



Fig. 1 Kampoeng Batara Community

One of the traditional games known since the inception of *Kampoeng Batara* is *seltok*. *Seltok* is a game that uses bamboo tools. The shape of bamboo resembles a tube so that it is included in the geometry concept. *Seltok* players must also have a strategy to adjust the distance between players so that they can hit the target precisely and quickly. The tube concept and the determination of the distance between the players shows the

ethnomathematics of the *seltok* game. For this reason, the exploration of the *seltok* game and the identification of ethnomathematics are interesting studies to do.

METHOD

This research was conducted with a descriptive qualitative method to explore and describe the phenomenon of the *seltok* game from various points of view of the players either in the current condition or in the past. The results are presented in the form of descriptive data according to real conditions.

This research was conducted in *Kampoeng Batara* because it is a location with natural conditions for traditional games in Banyuwangi. The research was conducted from July to September 2020. The research informants consisted of one *Kampoeng Batara* manager and two traditional game players in *Kampoeng Batara*. *Kampoeng Batara* managers were chosen because: he had direct involvement for the last 5 years, know the history of Banyuwangi traditional games, and understand and can explain in detail traditional playing tools and how to use them. Two informants of traditional game players were taken from 2 members in *Kampoeng Batara* aged 7 to 14 years, actively involved in various games in *Kampoeng Batara*, and able to play and explain the rules of the Banyuwangi traditional game (specially *seltok*).

Data collection was carried out by participatory observation, in-depth interviews, and cultural documentation. The researcher acts as the main instrument and is assisted by complementary instruments, namely observation guidelines and interview guidelines. Observations and interviews were carried out jointly in the process of making and playing *seltok*, with components: (1) making tools; (2) game preparation; (3) game rules; and (4) the game process. Documentation is carried out during observations and interviews through voice recording, video, and picture taking. The results of the voice recordings were then transcribed to facilitate the data analysis. Qualitative data analysis is according to indicators of mathematical concepts that can be identified in the *seltok* game. Conclusions are obtained in the form of emphasizing the meaning of mathematical concepts from the data obtained.

RESULTS AND DISCUSSION

Seltok Game Exploration

Seltok is one of the traditional games in Banyuwangi which children in rural areas still play. *Seltok* game tools are commonly used to repel animals that interfere with plants in fields or gardens. The *seltok* game tool made with the main ingredient of bamboo and stuffing those functions as a bullet are called a *mimis*. The three informants explained that the *seltok* game tool has two parts: placing *mimis* called *laras* and the trigger or pusher part. *Seltok* can be made in various forms, as shown in figure 2.



Fig. 2 Various form of *seltok*

According to the first informant, a *seltok* can be made from a segment of bamboo which is about 30 cm long. The plunger is about 7 to 10 cm long, while the *laras* can be up to 20 cm, 25 cm, atau 30 cm.



Fig. 3 (a) *Seltok* making process from a segment of bamboo; (b) *Seltok* Handle

The plunger is made with bamboo twigs or called a *carang*, with a size of the thumb or about 2 cm (as shown in figure 4 (a)). The second informant explained that the *seltok* can be made with old or dry bamboo with a length of one segment or about 30 cm. The pusher is cut to the size of the grip of the hand or as wide as 4 fingers, which is about 7,5 cm (as shown in figure 4 (b)).

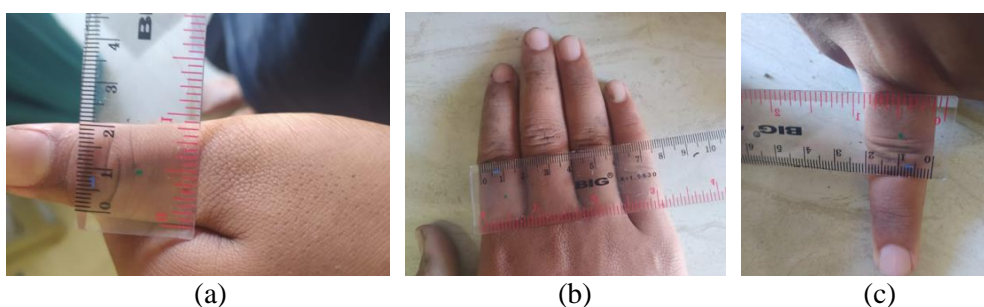


Fig. 4 (a) A size of the thumb; (b) The size of the grip of the hand or as wide as 4 fingers; (c) The size of a ring finger

The third informant uses bamboo *apus* or old bamboo *watu* with a length of one *jengkal* or 21 cm long, and a diameter of the size of a ring finger or about 2 cm (as shown in figure 4 (c)). The measurements used by informants were never realized as part of the concept of non-standard measurement but were always used as the basis for making *seltok*.

