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Mehen, The Ancient Egyptian Serpent Game: A Reappraisal of Game-play Theories

James F. R. Masters

Abstract

The Game of the Snake (the Serpent Game or Mehen) is thought to be a board game played by ancient Egyptians during the First to Sixth Dynasties. The mechanism of play is not known but many hypotheses have been advanced, in works dating from 1850 to the present. This article deconstructs such ideas into a series of specific game mechanics and shows, using the latest evidence set for Mehen, that the great majority of these hypotheses are unworkable. Following this analysis, a smaller number of plausible game mechanics remain that match the evidence and also meet basic ludological principles and from this, a substantially clearer picture of the game emerges.

Keywords

Mehen, mhn, Egypt, Board, Game, Serpent, Snake, Play, Ludology, Egyptology.

Introduction

The Game of the Snake, the Serpent Game or Mehen is thought to be a board game played by ancient Egyptians during at least the First to the Sixth Dynasty (c.3000 – c.2200 BCE).¹ The earliest evidence is dated 3650– 3300 BCE which is older than any other known board game, although it is not certain that it was a playable activity at this time. The general form of the board used for Mehen is a segmented spiral track based on a snake form with the head at the centre (e.g. Fig. 1). The game was often, or always, played with marbles together with relatively large recumbent lion and lioness pieces (e.g. Fig. 2).²



Figure 1: The grooved Mehen board held by the Petrie Museum, UCL (UC20453) on display at 'Dawn of Egyptian art' exhibition, Metropolitan Museum of Art in 2012. © Babelstone, Wikicommons (CC BY-SA 3.0)
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¹ In this document, 'Mehen' refers to the game unless it is made obvious that Mehen, the deity is being discussed.

² In this document, 'Marble' means a small ball composed of any hard material.

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<https://more.bham.ac.uk/birminghamegyptology/birmingham-egyptology-journal/>



Figure 2: Marbles, Lioness and Lion game pieces (E16667, E16668, E16669) at the Louvre © by Flickr 'kairoinfo4u' (CC BY-NC-SA 2.0). <https://creativecommons.org/licenses/by-nc-sa/2.0/> Picture has been cropped.

Note that prior works listing evidence are out of date and unreliable in ways that are critical to the understanding of this paper. In this document, each Mehen board artefact is referred to using its current city/museum location except the two that are referred to as the 'Louvre table board' and the 'Louvre Peribsen fragment'. The complete evidence set of Mehen boards has recently been published elsewhere and Fig. 3 has images of the known stone boards.³

How ancient Egyptians played Mehen, the game of the Snake, is unknown and all rule sets that have been proposed are inevitably speculative due to the paucity of evidence. Suggestions for game-play began with Falkener in 1892 and many Egyptologists reporting Mehen artefacts have subsequently contributed new ideas, including Klebs, Ranke, Petrie, Quibell, Junker, Montet, Piccione, Pusch, and Kendall.⁴ Notable works on board games are more circumspect, Murray and Bell report only its existence while Parlett notes that it is accepted as a race-game.⁵ Some ludologists have speculatively proposed rules in less scholarly publications.⁶ In totality, the existing body of literature gives a large, confusing, and, in many cases, contradictory pool of concepts.

³ For complete evidence set please see Masters upcoming. *Mehen, The Ancient Egyptian Serpent Game - A Reappraisal of the Evidence Set*: Appendix A.

⁴ Falkener 1898: 83; Klebs 1915: 113; Ranke 1920; Petrie 1927: 56; Quibell 1913: 20; Junker 1940: 37; Montet 1955: 193; Piccione 1990: 47; Pusch 2007: 84; Kendall 2007: 43–44.

⁵ Murray 1952: 13; Bell 1960: 14; Parlett 2018:89.

⁶ Bell 1979: 120; 1988: 104; Finkel 1996: 4.
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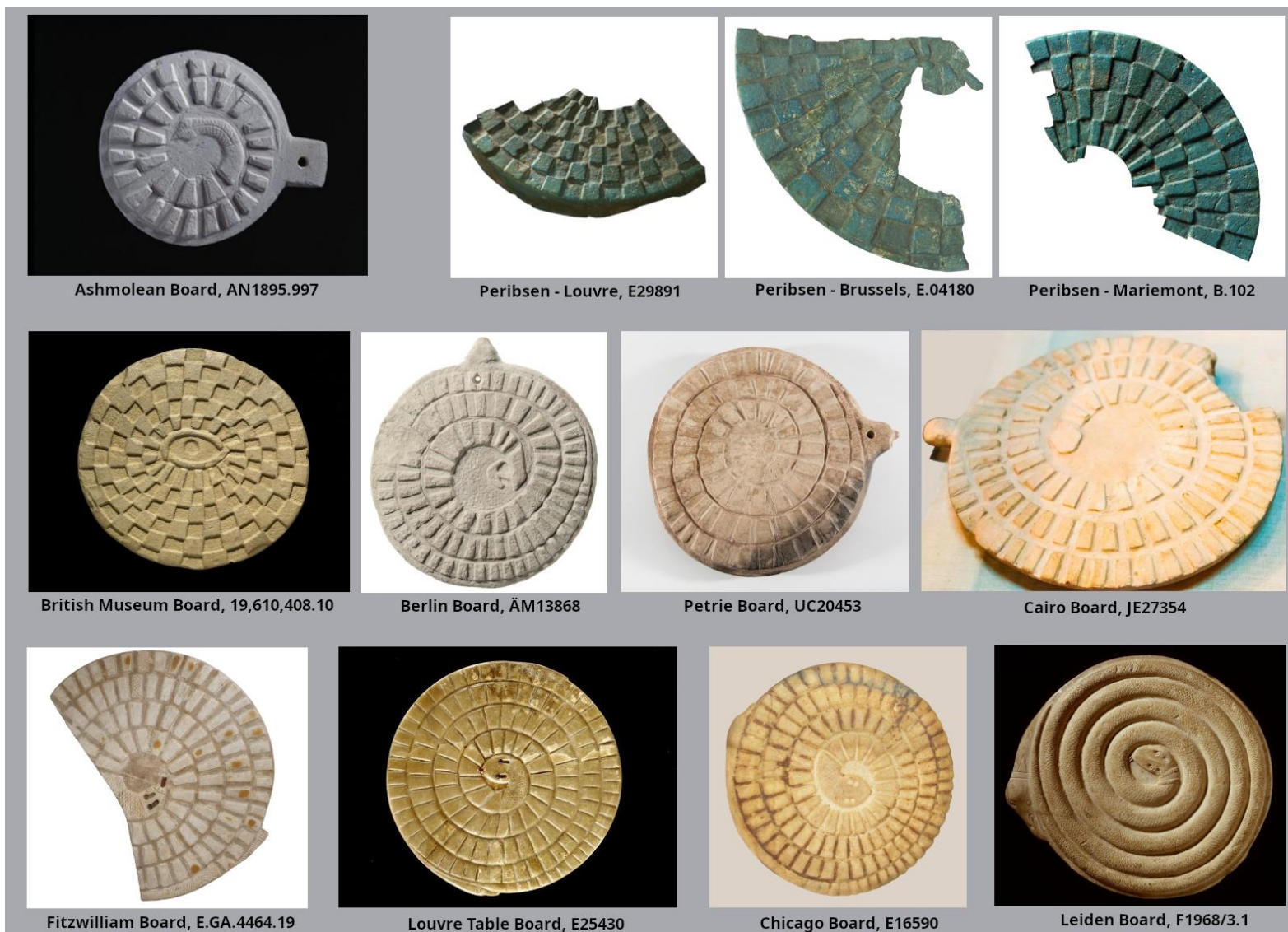


Figure 3: Montage of stone Mehen boards. © Ashmolean Museum, University of Oxford, © 2004 Musée du Louvre / Christian Décamps (<https://collections.louvre.fr/ark:/53355/cl010007634>), © RMAH, Brussels, © Musée royal de Mariemont, © The Trustees of the British Museum (CC BY-NC-SA 4.0). <https://creativecommons.org/licenses/by-sa/4.0/>, © SMB-SPK, Ägyptisches Museum und Papyrussammlung, Photo: Sandra Steiß, © Petrie Museum of Egyptian and Sudanese Archaeology, UCL, © Alain Guilleux, © The Fitzwilliam Museum, Cambridge. Reproduced by kind permission of the Antiquities Department, © 2006 Musée du Louvre, dist. RMN-Grand Palais / Georges Poncet (<https://collections.louvre.fr/ark:/53355/cl010004770>), © Courtesy of the Institute for the Study of Ancient Cultures of the University of Chicago. <https://oi-idb.uchicago.edu/>, Thanks to the National Museum of Antiquities, Leiden.

It has been suggested that little further progress can be made for Mehen, particularly surrounding game-play.⁷ The author asserts, however, that selected game-play mechanics can usefully be disentangled from the main proposals for game-play and assessed objectively for viability. This paper will undertake that exercise and will show that many game devices suggested by earlier authors are unworkable in practice. A smaller set of plausible game-play options will remain, and from them, a clearer overview of how ancient Egyptians played Mehen will become apparent. The following selected game mechanics will be examined using an interdisciplinary approach combining Egyptological evidence with practical ludology:

- The popular conjecture that individual lions were independently raced along the snake track
- The general concept of moving lions along the track.
- The idea that balls were moved *between* the coils of the snake track.
- The practicality of moving marbles *within* the snake track on each of the three types of board. Two types of stone board are found in internationally recognised collections – ‘pitted’ (British Museum, Peribsen fragments) and ‘grooved’ (e.g. Figs 1, 7, 8). A third style of board is depicted in the tomb of Hesy (Fig. 4) and the causeway of Sahure.⁸
- Implications of six players each racing six game-pieces.
- Three proposals for the mechanism used to determine movement of the pieces will be compared: dice, marble guessing and finger guessing.

The geographical and chronological scope for this article is Egypt until the end of the Old Kingdom (2130 BCE); Mehen boards from later periods or other locations are not considered.⁹ To gather all formerly proposed ideas on Mehen game-play, more than sixty primary archaeological and ludological Mehen reference sources were obtained and assessed. In person examination was undertaken of Mehen boards and associated game pieces in the collections of the Ägyptisches Museum, Berlin and the Petrie, Fitzwilliam, Ashmolean and British Museums. Consultations were made with leading ludologists, Egyptologists, and curators.

Although no academic work has seriously proposed it, there are those who do not believe that Mehen was a board game or even a game at all. It is not possible to completely rule out such theories, but sufficient evidence exists to render them almost certainly false. Mehen is depicted next to other board games in seven independent tomb scenes,¹⁰ captions next to such images use the word ‘play’ and the tomb of Rashepses (Fig. 5) shows two players placing small items on the snake track.¹¹ Several amuletic, unsegmented Mehen platters are known showing that there was no need for Mehen coils to be subdivided, nothing from Old Kingdom mythology suggests that Mehen, the deity, should be segmented and the only sensible hypothesis proposed for such divisions to exist is for the play of game-pieces.

⁷ Romain 2000: 14; Pusch 2007: 83; Crist et al. 2016: 27; Hanussek 2020: 6.

⁸ Khaled 2020: 862.

⁹ Kendall 2007: 43.

¹⁰ Hesy, Rashepses, Kaemankh, Nimaatre, Idu, Ibi and Ankhefensakhmet

¹¹ El-Tayeb 2018: 297; Masters 2024 -the section on the tomb of Rashepses.

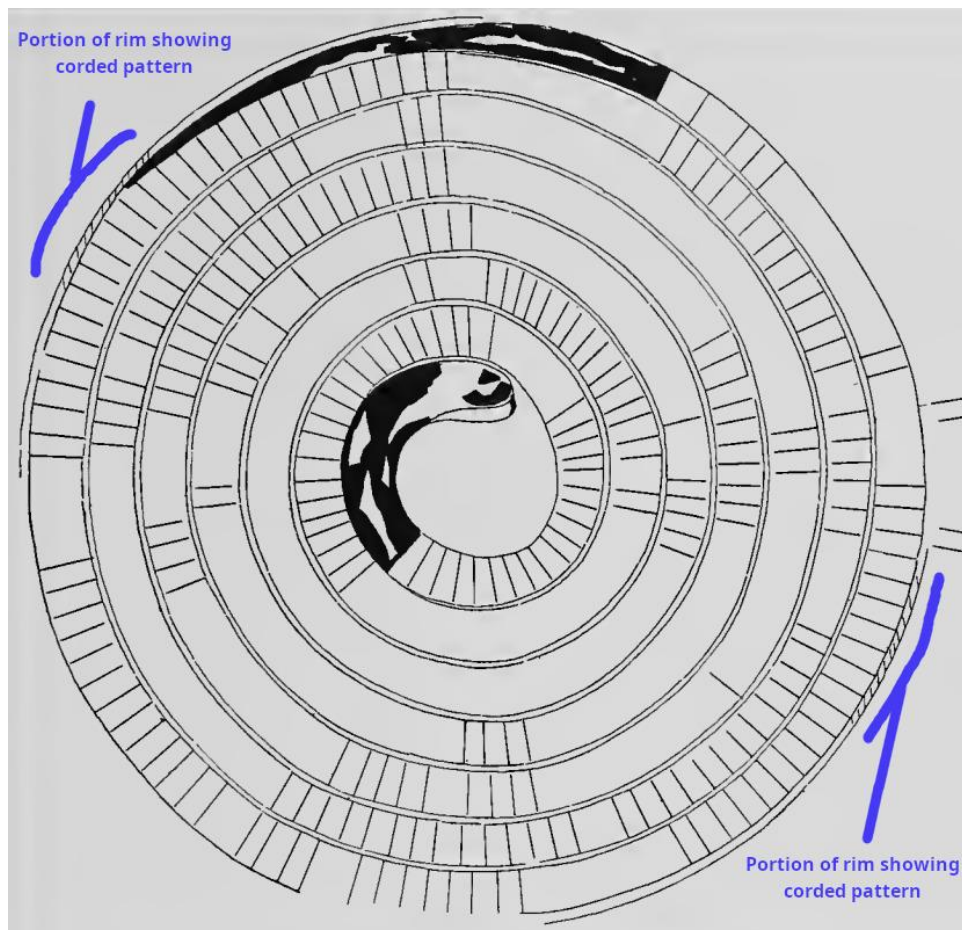


Figure 4: The picture of the Mehen board from the tomb of Hesy, Saqqara (LS16), Fifth Dynasty as depicted by Quibell (1913: Fig.2). Out of copyright.

It is accepted that there was a single coil, the direction of coil rotation and number of spaces on a Mehen board was unimportant, and that it is highly likely that the objective of the game was to move game-pieces along the snake-track from the tail to the head.¹² This is based upon the convincing narrative ideas of Peter Piccione, the underlying purpose being to symbolise the ascent of a newly deceased person through the underworld via the snake god Mehen to be reborn into the afterlife via the serpent's head.¹³

Was Mehen a Simple Lion Race?

Many former writers on Mehen, theorised that the lion pieces were moved along the track, usually in the belief that each player took one feline and played it independently in the manner of Snakes and Ladders or 'Goose'¹⁴ attempting to reach the serpent's head first.¹⁵

¹² Masters 2024 - section on the Peribsen fragments; Kendall 2007: 39.

¹³ Piccione 1990.

¹⁴ Throughout this document, 'Goose' is short for 'The Game of the Goose', a well-known spiral race board game, dating from the fifteenth century and typically played by four players, each with single token on a board with a spiral track of 63 spaces.

¹⁵ e.g. Quibell 1913, 20; Montet 1955, 193; Bell 1988, 104; Piccione 1990, 47; Pusch 2007, 84. Montet did caveat his piece: 'it must be conceded, however, that no depiction shows the lions or lionesses placed on the snake'.

Game-play in this scenario can be envisaged. Suppose the first turn of the game meant that the first lion moved forward five spaces and that the front of the lion is used to count with. Its position is as depicted in Fig. 7 occupying the first five spaces of the track. When the second lion is moved, starting from the tail, a movement allocation of 1 - 9 will overlap with the first lion and only a movement score of ten or more will mean no interaction with the first lion. If movements are limited to no more than twelve, it is certain that a third lion will land on part of another lion and so on up to six lions. There is no sensible rule specification that could cope with this kind of congestion at the start of the track. If a piece is returned to the beginning when another lion lands on it, pieces will be returned to the beginning repeatedly. If pieces are swapped as has been conjectured for Senet,¹⁶ this again will happen repeatedly which is untenable.

There remains a scenario, however unlikely, that the mechanism for determining moves gave much larger movements meaning that interaction was reduced to a sensible level. However, in virtually all multi-player games, it is normal for pieces played on the board to be uniquely distinguishable in some way (most commonly by colour). Marbles associated with Mehen were of different colours so the idea of distinguishing game-pieces was understood at the time but lions that

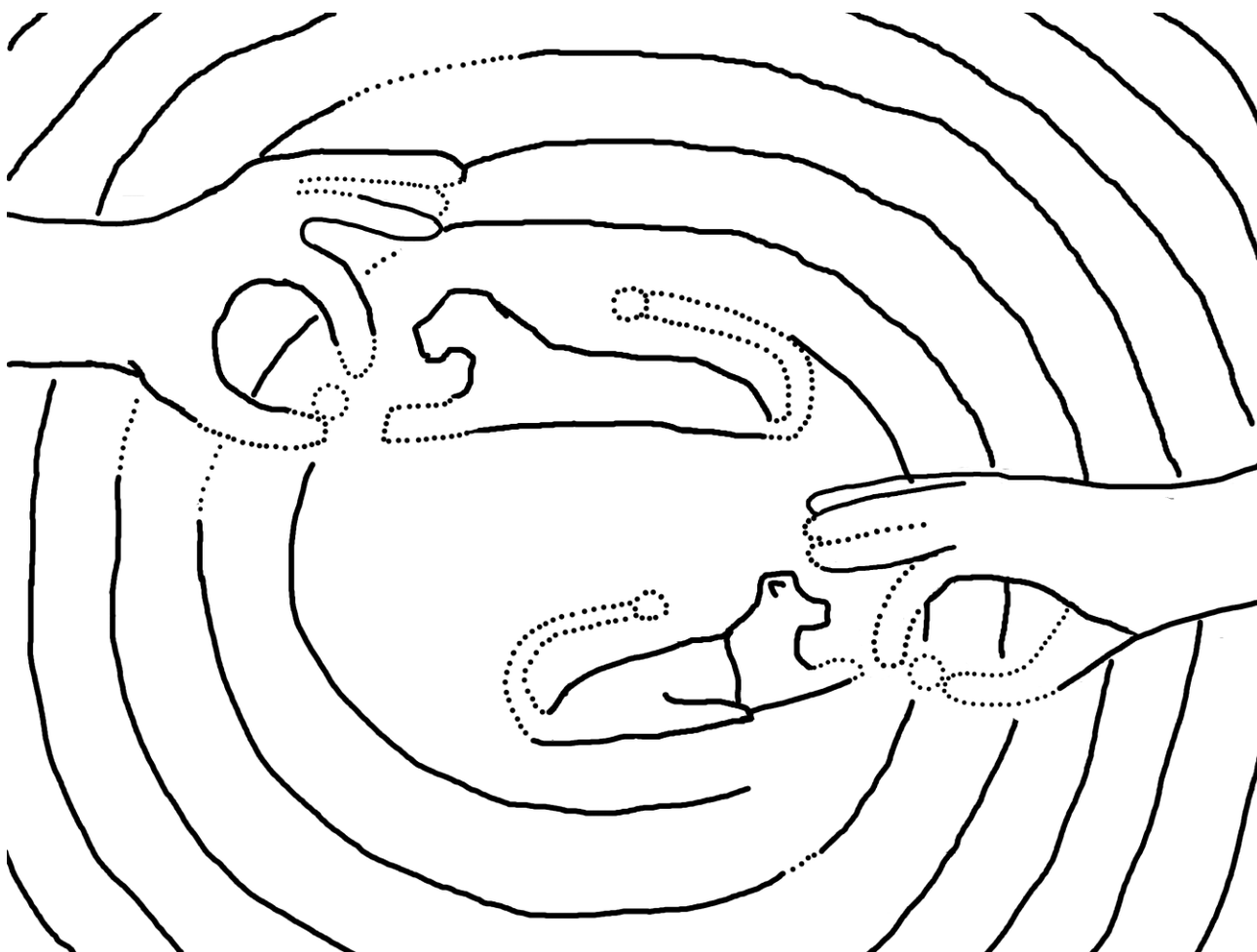


Figure 5: Mehen play depicted in the tomb of Rashepses, Saqqara (LS16), Fifth Dynasty. © James Masters (CC BY-NC-SA 4.0). <https://creativecommons.org/licenses/by-sa/4.0/> The game-pieces held are uncertain but are likely to be marbles. Lions are indisputable.

¹⁶ Parlett 2018: 68.

were associated with Mehen have always been found uncoloured.¹⁷ It seems highly unlikely that pigment assigned to them has completely disappeared since their burial and irrefutably the painting in the tomb of Hesy shows lions and lionesses uniformly coloured – apparently plain ivory. The evidence set shows that lions were only ever distinguished into two types – by gender. The theory that six players each independently raced a single undistinguished lion along a track, in the manner of a game such a ‘Goose’ is therefore almost certainly false.