Mimis are adjusted to the size of the *seltok* slots. The first informant explained that previously *bacin* flowers were used as *mimis*. However, overtime the *bacin* flower began to become extinct so that the *mimis* was replaced with paper that was moistened and compacted. The second informant stated that currently the

mimis can be in the form of moistened paper and then compacted or using *pucil* (little guava) which is adjusted to the size of the *seltok* hole. In addition, it can also be used some plant leaves that are compressed into the *seltok* hole as material for the *mimis*.

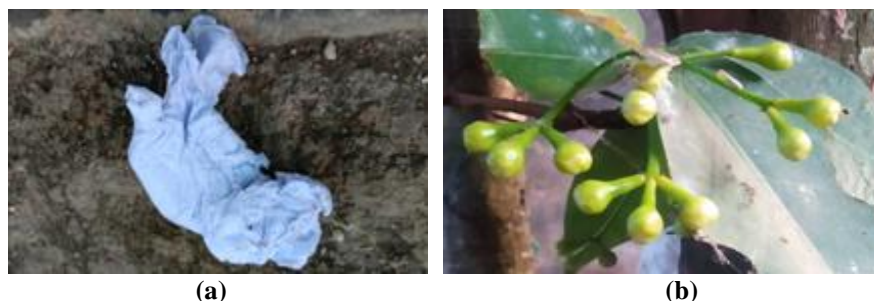


Fig. 5 (a) The paper is wetted as a *mimis* material; (b) *Pucil* (little guava)

Seltok games are usually played by players of varying ages and heights. The game area is limited by mark boundaries, for example from road A to road B, around 90 m². *Seltok* game begins with the player removing the pusher from the *laras*, then filling the *laras* with a *mimis* from wet paper or plant seeds and then hitting the *mimis* with the pusher handle.

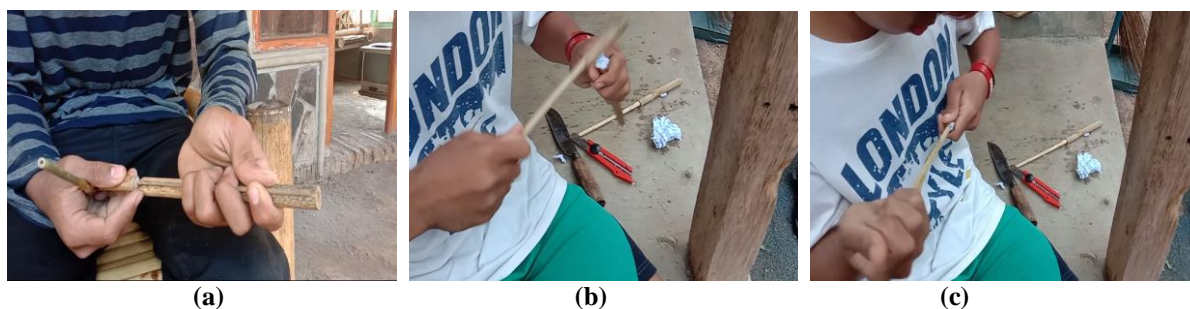


Fig. 6 (a) The plunger is removed from the *seltok*; (b) *Mimis* from wet paper attached to the *seltok*; (c) Installing the plunger back on the *laras*

Then the player puts the plunger back on the *laras* and makes a start by pulling and then pressing the pusher part of the *seltok*. The process of making the prefix is carried out with considerable pressure and can be done more than once until the *mimis* is pushed out.

Seltok games can be done individually like police games where one player is a cop, and the others is criminals. For example, if there are 10 players then one player becomes the police. The player who loses when *hompimpa* or *sut* will become the police while the other 9 players become criminals. The nine players will hide in several areas that have been determined by boundaries and the player who plays the role of the police is in charge of finding and shooting criminals with *seltok*. Players who are in charge of police will run around the boundaries of the game area to find criminals. When a criminal is found, the police have the right to *seltok* the criminal. The criminals who are hit by the *seltok* have to move to the middle of the game area. And so, on until it is agreed that the game is over.

Fig. 7 Players perform *sut*

Seltok games can also be done in the form of group battles. In war games, players are divided into two groups with the same number of members. The formation of the group is done by means of players who have the same large bodies, which are doing *sut*. All players who win in the *sut* process join in one group, whereas the players who lose in the *sut* process join the opposing group. Each group runs to find a position in a restricted area, as shown in figure 8.