Were Lions Moved Along the Mehen Track?

Feasible ludological scenarios exist for lions to have moved along the track despite being individually indistinguishable. Perhaps Mehen was a two player or two team game – lions versus lionesses raced along the track. Alternatively, it might be that lion pieces were moved along the track as hazards, independent of the players. The modern Sudanese game of Li’b el-merafib (‘Hyena’), involves playing a single predator piece along a spiral track at the end of the game, and it is conceivable that a similar concept existed 5000 years ago.¹⁸

The depiction of Mehen play in Rashepses (Fig. 5) tomb shows that lions were sometimes placed at the centre of the board. It is possible that they were placed directly on the track as blockers or to guard or attack other pieces, but all of those actions are different to moving lions along the track in an orderly fashion. This section will examine the hypothesis that lions were always bigger than playing spaces and, if that appears to be the case, consider whether moving such lions along the track according to throws of dice or other game mechanic is conceivable in practice.

Former authors have raised the issue that Mehen lion pieces seem to be larger than track playing spaces on known boards including leading ludologists Parlett and Schaedler but this has never been explored in detail.¹⁹

¹⁷ Crist et al. 2016: 25–6.

¹⁸ Davies 1925: 145–146.

¹⁹ Petrie 1927: 56; Shore 1963: 90; Romain 2000: 14; Schädler 2007: 22; Parlett 2018: 89.



Figure 6: Replica Mehen board with lions scaled to a typical size © James Masters (CC BY-NC-SA 4.0)
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Since lions have never been found with a board, it could be argued that the lions that were played with were much smaller, or perhaps boards that were played with known lions were much bigger. An analysis of lion piece size is given in Appendix A. Average and a typical length is 70 mm and for such lions, average and median width is around 27 mm. The size of a board that would need to be big enough to contain lion pieces of 90 cm within its playing spaces can be estimated by scaling a real board proportionately. A board in the style of the Petrie board would be at least 1.7 m in diameter, untenably large; one like the Chicago board would be at least 2.3 m across. A determined cynic might argue that boards of this size were dug into the ground, as is commonly seen for modern Mancala games, but known recumbent lions are clearly designed to sit on flat surfaces and some show wear on their flat undersides.²⁰ The depiction in the tomb of Hesy supports this – the number of spaces may be exaggerated but the lions are much bigger than the playing spaces. It seems certain, therefore, that lion pieces were generally considerably larger than Mehen board playing spaces.

Figs. 6 and 7 shows what this means in practice. Median sized lion pieces appear on the Chicago board, one of the largest from the evidence set. Although this board is better crafted than most, it shows considerable variation in the dimension of its spaces. In terms of width, the Chicago board track varies from around 19 – 40 mm wide so a lion of width 27 mm would often not fit, although not to a degree where it would necessarily be impractical. However, the length of the two lions viewed as on the left both cover just over three spaces while the two lions near the edge each cover five spaces. The lion nearest the middle covers five spaces on the inner part of the track and three on the

²⁰ Petrie 1927: 56.

outer part of the track. Table 1 shows that even the biggest spaces are around a third of the length of a 70 mm lion.

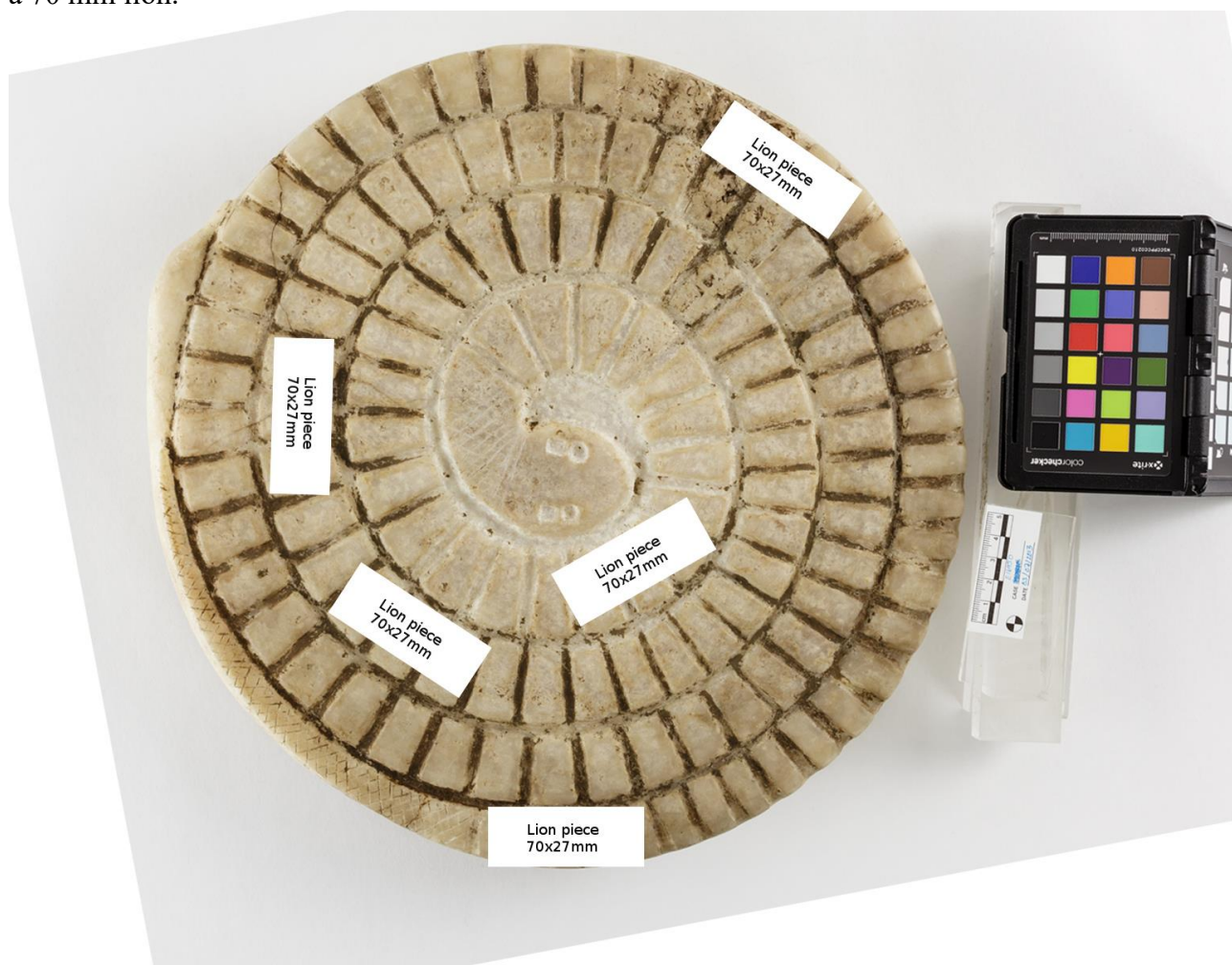


Figure 7: Chicago board, ISAC (E16950) © Courtesy of the Institute for the Study of Ancient Cultures of the University of Chicago, <https://oi-idb.uchicago.edu/> – overlaid with typically sized lion game pieces

TABLE 1 - Length of selected spaces in the direction of the coil on the Chicago board

Space	Estimated Min. / mm	Estimated Max. / mm
Small, thin	11	12.5
Wide	17	22.5
Most extreme trapezium	8	22.5
Typical	16	19
Typical	12.5	18

It might be argued that Egyptians were unconcerned about poor aesthetics and managed to work around congestion and practical difficulties by adjusting the lion positions as necessary, unlikely as this seems, given that all contemporary games are pleasingly aesthetic, and a better solution would

be to make smaller lions. Examples do exist of board games with pieces bigger than playing spaces. For example, the race game of ‘Steeplechase’, first invented in France around 1850, used a game mechanic wherein the front of the horse game-pieces aligned with the front of game spaces. However, there is a critical difference – a Steeplechase game board features a wide track so horses can be placed next to each other without contention or ambiguity.

In a scenario where the location of a game-piece is not clearly defined, one player might play a lion so that its front touches the front of a space just avoiding a lion behind it, but another player might claim that the correct position for it is a fraction of a millimetre inwards in which case it will touch the other lion with a different consequence. It would be impossible to pronounce either player as right or wrong. Another scenario might involve one lion being played so that it lands equitably upon two other lions – in this case which lion will be swapped or captured? Kendall's idea of a single lion being moved along the track capturing other pieces, perhaps marbles, similarly cannot work – a lion might land on a space with a marble if placed one way but if it were positioned ½ mm towards the centre, the marble might not be captured. These simple examples show why, across five thousand years of board game history, there is no evidence for a board game in which the position of pieces can be ambiguous. Board games²¹ have an underlying mathematical precision that enable the rules to be unequivocal and, without it, possibilities for cheating and unresolvable disagreements arise.

In conclusion, it appears to be untenable that lion pieces associated with Mehen were moved along the track in the manner of games such as ‘Goose’, Snakes and Ladders, or Pachisi. This result eliminates many speculations for game-play including those of Quibell, Junker, Montet, Bell, Piccione, Pusch and Kendall which in turn discredits the overwhelming majority of rule-sets published for Mehen in its history.²²

What Was the Role of the Lion Game-pieces?

Evidence to indicate how the lion pieces *were* used is minimal. De Wit in his authoritative piece on lions²³ lists more than thirty lion-related deities in Egyptian mythology but none are a good match for the lion pieces and since there are two lion genders, the idea that a specific deity is represented seems unlikely. Never-the-less, clues exist that significantly narrow the possibilities. Mehen lionesses always have a collar and lion's manes are sometimes coiffured or have a collar too.²⁴ Lions were hunted and killed in the Old Kingdom but lions with collars are not prey.²⁵ Old Kingdom kings reportedly kept real lions which were used as guardians, for hunting and in battle and therefore the most likely context for Mehen lions in the game is as subjugated agents of the king.²⁶ There is no evidence for the existence of a multi-player board game until c.1000 AD (Indian Chaturaji) and, given two lion types, it is likely that the game was for two players or two teams.²⁷ Finally, recently published photos from the tomb of Rashepses (Fig. 5) show lion pieces placed at the centre of the board with

²¹ Some war games position pieces by distance measurement but they are not classed as board games.

²² Quibell 1913: 20; Montet 1955: 193; Bell 1988: 104; Piccione 1990: 47; Pusch 2007: 83–4; and for Kendall see later section on ‘Hyena’.

²³ de Wit 1951.

²⁴ e.g. Montet 1946 Plate VII.; and for those with a collar see Cairo Museum JE 44918, Fitzwilliam Museum E.5.1927

²⁵ de Wit 1951: 3–5.