Fig. 8 The players run to find a position

Each member of the group attacks the other members of the group until all members of one of the groups are hit by *seltok*. Players who are hit by *seltok* must leave the game area and are not allowed to continue playing. The game continues until one of the groups wins.

Fig. 9 (a) War-type *seltok* game; (b) One of the players was hit by *seltok*

The rule of *nyeltok* (shooting) in police games and warfare is that shots may be taken in all parts of the opponent's body except the head and face.

Another form of the *seltok* game is hard fighting, which is only focused on whether or not the sound of the *seltok* is produced. This game is played individually by at least 2 players. There is no special prefix but there are prompts given to start the game from another friend who is not a player.



Fig. 10 (a) *Seltok* flights game; (b) *Seltok* sticky game

Other than that, *seltok* game can be used to fight sticks on certain media. The media used is usually a banner affixed to a wall or a relatively flat surface. Just like the *seltok* flight games, this game also has no prefix but friends who are not players give a signal to start the game.

The four types of *seltok* games that have been discussed have the same initial steps, namely determining the opposing player or group of opposing players by means of *hompimpa* or *sut*. *Hompimpa* is a player's determination by turning the palms back and forth accompanied by the phrase "*hompimpa alai hom gambreng*" until one or some players turn over the same part of the hand. The decision of *hompimpa* is made based on agreement.



Fig. 11 *Hompimpa*

Sut is the determination of the winner by extending the thumb, index finger, or little finger by holding the hand first and accompanied by the sentence "*sut jreng*". The winning determination in the *sut* process is generally arranged as: the thumb wins over the index finger, or the index finger wins over the little finger, or the little finger wins over the thumb.



Fig. 12 *Sut*

Ethnomathematics in *Seltok* Games

Based on interviews with informants, it can be seen that the informants understand the process of making *seltok*, how to use them, and various games that can be played with *seltok*. But, the informants were never aware of the mathematical concepts of the various things they understood. However, the results of the

interview show that there are mathematical concepts contained in the seltok game. The identification results obtained are as follows.

1. Geometry Concepts

The *seltok* game tool is made of bamboo which resembles a tube shape, which is a space structure that has a congruent circular top/cover and a bottom/base circle (Marsigit, et al., 2011). The hole of the *seltok* resembles a circle, which is the position of the points that are equidistant from a certain point (Dris & Tasari, 2011b). These shapes indicate the existence of two-dimensional and three-dimensional geometric concepts in the *seltok* game tool.

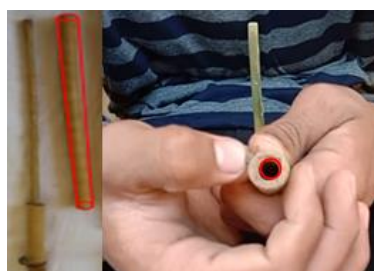


Fig. 13 The concept of the tube and circle in the *seltok* game

2. Set Concepts

In the *seltok* game, there is a process of separating players from certain groups. The war-type *seltok* game is carried out by 2 groups with the same number of members. Whereas in the police *seltok* game, there are grouping of players who play criminals. These players are allowed to run for positions in a restricted area. This grouping shows the concept of a set as in the following illustration.

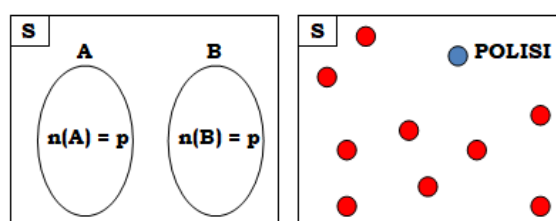


Fig. 14 Player groupings on the *seltok* game

The concept of set is intended as a collection of objects that can be clearly defined (Dris and Tasari, 2011).

3. Relationship Concept

In the war-type of *seltok* game, members of the first group have the opportunity to perform *seltok* to members of the second group (opposing group). This shows the concept of a relation from the first set to the second set which occurs if there are members of the first set and the second set that are paired/related (Dris & Tasari, 2011).

4. The concept of Measurement with Non-Standard Units

In the process of making *seltok* there are measurements using non-standard units, such as: one bamboo segment (equivalent to 30 cm), thumb size (equivalent to 2 cm), the size of a fist or the size of 4 fingers (equivalent to 7,5 cm), and one adult span (equivalent to 21 cm). Non-standard units are one of the

concepts in mathematics which are introduced to students according to the culture around them. Non-standard units are units that are understood and used in culture but are not agreed upon internationally.

5. The Concept of Speed

In the *seltok* sticky game, there is the position of the player who is the same distance from the target field. Players are expected to be able to *nyeltok* as quickly as possible so that the *mimis* can stick to the target area. This process contains the relationship between distance and time to determine speed, namely the ratio between the distance traveled and the time traveled.

6. Combination Concept

Determining the players in the police-type *Seltok* game is done by choosing one player to become a cop and nine other players to become criminals, by *hompimpa* or *sut*. Determination of the player contains the concept of combination, which is the joining of one or more objects from a set of objects regardless of the order.

7. Probability Concept

The start of the game which is carried out by *hompimpa* or *sut* is part of the probability concept, which is a measure of the certainty that an event will occur (Marsigit, et al., 2011). This happens because with *hompimpa* or *sut*, every player has the opportunity to: (1) become a cop or a criminal (in police-type *seltok* game); (2) being a member of the first group or the second group (in the war-type *seltok* game); (3) doing *seltok* for the first time (in the *seltok* of the type of flights and sticky game).

Mathematical concepts that can be identified in the *seltok* game show that traditional games contain ethnomathematics as conveyed by Hariastuti (2016), Hariastuti (2017), Risdiyanti & Pramana (2018), Aprilia, et al. (2019), and Febriyanti, et al. (2019). Mathematical concepts that can be identified from *seltok* can be used as a tool to visualize mathematical objects that appear abstract to students. For example, students can understand circle and tube objects not only through pictures but can be done by bringing *seltok* into the learning process. Students can also find out that there are non-standard units of measurement other than the standard units of measurement they already know, such as meters, centimeters, and so on.

CONCLUSION

Seltok is one of the traditional games from Banyuwangi, East Java which contains mathematical concepts from the process of making tools to the game. The tools used in the *seltok* game are usually made by the *seltok* players themselves. The manufacture of the tool contains the concept of measurement with non-standard units. The *seltok* game tool contains the concept of geometry (circles and tubes). The *seltok* game contains the concept of set, relation, speed, combination, and probability. The identification of mathematical concepts in the *seltok* game shows that other traditional games in Banyuwangi may have the possibility of containing various mathematical concepts. For this reason, it is necessary to explore and identify other traditional games, especially in Banyuwangi. The identified mathematical concepts can then be integrated

into mathematics learning with the aim of developing students' mathematical connection skills, especially those related to culture which is part of their daily life.

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Several cases due to the negative effects of online games were found in various countries. In Indonesia, ten children in Banyumas were diagnosed with mental disorders due to addiction to playing online games throughout 2018, with 7 out of 10 children being elementary and junior high school students (Aziz, 2018). Another case described by Wirawan (2019) is about a child who hit, held a knife, and shouted at his mother for refusing orders not to play online games. In South Korea, a 28 year old youth died of alleged exhaustion after playing *Starcraft* for 50 hours continuously (Anggarani, 2015). These cases show that

playing through digital media can be addictive, making users negligent and endangering the health and safety of themselves and others.

[Saragih \(2017\)](#) states that currently, the taste for modern games in children is increasingly entering a high level, affecting children's habits and behavior. The impact is very concerning, namely the effect on learning achievement, causing a character crisis in children, making children behave aggressively, even subjecting children to crimes such as theft and rape, and causing children to experience multiple personalities, leading to death. Some of the effects of these online games should be of particular concern to the public to find solutions to problems that occur. One solution that can be done is to return online games to traditional games.

Traditional games can be performed according to the categorization of playing patterns, including playing and singing, and/or dialogue; play and think, as well as playing and competing for agility ([Dharmamulya, et al., 2008](#)). These various categorization patterns cause the players to always move and bring up activity so that the player does not just sit or lie down, which has an adverse effect on health.

Traditional games have many advantages, including: they do not require money, can train creativity, develop social and emotional intelligence, bring children closer to nature, as a learning medium for values, develop children's motor skills, benefit health, optimize cognitive abilities, provide joy and fun, can be played across ages, hone children's sensitivity ([Hariastuti, 2016](#)), and can develop children's basic abilities such as kinesthetic, linguistic, logical-mathematical, visual-spatial, musical, natural, intrapersonal, and spiritual intelligence ([Saputra & Ekawati, 2017](#)). These opinions indicate that traditional games are not just a process of playing but have advantages including having a good influence on children's physical, mental and intellectual development; able to train children to interact socially; and can develop cultural knowledge and other sciences.