²⁶ de Wit 1951: 10–15.

²⁷ Parlett 2018: 325.

their fronts adjacent to and pointing directly at a game-piece on the track.²⁸ The chance of that being a coincidence seems vanishingly small so it may be that pointing lions at other pieces was important although it might equally be no more than a whim of the artisan. Arguments for a more specific use of the lion figurines can only be speculative until more evidence is found.

Was Mehen a Marble Race?

It is conceivable that, for some versions of Mehen, flat-bottomed game-pieces were played along the track. However, the evidence does not support this – finds of game-pieces that are almost certainly or highly likely to be for Mehen do not include any and none are shown in the apparently complete set of Mehen pieces depicted in Hesy's tomb.

Many items found in elite burials, including game-boards for Senet and Hounds and Jackals, are made from light materials. Marbles are more easily knocked out of position by a movement of the playing surface than flat-bottomed pieces so a hypothesis for the use of stone and Ebony, a heavy hardwood timber depicted for the board of Hesy, is that greater inertia was necessary to reduce the higher chance of an inadvertent perturbation of a board holding marbles spoiling the game. Regardless, the previous section concluded that it is almost certain that lions were not moved along the track and therefore, at least for Hesy's version of the game, the only other depicted pieces – marbles – must have been conveyed along it.

Marbles could be conveyed either within the body of the Mehen snake or between its coils. The following two sections will examine both possibilities.

Were Marbles Moved Between the Track Coils?

A theory from the inception of Mehen study is that, for un-pitted boards, marbles were rolled or moved along the spiral track in the channel between the coils of the snake.²⁹ For un-augmented 'grooved' boards, this appears to be the only practical possibility for playing marbles in the manner of a typical race game.³⁰

One hypothesis for such boards is that lions placed radially across two coils provided delimiters for marbles to rest in the spiral channel. Perhaps the marbles were able to hop over lions into the next available space between lions or perhaps lions moved along the track sideways, shuffling the marbles along with them. Such a theory cannot be analysed dimensionally because we do not know the size of the board on which any known lion was played, but a typical lion would fit within two coils on some stone boards. None-the-less, collisions and contention would arise when a lion met another that was one coil further towards the middle and the Tomb of Rashepses (Fig. 5) shows two lions at the central area. Potentially the lions finished in this space, but they are shown pointing at game pieces and no other lions are apparent, all of which seems to render the idea implausible.

Petrie regarded it as obvious that the idea of balls being raced along the channel (without delimiters) was untenable curtailing the debate in half a sentence: 'on the limestone serpent no ball could travel the groove, owing to cross cuts and the groove not continuing at the ends'.³¹ Piccione, however, reignited speculation surrounding the idea, observing that the amount of pigment along the spiral lines on the Chicago board was less than on the lines perpendicular to them and suggesting that

²⁸ El-Tayeb 2018: 297.

²⁹ Klebs 1915: 113; Petrie 1927: 56; Junker 1940: 37; Piccione 1990: 47.

³⁰ If marbles were placed on the raised spaces on a grooved board, they would roll off and if they were placed in the cross-channels between the spaces, they would often roll unpredictably one way or the other into the spiral channel.

³¹ Petrie 1927: 56.

this was caused by marbles running along the spiral channel.³² It should be noted that this is contrary to Piccione's own understanding of Mehen's religious symbolism, wherein the deceased travelled within the deity rather than between the coils.

Marbles played on Mehen boards with grooves – archaeological examination

It is possible that the seven grooved boards from the archaeological record were playable, so each was examined with regard to the separation and variability of the groove. For the Ashmolean, Cairo, Berlin (Fig. 8) and Fitzwilliam boards, craftsmanship is relatively crude and in some places, channels widen to the point that it is not possible to believe that a marble would be contained sufficiently. On some, it also seems likely that a marble would easily roll into the cross-bar channels. The Louvre table board has channels and cross-bars that are thinner, more like incised lines and, although construction is consistent, it is difficult to believe that balls would be held sufficiently firmly in such a shallow channel. Only the Chicago and Petrie boards look consistent enough that marbles would probably be contained throughout and so, on five out of seven known grooved boards, it is almost certain that marbles could never have been moved along the spiral channels consistently or practically.

³² Piccione 1990: 47.



Figure 8: The Berlin Board (ÄM 13868) © SMB-SPK, Ägyptisches Museum und Papyrussammlung, Photo: Sandra Steiß

Marbles played on Mehen boards with grooves – theoretical examination

Although marbles could not have proceeded along the main spiral channel on most known stone boards, it is conceivable that, being funerary items, these boards were not designed to be played upon and were copies of real boards with a similar design. Hence, the potential for playing marbles in this manner on boards of this *type* must be examined, and it is immediately evident that the only method for securely holding a marble in the spiral channel is by aligning it with a 'cross-bar'.³³

If the pieces are moved along the spiral channel in the manner of a normal board game, a creator of consistent rules needs to choose from one of three possibilities: marbles will move from one cross-bar to the next using cross-bars on the outside of the channel; on the inside of the channel; or to the next available cross-bar whether inside, outside, or on both sides at once.

On all known Mehen boards and depictions, cross-bars on the inside of the spiral channel do not coincide with cross-bars on the outside and the distances between cross-bars varies. If both outer

³³ Petrie 1927: 56.

and inner cross-bars were used, in many cases the distance between outer and inner cross-bars is so tiny that it would be unclear whether one move or two should be made.

Furthermore, craftsmanship was never perfect and inconsistencies in construction means that balls would be misbehaved to the point that the game is unviable. Outer cross-bars are sometimes misaligned with opposing inner cross-bars by distances of less than a cross-bar's width. Therefore, if moves used one side of the channel, sometimes cross-bars on the other side of the channel would interfere and the balls would roll in their direction instead of sticking to the inside cross-bar. A marble might stay in a particular spot if placed gently but more often will roll to a different spot. Imperfections in marble construction would add to the level of variation within the game, making things even less predictable in practice.

Marbles played on Mehen boards with grooves – practical examination

In 2020, a sculptor was commissioned to make a replica Mehen board of the 'grooved' type (Fig. 9) with a consistent spiral groove and cross-bars that resembled the track of the Fitzwilliam and Chicago boards. Balls measuring 11 mm were moved along the grooves. 9.5 mm balls were also tried but worked less well.



Figure 9: Replica Mehen board with lion, lioness and six 11 mm marbles, © James Masters (CC BY-NC-SA 4.0) <https://creativecommons.org/licenses/by-sa/4.0/>

Moving marbles along the main spiral groove showed all the hypothesised problems outlined in the previous section. In certain positions, balls could not be stopped from rolling into a cross-bar, at others, they would only hold in place if placed lightly and an insignificant perturbation would make them roll away. It was impossible to place the ball so that it was held against some cross-bars – they would always roll elsewhere. It was concluded that ambiguity, possibilities for disagreement and cheating render the idea of moving marbles along the spiral groove almost certainly impractical.

Were Marbles Moved Within the Mehen Track?

Boards of the pitted variety seem to be intrinsically suitable for holding marbles along their track and might have originally featured a rim to prevent marbles falling off the edge or alternatively, marbles might have started one coil in from the edge.

The board shown in the tomb of Hesy appears to be constructed from timber with the snake head and tail made from Ebony.³⁴ The main spiral between the coils of the track and around the rim on the picture in Hesy's tomb has a consistent thickness and was reported by Quibell as a 'lighter tint' whereas the cross-bars are depicted as red lines.³⁵ It therefore seems likely that the boards depicted in the tombs of Hesy and Sahure were constructed with spaces delineated by dividers that finished slightly above the rest of the playing surface, allowing them to retain marbles. This would be similar to the construction of known Senet and Game of Twenty boards (see Fig. 10). The Senet game depicted above the Mehen board on Hesy's tomb wall also appears to have been constructed in this way.



Figure 10: A Game of Twenty board held at the Metropolitan Museum of Art (16.10.475a) from the second intermediate period showing a similar construction to the Senet board depicted in the Tomb of Hesy. Rogers Fund, 1916. Public Domain.

On pitted and Hesy/Sahure boards, a marble race seems easily plausible, but most boards held in international museums are of the 'grooved' design and for these, the practicality of playing marbles along the snake track is more difficult to reconcile. However, experimentation for this paper has established that if the spiral channel on a grooved board is filled, it becomes morphologically equivalent to a pitted board. This might be achieved by fitting cord or wooden strips into the main channel or just by filling the channel with clay. With the replica board made for this study, it proved surprisingly easy to do this by winding cord into the channel as shown in Fig. 11. To prevent the marbles falling off the edge, the cord or filler or divider must continue around the rim of the board or

³⁴ Ranke 1920: 4.

³⁵ Quibell 1913: 19.

potentially a separate rim could be attached. With the spiral channel filled, the track becomes alternately raised and pitted, and marbles can be reliably moved from one cross-bar to another in the manner of a typical board game. Another possibility is that the cross-bars were also filled in which case marbles could be safely played into the spaces between them instead.

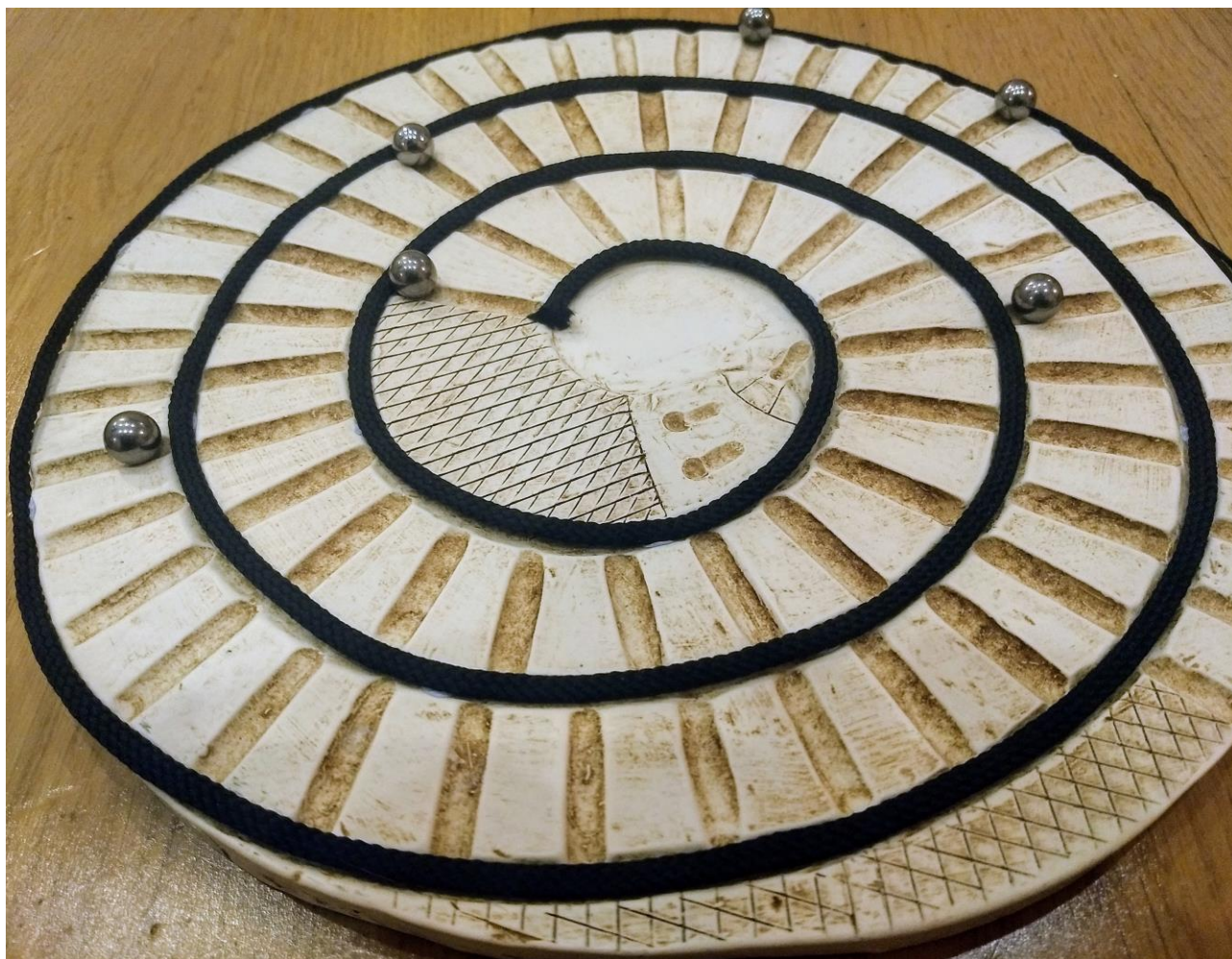


Figure 11: Replica Mehen board with cord in the spiral channel and 9.5 mm marbles, © James Masters (CC BY-NC-SA 4.0) <https://creativecommons.org/licenses/by-sa/4.0/>

The divider adornment theory for grooved boards might seem speculative but there is evidence in favour of it. Firstly, most grooved boards feature an appendage on the edge that might have obstructed any edging around the rim rendering this theory untenable.³⁶ But analysis of each complete board shows that their design allows for it. The Ashmolean, Petrie (Fig. 1), Berlin (Fig. 8), Fitzwilliam, and Louvre Table boards are all designed with a lip around the edge of the board where a cord or other raised edge could be positioned so that the appendage is not a factor. The appendages on the Cairo and Chicago boards are positioned so that they do not impede the progress of a raised edge around the rim to the end of the track. Secondly, the Chicago board shows a brown substance in its spiral channel and cross-bars, thought to be pigment.³⁷ Pigment was also apparently found on the Louvre table board, later removed as part of a restoration process.³⁸ Both the Berlin and Petrie boards

³⁶ This was true of the replica board created for this project which was designed without knowledge of the cord idea.

³⁷ Piccione 1990: 47.

³⁸ Hanussek 2020: 23.

have remnants of a red pigment in the main groove and including the edge of the board.³⁹ It is possible that the pigment was also an adhesive used to hold a cord or other divider in the spiral track. Piccione observed that the Chicago board showed less pigment in the spiral lines than in the cross-bars which could indicate that a divider had been pressed into the main channel. Thirdly, the archaeological report for the tomb of Hesy states that outside the tail 'is a cord pattern of red lines on white' - this diagonal hatching on the rim can be seen in two places in Quibell's sketch (Fig. 4).⁴⁰ Fourthly, a remarkable 4.5 cm unplayable Mehen amulet reported by Kendall appears to be a perfect model of a grooved Mehen board.⁴¹ There are four tiny holes on the board's snake track, they are the correct relative size for a marble, and it cannot be a coincidence that each one lies exactly on a crossbar. One can also think of the construction of a Mehen board from the perspective of its maker. Tasked with making a game board upon which marbles must be contained, an obvious solution is to use raised dividers and a sensible way to retain a divider securely is to make the board with grooves to hold the divider in place, perhaps pushed forcibly into the groove or held with some kind of glue.

In conclusion, there are three possibilities for grooved boards: 1. Dividers were used to enable marbles to be played along the track; 2. Flat-bottomed game-pieces were raced on grooved boards, although evidence of their use for Mehen has yet to be found or 3. Grooved boards were amuletic, apotropaic, or votive unplayable religious artefacts only, despite the fact that there is no known reason to segment the snake's body other than for game-play. It should be noted that other conclusions drawn in this article are independent of the grooved board question. Archaeological depictions show that Mehen was played as a game for much of the Old Kingdom and there is no doubt that marbles could be played along tracks of the pitted and Hesy/Sahure board types.

Corollary – Morphological Equivalence of Boards

If grooved boards were used with a filled spiral channel, the boards of Sahure and Hesy were likely boards of this type, the 'corded rim' depicted in the tomb of Hesy being an example of the divider. Grooved boards could be viewed as an evolutionary development from pitted boards or vice-versa, and all three types of board, while appearing markedly different, would be morphologically equivalent.

How Many Marbles Were Raced?

A popular theory for Mehen has been that it was played by six players, each racing six marbles moved along the track from tail to head,⁴² primarily based on the picture of 36 marbles in the tomb of Hesy. Two finds of marbles for Mehen incorporating 34 and 39 marbles respectively support this to an extent.⁴³ Starting with so many pieces from a single location in a board game risks intolerable over-congestion, but game-play rules can restrict the number of marbles allowed on the track at one time.

Much of the basis of the 36-marble race theory comes from misrepresented evidence. For more than 170 years, scholars have been relying on Lepsius' line drawing of Rashepses tomb that incorrectly shows nine or ten marbles on the track.⁴⁴ Recently published photographs of this depiction

³⁹ Both of these were by own examination of the boards; Berlin in February 2023 (with thanks to Robert Kuhn) and the Petrie board in June 2021.

⁴⁰ Quibell 1913: 19.

⁴¹ Kendall 2007: 37.

⁴² Ranke 1920: 5; Petrie 1927: 56; Kendall 2007: 52. For Kendall, it was also back to the tail, doubling the route length.

⁴³ Petrie 1925 Pl. VII.; Emery 1954: 48, Pl. XXIX. See Appendix B

⁴⁴ Lepsius 1849: fig. Bl. 61a. Masters 2024: Section on Rashepses.

show two lion pieces at the middle of the board and two players playing just one game-piece each (Fig. 5).⁴⁵ Compounding this, Quibell's colour painting of the tomb of Hesy shows six marble colours but his accompanying text belies this – only three colours were distinguishable.⁴⁶

Seville's seminal 2002 computational statistical study analysed two simple unicursal race games, Snakes and Ladders and 'Goose', showing that both finish on average in less than 70 moves and 95% of them finish in less than 150 moves, giving a guide for the number of moves that are acceptable for such games in modern times.⁴⁷ Abstract race games with an element of strategy might hold a longer interest but the difference is not great, as is subjectively known from games such as Ludo⁴⁸ and Backgammon which, on average, ends sooner. For a game racing thirty-six marbles, by the time that each marble has been moved only twice, the minimum number of moves is 72 and by comparison, most games of Snakes & Ladders or Goose would have already finished. A typical number of moves would be far greater and, regardless of the length of track, average number of spaces moved per turn, and whether Mehen has an element of skill, it is apparent that a game of this format will take many times longer than 150 turns with a corresponding duration of many hours, unless the rules were untenably facile.

The overwhelming majority of provenanced evidence for Mehen comes from elite burial locations⁴⁹ so it is conceivable that it was played only for religious, ritualistic⁵⁰ or prestige⁵¹ reasons during the Old Kingdom. In such circumstances, Mehen might not conform to modern ideas of a board game and ludological expectations for 'enjoyability' would be inapplicable – for instance game-play might have been intrinsically uninteresting or the game might have continued for hours without conclusion. Therefore, the duration argument is not conclusive but Mehen is always shown within scenes depicting entertaining activities such as dancing, singing, playing musical instruments, wrestling and other board games and it seems unlikely that an unenjoyable or tedious rite would be amongst such pursuits.

A second reason to doubt that all the marbles shown in the tomb of Hesy were raced on the board derives from Piccione's idea that each game-piece symbolised a dead king passing through the underworld. Moving a single piece seems to match that concept much better than six pieces.

If less than 36 marbles were used for the game depicted in the tomb of Hesy, the remaining marbles must have served some other purpose. Using identical pieces for two different purposes within a game is not uncommon,⁵² as it is convenient from a manufacturing perspective and accepted even by modern players who arguably are fussier about game aesthetics than ancient peoples were.⁵³

Attempting to reduce possibilities for Mehen game-play further based on the layout and colour of game pieces depicted in the tomb of Hesy (Figure 12) is not currently feasible due to the uncertainty of the marble colours. It cannot be ruled out that Hesy's game showed six different marble colours or four different colours – e.g. each side used a set of black, a set of red and a set of their own unique colour. If both sides used identical red, white, and black colours,⁵⁴ as Quibell⁵⁵ and Petrie suspected, each team could simply choose a contrasting colour to play on the track (probably one marble,

⁴⁵ El-Tayeb 2018: 297.

⁴⁶ Quibell 1913 Pl. XI.

⁴⁷ Seville 2002.

⁴⁸ Hariharan 2021 a popular online Ludo game lasts 15 to 40 minutes.

⁴⁹ Crist et al. 2016: 31.

⁵⁰ Crist et al. 2016: 18.

⁵¹ Hanussek 2020: 42.

⁵² E.g. Whist and Bridge players keep score using piles of used cards known as tricks. Some marble games score using the marbles themselves.

⁵³ E.g. modern classics Carcassonne and Stone Age use meeples to both score and play.

⁵⁴ A cursory museum survey shows that red (porphyry or breccia), white (limestone or ivory) and black (diorite) ancient Egyptian marbles were common.

⁵⁵ Quibell 1913: 20.

possibly six), the remaining marbles serving a different purpose. A final option exists under the same scenario which is that each row of game pieces represents the equipment for one player or team – twelve marbles of the same colour plus a lion and a lioness. A game with three sets of game pieces is most unusual but, however unlikely, depictions of Mehen play with two, four and six players do not preclude it – two or four player games would leave one set of pieces unused while six participants would be in three teams of two players each.