The process of moving and thinking in traditional games will make children learn many things and develop knowledge from their games. Among the concepts of knowledge contained in traditional games are: mathematics, science, social studies, languages, sports, and even religion ([Hariastuti, 2016](#)). However, an exploration process in traditional games is needed to be used as part of learning according to the ² [concepts that can be identified from the game](#).

² [Traditional games](#) have a big role in developing science, one of which is mathematics. The existence of traditional games in mathematics learning can positively affect students, especially to help students understand abstract mathematical concepts. There is a concept of addition and multiplication of whole numbers in the mangosteen guessing game, and there are concepts of measurement, comparison, addition, multiplication, and direction in the *Patil lele* game ([Hariastuti, 2016](#); [Hariastuti, 2017](#)). ² [Kubuk, Kubuk Manuk, Dhukter, Macanan, and Jeg-Jegan](#) games have mathematical concepts, such as: number operations, shapes, similarities, congruence, number comparisons, and relations ([Risdiyanti & Pramana, 2018](#)). ² [The engklek game contains elements of shapes, reflections, congruence, nets, and counting](#) ([Aprilia, et al.,](#)

2019). Meanwhile, in the marbles game, there are mathematical concepts: spherical geometry, circular shapes, and counting operations (Febriyanti, et al., 2019).

The results of previous research indicate that traditional games can be an interesting part of learning mathematics through the exploration of mathematical concepts contained therein. Traditional games are part of the culture, namely, habits carried out in a group of people formed from an agreement and became knowledge passed down from generation to generation. Mathematical concepts contained in culture are known as ethnomathematics.

Ethnomathematics is mathematics that is practiced among cultural groups that can be identified in groups of workers, groups of children of certain ages, workers, and children of the professional class (D'Ambrosio, 2001). Ethnomathematics is a study resource that describes mathematical ideas and activities given based on cultural contexts (Budiarto & Setianingsih, 2019). Ethnomathematics became an interesting discussion because every region in the world has a different culture in terms of naming, although perhaps in practice many things are similar (Hariastuti, 2019). And it is considered important to explore ethnomathematics from various cultures around us, and then make the results of the exploration as interesting contextual learning materials.

Traditional games are part of culture in various communities, one of which in Banyuwangi. In Banyuwangi, there is a community that has special attention to preserving traditional games, called "Kampoeng Batara". This community is in Papring, kalipuro District, Banyuwangi. *Kampoeng Batara* is a community whose goal is to foster children's interest in reading and the community with basic material on the introduction and preservation of traditional games as an effort to reduce gadget addiction for children.

Various traditional games are taught to children around *Kampoeng Batara* or children from outside Papring neighborhood, who are interested in learning traditional games. Observations made in *Kampoeng Batara* show that there are several traditional games taught and developed in *Kampoeng Batara*, namely: *petheng dudu*, *seltok*, *egrang batok*, *leker* or *temeker*, *tembung bikel*, *pelencatan*, *yoyo*, *kitiran*, *gasing jajang*, *wooden gasing*, *dakon*, *kuartet Using*, *kucing-tikus*, *unclang jajang*, and *dhar-dhar*.



Fig. 1 Kampoeng Batara Community

One of the traditional games known since the inception of *Kampoeng Batara* is *seltok*. *Seltok* is a game that uses bamboo tools. The shape of bamboo resembles a tube so that it is included in the geometry concept. *Seltok* players must also have a strategy to adjust the distance between players so that they can hit the target precisely and quickly. The tube concept and the determination of the distance between the players shows the

ethnomathematics of the *seltok* game. For this reason, the exploration of the *seltok* game and the identification of ethnomathematics are interesting studies to do.

¹⁰ METHOD

This research was conducted with a descriptive qualitative method to explore and describe the phenomenon of the *seltok* game from various points of view of the players either in the current condition or in the past. The results are presented in the form of descriptive data according to real conditions.

This research was conducted in *Kampoeng Batara* because it is a location with natural conditions for traditional games in Banyuwangi. The research was conducted from July to September 2020. The research informants consisted of one *Kampoeng Batara* manager and two traditional game players in *Kampoeng Batara*. *Kampoeng Batara* managers were chosen because: he had direct involvement for the last 5 years, know the history of Banyuwangi traditional games, and understand and can explain in detail traditional playing tools and how to use them. Two informants of traditional game players were taken from 2 members in *Kampoeng Batara* aged 7 to 14 years, actively involved in various games in *Kampoeng Batara*, and able to play and explain the rules of the Banyuwangi traditional game (specially *seltok*).