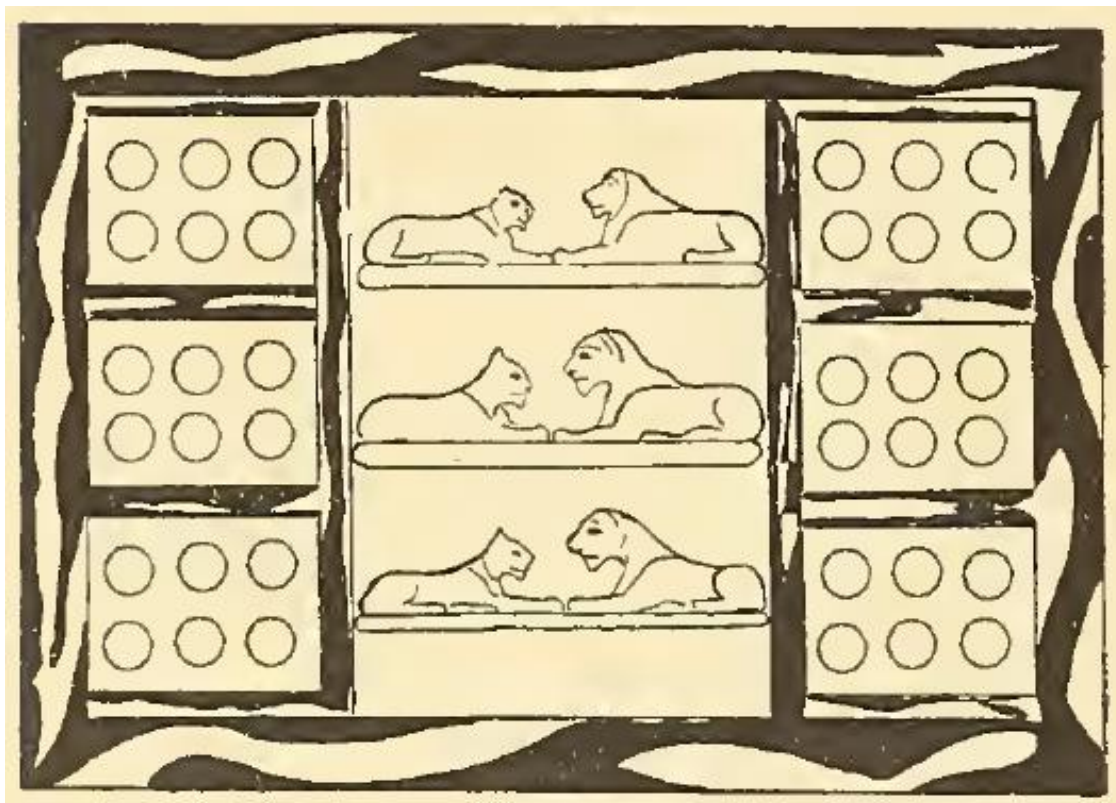


Figure 12: Sketch of the box of Mehen game pieces drawn on a wall in the tomb of Hesy, as depicted by Quibell. Out of copyright.

This analysis shows only that it is unlikely that all marbles were raced on the track and so the remainder were probably used for some other purpose. As with lion usage, until further evidence is obtained, more detailed theories as to the precise number and allocation of marbles can only be speculative.

What Mechanism Determined Game-piece Movement?

If Mehen was a race board game, a game mechanic for moving the pieces must have existed. Due to the lack of dice and the existence of marbles in Hesy's set of game-pieces, the idea that marble guessing was involved has been proposed by multiple authors but such a technique is unknown for any other board game, arguments in favour of it have been unconvincing and there are no reports of research to see if the idea works in practice.⁵⁶

⁵⁶ Ranke 1920: 11; Petrie 1927: 56; Bell 1988: 104; Pusch 2007: 83–84.

Guessing how many items are held in another player's fist is an activity known throughout modern history⁵⁷ and such an uncontrived activity has probably been re-invented frequently since the inception of human recreation.⁵⁸ It is unsurprising therefore, that marble guessing games were known to the ancient Egyptians in the late period and almost certainly for the Old Kingdom and earlier, too.⁵⁹

Arm and Hand positions of Mehen players

Ranke was the first to report the unusual positions of players in depictions of Mehen play, writing that one participant 'seems to be hiding something in his hands, one on top of the other' and about his partner, 'holds one hand out open and the other closed into a fist'.⁶⁰ The Twenty-sixth Dynasty tomb of Ibi (Fig. 13) shows a scene with the caption 'enjoying the game (on) the Mehen board, on the senet-board, (and) the marble game'.⁶¹ There are four men around a Mehen board, two men around a Senet board and a pair in between. The six not playing Senet have their hands in the attitude of holding or hiding something in their hands. The Twenty-sixth Dynasty tomb of Ankhefensakhmet (Fig. 14) has a scene where players either side of the Mehen board hold their hands similarly and in this case, marbles can clearly be seen between the palms of two of them. Pusch therefore argued that these two scenes showed that marble guessing was used for Mehen.⁶² Unfortunately, the argument by itself is weak because these two depictions are almost certainly copied from a Fifth Dynasty tomb, probably the same tomb and reproduction errors or re-interpretations appear to have occurred rendering details unreliable.⁶³ The artists probably did not know the game of Mehen, since the second scene shows the figures pointing away from the board as if it is an ornament unrelated to the activity.⁶⁴ It is possible that the later artists added marbles between hands based on assumptions for a game played in their time.

However, it seems unlikely that the depiction of one hand being held back with the other covering it was entirely invented and this is corroborated by the recently published photographs of Mehen play from the tomb of Rashepses, showing a man with the same hand position (Fig. 15).

⁵⁷ Gomme 1964: 187.

⁵⁸ Pusch 2007: 82.

⁵⁹ Falkener 1898: 106 footnote. Much of this chapter could be about marble guessing and as intended, finger guessing. Pusch 2007: 74.

⁶⁰ Ranke 1920: 5,11.

⁶¹ Ranke 1920: 11; Pusch 2007: 74.

⁶² Pusch 2007: 75–76.

⁶³ Since the images differ, if they were copied from the same tomb, copying errors occurred. Ranke 1920: 13; Vandier 1964: 489.

⁶⁴ Ranke 1920: 14; Pusch 2007: 83.

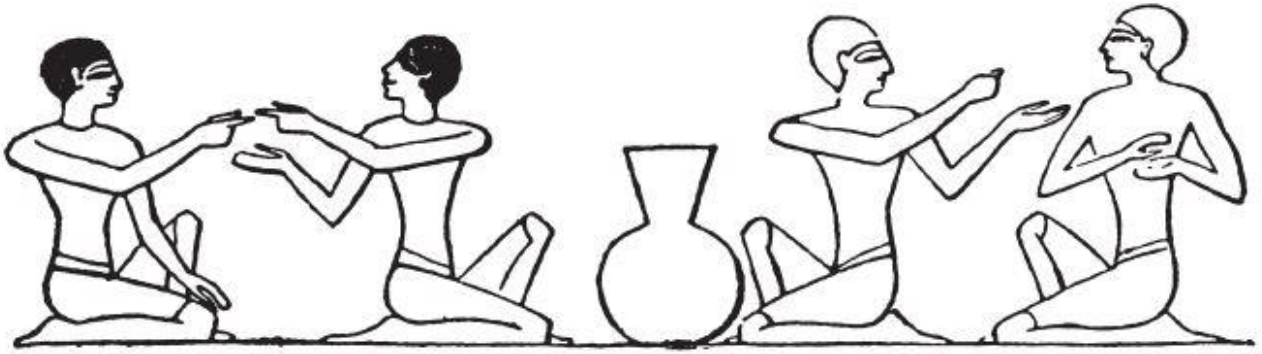


Figure 13: Mehen as depicted on the relief from the Tomb of Ibi (TT36), Thebes, Twenty-sixth Dynasty. Line drawing from Wilkinson 1847, P.55. Out of copyright.



Figure 14: Mehen as depicted on the relief from the Tomb of Ankhfensakhmet, Memphis, Twenty-sixth Dynasty. © CC0 1.0 Universal <https://art.thewalters.org/detail/34307/lintel-with-musicians-and-game-players/>



Figure 15: The bottom part of the northern wall in the passage (room no. 15) of the tomb of Rashepses, Saqqara (LS16), Fifth Dynasty. Cropped. © Hany El-Tayeb

A second specific hand position shown in Mehen reliefs from the tombs of Ibi and Ankhefensakhmet is re-affirmed in the tomb of Kaemankh (Fig. 16) wherein players hold a fist up to the assumed opponent. Play-testing of marble guessing conducted for this paper shows that this is instinctively what players do in practice when they challenge another player to guess what is in their hand. These figures' position differs from the hieroglyph representing a seated man with his hand extended, so is not a copy of the standard form.

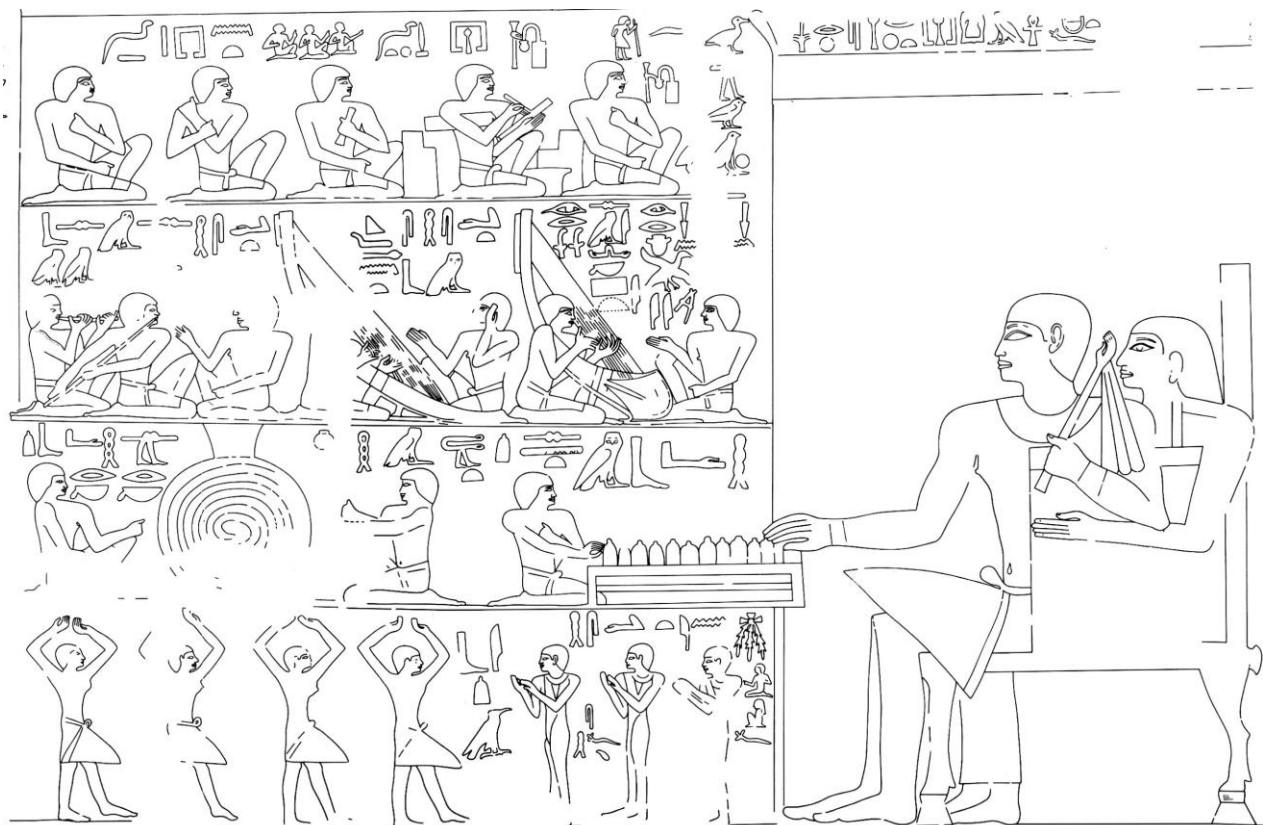


Figure 16: The relief of entertainment and games in the tomb of Kaemankh, Giza (G7102), Fifth Dynasty. © Naguib Kanawati

Of six depictions of Mehen in action, the Causeway of Sahure is the only one that does not show players with unusual positions of head, arms, or hands.⁶⁵ In the tomb of Idu, the Mehen board (Fig. 17) is depicted with what appears to be a table.⁶⁶ One player seems to have his hand thrust forward, palm upwards, in what could be interpreted as revealing something in hand. Any theory for the game-play of Mehen should attempt to explain what these unusual hand/arm activities represent.

⁶⁵ Khaled 2020: 864.

⁶⁶ Simpson 1976: fig. 38, Pl. XXIV.

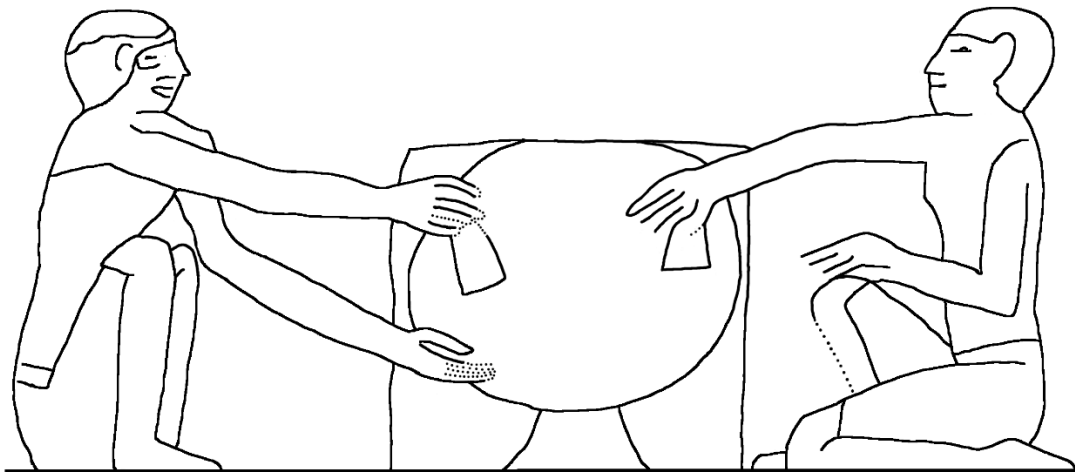


Figure 17: Mehen play within a scene of general entertainment depicted on a relief in the tomb of Idu, Giza (G4561), Sixth Dynasty. © James Masters (CC BY-NC-SA 4.0) <https://creativecommons.org/licenses/by-sa/4.0/>

Marble Size

A typical range for the diameter of marbles associated with Mehen appears to be 8 – 11 mm.⁶⁷ Information from only three definite finds is statistically insignificant – they may be an outlier or were played on a particularly small board but other finds of marbles that were probably for Mehen are also the same small size. For modern board games involving movement of marbles, marble diameter is typically 14 – 16 mm. In volumetric terms, the difference is substantial as shown in Fig. 18.



Figure 18: Replica Mehen board with cord in the spiral channel and 9.5 mm and 15 mm marbles, © James Masters (CC BY-NC-SA 4.0) <https://creativecommons.org/licenses/by-sa/4.0/>

⁶⁷ See Appendix B.

Gaming equipment evolves to be the best for convenience, practicality, and enjoyment and in these terms, Mehen marbles are surprisingly small. If the only purpose for marbles was to be moved around a game board, 8 – 10 mm marbles work but 15 mm marbles are more practical. Larger balls and marbles are common during this period so it must have been a conscious decision to use smaller spheres. Two possible ludological reasons for this can be imagined. Perhaps a smaller diameter was necessary for sufficient numbers of marbles to fit within a game space, or perhaps only smaller marbles were practical for the activity of marble guessing.

To investigate the practicalities of marble size in marble guessing, the set of Mehen marbles found by Emery was emulated using metal marbles of 9.5 mm and 11 mm in a ratio of 3:1.⁶⁸ Mehen is only depicted being played by men.⁶⁹ As the average height of an Old Kingdom male was 168 cm a twenty-first century man of this height with medium size hands was chosen to play-test the idea.⁷⁰ The highest number of marbles that might plausibly be used for Mehen marble guessing is eighteen – if Mehen was a two-player game, as pictured in the tomb of Hesy, with eighteen marbles each. Up to eighteen marbles could be enclosed in one fist but to close the hand completely, the marbles needed to be held more tightly than was comfortable and the sheer quantity of marbles, regardless of size, seemed impractically unwieldy. It was concluded that marble guessing with eighteen marbles was conceivable but highly unlikely. Manipulating twelve marbles was also unwieldy but was practical – marbles were easily disguised within a fist. By contrast, for 15 mm marbles, it was a struggle to fit six marbles within a fist in such a way that their number was easy to disguise. For marbles in quantities of four or more, the smaller marbles were a noticeably more sensible choice than 15 mm marbles.

Alternative Movement Mechanic Theories

The theory that dice were used for Mehen fits the evidence less well.⁷¹ Dice sticks have never been found in a set of game-pieces that appear to be solely for Mehen and in the tomb of Hesy, they are depicted within the Senet set but not within the Mehen set. It does not explain why players are depicted as holding and hiding something in their hands and holding a fist up to their opponent. Nor does it account for the small size of Mehen marbles or why there are so many of them.

Another idea is that a finger guessing game, similar to the modern game of ‘Morra’ and to the ancient Egyptian game of ‘Atep’, determined movement.⁷² This would explain some unusual postures seen in depictions of Mehen play, but marble guessing seems to fit the hand positions better and this hypothesis also offers no explanation for marble size or quantity.

Isolation of Marble Guessing in Board Game History

No evidence exists for any other board game in history employing a marble guessing mechanic (this applies equally for finger guessing) and so a proponent of the theory needs to be able to account for how and why marble guessing came to be used for the game of Mehen but no other game since. Dice are used ubiquitously for modern games, but it is likely that Mehen was one of the first board games, if not *the* first, so, in pre-dynastic Egypt, dice might not have been an obvious choice. If Mehen evolved from religious practice or ritual, it is possible that it came about intrinsically linked with marble-guessing naturally, perhaps as a teaching or divination device. There are other examples of

⁶⁸ Emery 1954: 58.

⁶⁹ Crist et al. 2016: 32.

⁷⁰ Zakrzewski 2003: 224.

⁷¹ Kendall 2007: 34.

⁷² Wilkinson 1847: 55; Falkener 1898: 103.

board games evolving from religious artefacts - the Tuareg game of Alkarhat and some forms of North American Zohn-Ahl were used for divination,⁷³ the Game of Knowledge was both a game and a teaching aid for multiple belief systems,⁷⁴ the game of Xuanfo Tu was used by the philosopher Zhixu to teach Buddhist doctrine,⁷⁵ and it has been conjectured that the board for the Royal Game of Ur derived originally from a divination device.⁷⁶

Once the idea of using dice sticks for board games appeared, as it had for Senet by the Third Dynasty, it should not be surprising that dice became the preferred choice for most future board games, given their speed and simplicity compared with a guessing mechanic. That marble guessing does not seem to have been used for any game after Mehen may be no more than an example of one technology being replaced by a newer, better one.

Viability

It is insufficient to propose that marble guessing was used in Mehen vaguely and without detail. Although numerous ways to engineer such a mechanism can be concocted, it must be shown that at least one method exists that is practical, ludologically viable and preferably also entertaining. R. C. Bell proposed a method where, for six marbles, moves were given by the difference between the guess and the reality⁷⁷ but play-testing for this paper discovered that this was unsatisfactory in practice. Guessing randomly gives an average move of less than two and the guessing player can adopt a strategy of always choosing three or four, reducing the average move to 1.5.

Other algorithms for marble guessing were considered and the most promising were tested. Several ideas were found that worked and the following example best met the criteria for viability, quickly giving sensible movements while also, it transpired, being entertaining: One to five marbles were hidden in a player's fist (the sixth marble assumed to be on the track). If the opponent failed to guess correctly, the player moved the game-piece that number of spaces; If the opponent guessed correctly, a penalty was imposed upon the player, or a reward was given to the opponent.

With this method, players tended to favour higher numbers because this would allow their pieces to move more quickly but, the opponent knew this so both moves and guesses were skewed higher. This helped the dynamic because a one in five chance of success seemed subjectively to be insufficiently interesting. In practice, a success rate of nearly one in three made the activity entertaining without being too easy and the higher numbers reduced game duration to within the bounds of other simple race games. Lions are easily incorporated via the penalty / reward concept.

Having shown that guessing processes can exist that are ludologically viable and entertaining, and given the evidence in favour of it, this section concludes that marble guessing is likely to have been the movement mechanism for most or all of Mehen's history.

Mehen and Hyena

The substantial majority of proposed Mehen rule sets published in the last thirty years in books, on the internet and accompanying commercial Mehen products are based on the Sudanese game of Li'b

⁷³ Parlett 2018: 39,124.

⁷⁴ Schmidt-Madsen 2019: 94,137 etc.

⁷⁵ Schmidt-Madsen 2019: 55.

⁷⁶ Becker 2007: 13–14.