² Data collection was carried out by participatory observation, in-depth interviews, and cultural documentation. The researcher acts as the main instrument and is assisted by complementary instruments, namely observation guidelines and interview guidelines. Observations and interviews were carried out jointly in the process of making and playing *seltok*, with components: (1) making tools; (2) game preparation; (3) game rules; and (4) the game process. Documentation is carried out during observations and interviews through voice recording, video, and picture taking. The results of the voice recordings were then transcribed to facilitate the data analysis. Qualitative data analysis is according to indicators of mathematical concepts that can be identified in the *seltok* game. Conclusions are obtained in the form of emphasizing the meaning of mathematical concepts from the data obtained.

RESULTS AND DISCUSSION

Seltok Game Exploration

² *Seltok* is one of the traditional games in Banyuwangi which children in rural areas still play. *Seltok* game tools are commonly used to repel animals that interfere with plants in fields or gardens. The *seltok* game tool made with the main ingredient of bamboo and stuffing those functions as a bullet are called a *mimis*. The three informants explained that the *seltok* game tool has two parts: placing *mimis* called *laras* and the trigger or pusher part. *Seltok* can be made in various forms, as shown in figure 2.



Fig. 2 Various form of *seltok*

According to the first informant, a *seltok* can be made from a segment of bamboo which is about 30 cm long. The plunger is about 7 to 10 cm long, while the *laras* can be up to 20 cm, 25 cm, atau 30 cm.



Fig. 3 (a) *Seltok* making process from a segment of bamboo; (b) *Seltok* Handle

The plunger is made with bamboo twigs or called a *carang*, with a size of the thumb or about 2 cm (as shown in figure 4 (a)). The second informant explained that the *seltok* can be made with old or dry bamboo with a length of one segment or about 30 cm. The pusher is cut to the size of the grip of the hand or as wide as 4 fingers, which is about 7,5 cm (as shown in figure 4 (b)).

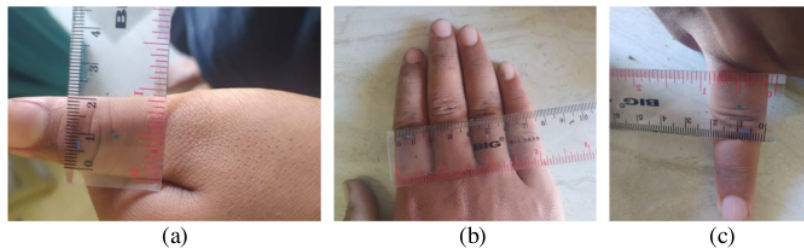


Fig. 4 (a) A size of the thumb; (b) The size of the grip of the hand or as wide as 4 fingers; (c) The size of a ring finger

The third informant uses bamboo *apus* or old bamboo *watu* with a length of one *jengkal* or 21 cm long, and a diameter of the size of a ring finger or about 2 cm (as shown in figure 4 (c)). The measurements used by informants were never realized as part of the concept of non-standard measurement but were always used as the basis for making *seltok*.

Mimis are adjusted to the size of the *seltok* slots. The first informant explained that previously *bacin* flowers were used as *mimis*. However, overtime the *bacin* flower began to become extinct so that the *mimis* was replaced with paper that was moistened and compacted. The second informant stated that currently the

mimis can be in the form of moistened paper and then compacted or using *pucil* (little guava) which is adjusted to the size of the *seltok* hole. In addition, it can also be used some plant leaves that are compressed into the *seltok* hole as material for the *mimis*.

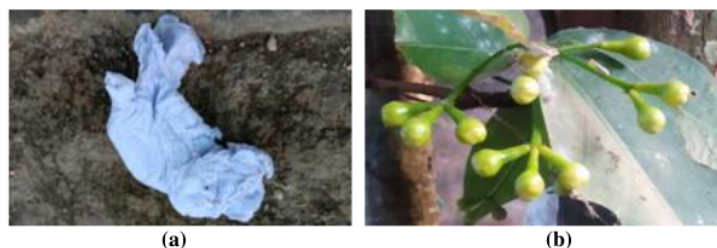


Fig. 5 (a) The paper is wetted as a *mimis* material; (b) *Pucil* (little guava)

Seltok games are usually played by players of varying ages and heights. The game area is limited by mark boundaries, for example from road A to road B, around 90 m². *Seltok* game begins with the player removing the plunger from the *laras*, then filling the *laras* with a *mimis* from wet paper or plant seeds and then hitting the *mimis* with the pusher handle.

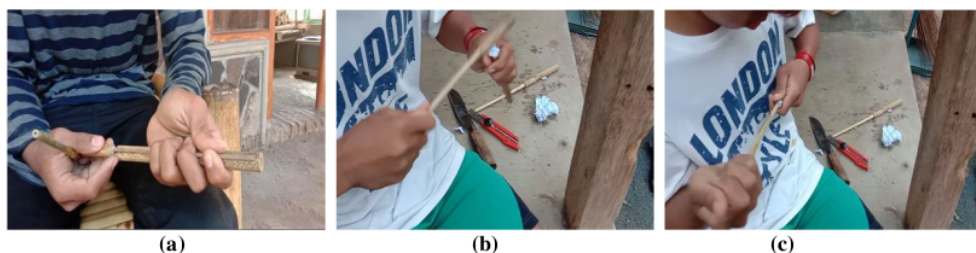


Fig. 6 (a) The plunger is removed from the *seltok*; (b) *Mimis* from wet paper attached to the *seltok*; (c) Installing the plunger back on the *laras*

Then the player puts the plunger back on the *laras* and makes a start by pulling and then pressing the pusher part of the *seltok*. The process of making the prefix is carried out with considerable pressure and can be done more than once until the *mimis* is pushed out.

Seltok games can be done individually like police games where one player is a cop, and the others is criminals. For example, if there are 10 players then one player becomes the police. The player who loses when *hompimpa* or *sut* will become the police while the other 9 players become criminals. The nine players will hide in several areas that have been determined by boundaries and the player who plays the role of the police is in charge of finding and shooting criminals with *seltok*. Players who are in charge of police will run around the boundaries of the game area to find criminals. When a criminal is found, the police have the right to *seltok* the criminal. The criminals who are hit by the *seltok* have to move to the middle of the game area. And so, on until it is agreed that the game is over.



Fig. 7 Players perform *sut*

Seltok games can also be done in the form of group battles. In war games, players are divided into two groups with the same number of members. The formation of the group is done by means of players who have the same large bodies, which are doing *sut*. All players who win in the *sut* process join in one group, whereas the players who lose in the *sut* process join the opposing group. Each group runs to find a position in a restricted area, as shown in figure 8.



Fig. 8 The players run to find a position

Each member of the group attacks the other members of the group until all members of one of the groups are hit by *seltok*. Players who are hits by *seltok* must leave the game area and are not allowed to continue playing. The game continues until one of the groups wins.



Fig. 9 (a) War-type *seltok* game; (b) One of the players was hit by *seltok*

The rule of *nyeltok* (shooting) in police games and warfare is that shots may be taken in all parts of the opponent's body except the head and face.

Another form of the *seltok* game is hard fighting, which is only focused on whether or not the sound of the *seltok* is produced. This game is played individually by at least 2 players. There is no special prefix but there are prompts given to start the game from another friend who is not a player.



Fig. 10 (a) *Seltok* flights game; (b) *Seltok* sticky game

Other than that, *seltok* game can be used to fight sticks on certain media. The media used is usually a banner affixed to a wall or a relatively flat surface. Just like the *seltok* flight games, this game also has no prefix but friends who are not players give a signal to start the game.

The four types of *seltok* games that have been discussed have the same initial steps, namely determining the opposing player or group of opposing players by means of *hompimpa* or *sut*. *Hompimpa* is a player's determination by turning the palms back and forth accompanied by the phrase "*hompimpa alai hom gambreng*" until one or some players turn over the same part of the hand. The decision of *hompimpa* is made based on agreement.



Fig. 11 *Hompimpa*

Sut is the determination of the winner by extending the thumb, index finger, or little finger by holding the hand first and accompanied by the sentence "*sut jreng*". The winning determination in the *sut* process is generally arranged as: the thumb wins over the index finger, or the index finger wins over the little finger, or the little finger wins over the thumb.



Fig. 12 *Sut*

Ethnomathematics in *Seltok* Games

Based on interviews with informants, it can be seen that the informants understand the process of making *seltok*, how to use them, and various games that can be played with *seltok*. But, the informants were never aware of the mathematical concepts of the various things they understood. However, the results of the

interview show that there are mathematical concepts contained in the *seltok* game. The identification results obtained are as follows.