⁷⁷ Bell 1979: 120; 1988: 104.

el-merafib (Hyena). That Mehen might be played similarly to Hyena is an idea intimated by Bell⁷⁸ and outlined in detail in Kendall's groundbreaking article.⁷⁹ It is instructive to compare the conclusions of this paper with that theory.

It has been shown that the general form of some games was maintained across centuries or even millennia so it is conceivable that basic general features of a game e.g. racing pieces along a spiral track might survive as long as four thousand years.⁸⁰ However, lesser details of all types of games vary and evolve. For example, the basic objective and track morphology of the game of fifty-eight holes was maintained across two millennia. It appeared in a variety of disparate forms during the Egyptian empire and evolved from a game with no interaction between pieces to some variants where the track has cross-over links and opposing pieces appear to meet.⁸¹ Perhaps the hyena is a singular historical remnant of the three lions and three lionesses from Mehen but to associate any further relationship between the rules of both games seems specious. Dice sticks are used to determine movement in Hyena and one piece is raced per player whereas six or more pieces are ascribed to each player or team in Mehen. Having no other reason for thirty-six marbles to exist, published Mehen rules based on Hyena often direct each player to race six marbles but this paper concludes that if thirty-six pieces are moved along a Mehen track to the middle, whatever the rules, the game would not finish for many hours and this is doubled for a tail – head – tail path. Hyena finishes in a considerably shorter time-frame, as do all simple race board games for which the rules are known.

Even if marble guessing is accepted as the movement mechanism for Mehen, leaving a single marble to be raced by each player or team, Hyena as a model for Mehen play remains untenable. The generally accepted underlying story of Mehen as originally outlined by Piccione implies that the goal is to reach the middle of the board while in Hyena, pieces must move to the centre and then back to the tail. The solitary piece of evidence given to support the idea that Mehen followed a tail – head – tail path is given by Kendall who believed that Pyramid Text Utterance 332 implies it, but he interpreted this text differently to any other author.⁸² Moreover, there are two types of lion piece in Mehen but no analogy in Hyena and, in the Sudanese game, a single predatory game-piece moves along the track at the end of the game whereas this paper concludes that it is untenable that lion pieces were moved along the Mehen track at all.

Conclusion

This article has taken several game-play mechanics that have been proposed for the game of Mehen and analysed them primarily from the viewpoint of practical ludology. Depictions of Mehen show the game amongst other entertaining and pleasurable activities, so while the game was undoubtedly imbued with religious significance, it seems likely to have also been enjoyable. It remains conceivable that Mehen was solely a ritualistic or religiously motivated pastime that would not conform to modern understandings of a board game but, even in this case, any game must still conform to physical practicality and mathematical coherence so the conclusions in this article remain true, except for those regarding game duration. The following proposals have been shown to be untenable:

- Three lions and three lionesses were commonly used in the game but, since they are not differentiated in six ways, the idea that up to six independent players raced them along the Mehen track is unviable.

⁷⁸ Bell 1960: 14.

⁷⁹ Kendall 2007: 43–44.

⁸⁰ de Voogt et al. 2013: 1728; Crist et al. 2016: 33.

⁸¹ Finkel 2021: 46.

⁸² Masters 2024. See section on Pyramid Text Utterance 332 in the Pyramid of Teti.

- The idea that lion pieces were moved along the track at all could not work in practice due to their large size relative to the playing spaces. In all conceivable scenarios, the inability to be sure that a lion piece was within a particular space would cause unresolvable ambiguity, rendering the game unviable.
- For 'grooved' Mehen boards, the theory that marbles were moved between the coils of the serpent track is unworkable in practice.

The improbability of these hypotheses significantly reduces options for Mehen game-play. A notable consequence is that the overwhelming majority of academically proposed suggestions for game-play, and popularly published rule-sets to date are unlikely to be close to how the game was really played. Other game-play proposals are strengthened, based on new evidence and observation. The Mehen game depicted in the tomb of Hesy shows only marbles, lion, and lioness game-pieces and so, for this version of the game, it seems almost certain that marbles were moved on the board. Since there is no evidence for flat-bottomed game pieces associated with Mehen, marble-play seems likely to have been the case for all or most of the game's history.

Reasonable hypotheses exist for the construction of all known designs of Mehen board to allow for the play of marbles along the track. For grooved boards, while it is conceivable that they were only ever amuletic or possibly were played with flat-bottomed pieces, a third hypothesis exists - that they were once augmented with a divider in the spiral channel allowing for the play of marbles. If this is the case, all three board types, while appearing distinct, are morphologically equivalent.

This paper gives several new arguments in favour of the idea that marble-guessing was the Mehen game-mechanic for much of the Old Kingdom: No dice or dice sticks are shown in the set of playing pieces for Mehen depicted in the tomb of Hesy; Marbles found with sets of lions appear to be the optimum size for marble guessing and significantly smaller than the size that that would be expected for marbles used only for moving on a game-board; It accounts for the depictions of Mehen players apparently hiding something in their hands; It accounts for the depictions of Mehen players holding a fist up to the opposing player. Finally, it is unlikely that all of the marbles accompanying a Mehen game were raced because firstly a game racing thirty six marbles would take many hours to complete which, while conceivable, seems less likely than a duration commensurate with other games of the simple race game genre and secondly, racing a single marble better matches the theories of Piccione wherein each game-piece symbolises a single deceased individual attempting to reach the afterlife through the body of Mehen. There is no evidence that marble guessing has been used for any other board game, but that is plausibly because Mehen was the first or one of the first board games, and dice only emerged as the preferred option later.

In summary, it is highly likely that the play of Mehen, particularly at the time of Hesy, was characterised by the movement of pieces along the track driven by a marble guessing mechanism for determining movement. It is conceivable that each player moved multiple marbles but in this case the game must have been tedious, presumably played only for ritualistic reasons. Much more likely is that each player or team raced a single game-piece, probably a marble, to the middle of the board. Lions were always or sometimes placed in the middle of the board, and it is likely that game-play involved them being pointed at pieces on the track. Their binary form suggests a game for two players or two teams.

Ideas for future research include applying statistical methods with computer simulation to reduce game-play options further, applying advanced imaging techniques to Mehen artefacts and tomb reliefs, particularly the hand details in the tomb of Rashepses, obtaining a deeper understanding of subjugated recumbent lions and the mythology behind the game - specifically the significance of the anatidae bird encircling three Mehen boards, the animal head protruding from the Petrie, Berlin and Cairo boards and the bird-like figure that exists at the centre of the Berlin board.

Appendix A – Size of Recumbent Lion Piece Finds

TABLE 2 - Dimensions of recumbent lion pieces that were almost certainly used for Mehen.

Location of find	Current Location	Quantity of lions	Reference	Length / mm	Width / mm	Source
Abu Roach Tomb I	Louvre E 16667-16671	6	Montet 1946, 189.	92	25	Louvre Museum
Abu Roach Tomb VIII	Cairo Museum JE 44918-a, b, c SR 2/ 3646-8	3	Montet 1946, 186.	65	Unknown	Cairo Museum gave two at 65 mm and one at 60 mm. Montet's report gives no dims.
Saqqara Tomb 3504	Cairo Museum Ref. Unknown	6	Emery 1954, 58.	70	28	From Emery's photographs with scale. +/- 1 mm.
Grave 156, Djet Square	Manchester (6766), Petrie (UC15506) & Fitzwilliam (E.4.1927, E.5.1927) Museums	5	Petrie 1925, 7, Pl. VII, XXI.	71	28	Manchester Museum gives 71x28 mm. Petrie Museum 70 mm, Fitzwilliam Museum 71 mm.

Table 3 lists individual recumbent lion piece artefacts. It is likely that all or most of these were also for Mehen so they can be used for reaching a broader picture. Dimensions are from museum websites or other authoritative sources.

TABLE 3 - Lengths of individual lion pieces that are likely to be for Mehen.

Holding Museum	Inventory/Acquisition Number	Length / mm	Width / mm
British Museum Dark	EA35529	80	
British Museum Light	EA52920	64	
Metropolitan Museum of Art	03.4.13	87	
Oriental Institute, Chicago	E7895	57	
Penn Museum	E11522	70	28.6
Walters Art Museum	71.623	53	
Victoria and Albert Museum	1305-1903	100	
Louvre	E11889	65	15
Louvre	E16671	94	
UCL (Petrie)	UC15509	65	
UCL (Petrie)	UC15510	60	
UCL (Petrie)	UC15511	70	
UCL (Petrie)	UC16179	68	

Statistics: Min: 53 mm, Max: 100 mm, Average 71 mm, Median: 70 mm

For lions that are likely to be for Mehen, 70 mm seems to be a typical length and for such lions, average and median width is around 27 mm.

Appendix B – Size and colour of Marble Finds

Of the four archaeological game-piece finds that are almost certainly for Mehen, three featured marbles. The find at Abu Roach Tomb VIII, has discrepancies. The display at the Cairo Museum describes them as ‘three black and six white’ which does not match Montet’s description of ‘red and white’ balls⁸³. However, three of the ‘white’ balls are off-white⁸⁴ and it seems possible that they were formerly coloured with a red pigment that has faded. Perhaps Montet neglected to mention the black marbles or maybe three black balls from another find were later combined with them.

TABLE 4 - Diameter of marbles that were almost certainly used for Mehen play.

Location of find	Current Location	Reference	Quantity	Diameter / mm	Source
Abu Roach Tomb VIII	Cairo Museum JE 45026, SR 2/ 3652	Montet 1946, 186.	3 white 3 off-white 3 black	White: 7–9 mm Black: 10 mm	Cairo Museum
Grave 156 in Djet Square	Manchester Museum 6767.a	Petrie 1925 Pl. VII.	34 white	8 – 11 mm Average: 9.3 Median 9.5	Petrie’s photographs with scale
Saqqara Tomb 3504	Cairo Museum Ref. unknown	Emery 1954, 48, Pl. XXIX.	39 white	8 – 11 mm, Average 9.4 Median 10	Emery’s photographs with scale

TABLE 5 Size of marbles in some modern board games that involve moving marbles on a board. Games were selected only because they were convenient to access by the author.

Modern Game	Comment	Diameter / mm
Chinese Checkers game	Manufacturer: Pico Pao, Spain	16 mm
Chinese Checkers game	Wooden board, Chinese made, manufacturer unknown	15 mm
Solitaire game	Manufacturer: Legler, Germany	15 mm
Chinese Checkers game	Manufacturer: House of Marbles, England	14 mm
Solitaire game	Author’s collection. Wooden marbles, manufacturer unknown	15 mm

⁸³ Montet 1946: 186.

⁸⁴ Thanks to Marie-Lys Arnette for detailed photos.

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