1. Geometry Concepts

The *seltok* game tool is made of bamboo which resembles a tube shape, which is a space structure that has a congruent circular top/cover and a bottom/base circle (Marsigit, et al., 2011). The hole of the *seltok* resembles a circle, which is the position of the points that are equidistant from a certain point (Dris & Tasari, 2011b). These shapes indicate the existence of two-dimensional and three-dimensional geometric concepts in the *seltok* game tool.

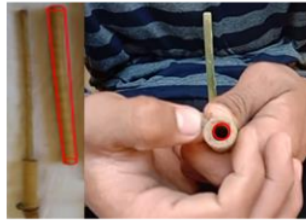


Fig. 13 The concept of the tube and circle in the *seltok* game

2. Set Concepts

In the *seltok* game, there is a process of separating players from certain groups. The war-type *seltok* game is carried out by 2 groups with the same number of members. Whereas in the police *seltok* game, there are grouping of players who play criminals. These players are allowed to run for positions in a restricted area. This grouping shows the concept of a set as in the following illustration.

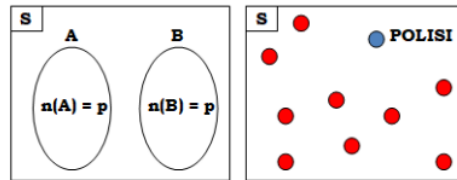


Fig. 14 Player groupings on the *seltok* game

The concept of set is intended as a collection of objects that can be clearly defined (Dris and Tasari, 2011).

3. Relationship Concept

In the war-type of *seltok* game, members of the first group have the opportunity to perform *seltok* to members of the second group (opposing group). This shows the concept of a relation from the first set to the second set which occurs if there are members of the first set and the second set that are paired/related (Dris & Tasari, 2011).

4. The concept of Measurement with Non-Standard Units

In the process of making *seltok* there are measurements using non-standard units, such as: one bamboo segment (equivalent to 30 cm), thumb size (equivalent to 2 cm), the size of a fist or the size of 4 fingers (equivalent to 7,5 cm), and one adult span (equivalent to 21 cm). Non-standard units are one of the

concepts in mathematics which are introduced to students according to the culture around them. Non-standard units are units that are understood and used in culture but are not agreed upon internationally.

5. The Concept of Speed

In the *seltok* sticky game, there is the position of the player who is the same distance from the target field. Players are expected to be able to *nyeltok* as quickly as possible so that the *mimis* can stick to the target area. This process contains the relationship between distance and time to determine speed, namely the ratio between the distance traveled and the time traveled.

6. Combination Concept

Determining the players in the police-type *Seltok* game is done by choosing one player to become a cop and nine other players to become criminals, by *hompimpa* or *sut*. Determination of the player contains the concept of combination, which is the joining of one or more objects from a set of objects regardless of the order.

7. Probability Concept

The start of the game which is carried out by *hompimpa* or *sut* is part of the probability concept, which is a measure of the certainty that an event will occur (Marsigit, et al., 2011). This happens because with *hompimpa* or *sut*, every player has the opportunity to: (1) become a cop or a criminal (in police-type *seltok* game); (2) being a member of the first group or the second group (in the war-type *seltok* game); (3) doing *seltok* for the first time (in the *seltok* of the type of flights and sticky game).

² Mathematical concepts that can be identified in the *seltok* game show that traditional games contain ethnomathematics as conveyed by Hariastuti (2016), Hariastuti (2017), Risdiyanti & Pramana (2018), Aprilia, et al. (2019), and Febriyanti, et al. (2019). Mathematical concepts that can be identified from *seltok* can be used as a tool to visualize mathematical objects that appear abstract to students. For example, students can understand circle and tube objects not only through pictures but can be done by bringing *seltok* into the learning process. Students can also find out that there are non-standard units of measurement other than the standard units of measurement they already know, such as meters, centimeters, and so on.

CONCLUSION

² *Seltok* is one of the traditional games from Banyuwangi, East Java which contains mathematical concepts from the process of making tools to the game. The tools used in the *seltok* game are usually made by the *seltok* players themselves. The manufacture of the tool contains the concept of measurement with non-standard units. The *seltok* game tool contains the concept of geometry (circles and tubes). The *seltok* game contains the concept of set, relation, speed, combination, and probability. The identification of mathematical concepts in the *seltok* game shows that other traditional games in Banyuwangi may have the possibility of containing various mathematical concepts. For this reason, it is necessary to explore and identify other traditional games, especially in Banyuwangi. The identified mathematical concepts can then be integrated

into mathematics learning with the aim of developing students' mathematical connection skills, especially those related to culture which is part of their daily life.

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