

THE MNEMONICS OF THE CRETAN LABYRINTH

TESSA MORRISON

Name: Tessa Morrison, Ph.D. candidate

Address: The School of Fine Arts, The University of Newcastle, University Drive, Callaghan. NSW 2308. Australia.

E-mail: c9520975@alinga.newcastle.edu.au

Fields of interest: geometric and algebraic topology, group theory and history of ideas

Awards: Certificate of Merit, Universitet im. Zhaksygarina, Aktobe, Zazakhstan, 1999

Diploma of Honour, Homage to the Poet, Ovidiu Petca. Cluj-Napoca, Romania, 2000

Best Graphic Print Bookplate, Australian Bookplate Design Award Exhibition, 2001

Publications and Exhibitions.

The Geometry of History; 032147658. Vismath, <http://www.mi.sanu.ac.yu/vismath> Volume 3. No 4. 2001,

Het Stedelijk Museum, Sint-Niklaas, Belgium, 2001.

Printmakers Perceptions of the Past One Hundred Years of Federation, Maitland City Council Art Gallery, Australia, 2001.

Stadtmuseum Bruneck, Brunico, Italy, 2001

Roman Identity and the Roman Labyrinth, Journal of Inter-Cultural Studies, The University of Newcastle, Australia 2002 (forthcoming issue).

Abstract: The aim of this paper is to examine the various possible symbolic mnemonic devices that the 'Cretan labyrinth' can be constructed from. The 'Cretan labyrinth' has been used throughout history, sometimes as graffiti. Yet it has a complex and difficult structure, not a structure that you would expect to find in graffiti that would have been constructed in a hurry. The structure does suggest that it was drawn from the center expanded out form a very simple symbol. This paper concentrates on all the possible different ways of constructing it. These simple mnemonic symbols may explain the longevity and popularity of the complex structure of the 'Cretan labyrinth'.

1. HISTORY OF THE CRETAN LABYRINTH.

Symbols that consist of concentric levels appeared very early in history. Carved into a Neolithic passage grave in Ireland are symbols that comprise of concentric circles and are cut to the center by a line. These symbols are known as 'Cups and Rings marks'. Despite the simplicity of the design these symbol would have been laboriously carved with no more sophisticated tool than a flint axe. This time-consuming process and precision of the carving does indicate that they have a ritual significant. The design of 'Cups and Rings' continued to be carved into rocks well into the Late Bronze Age. Regardless of the painstaking carving of these symbols they can be easily remembered, once seen never forgotten. A ritual of significance would explain this symbols longevity while the simplicity of the symbol would guarantee its exact repetition.

The next development of concentric level symbols was labyrinthine symbols. Although the Cups and Ring are not labyrinths, they are possibly an embryonic form of these later labyrinthine symbols. There are many examples of labyrinthine symbols that are dated to the Bronze and Iron Ages. They have been found carved onto rocks in Italy, Spain, England, Ireland and Sardinia (Kern 2000). A consistent structure began to emerge, which has become known as the 'Cretan labyrinth'. The Cretan labyrinth has one and one only path from the outside to the center and it consists of eight concentric levels. Each level runs in an opposite direction to the one before and the level sequence is from the outside to the 3,1,2,4,7,6,5, levels and then into the center (Morrison 2001).

Although there are rock carvings of the Cretan labyrinth have been dated to the early Bronze Age, the earliest dated Cretan labyrinth on the basis of archaeological and historical criterion is on a clay tablet from the palace of Nestor, Pylos (see Figure 1).

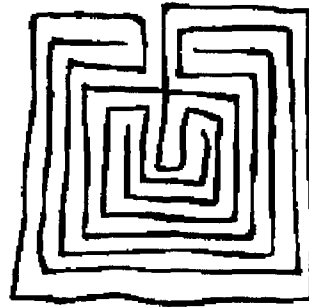


Figure 1. The Pylos 'Cretan Labyrinth' thirteenth century BC.

This tablet was originally unbaked and only survived because of the fire that destroyed the palace. The writing on the other side of the tablet has no relevance to the labyrinth; this has led to the assumption that this symbol was a doodle by an idle scribe (Heller 1961). However, the other tablets that have been found in the same archive indicate that the scribes had no time for doodles. The tablets show a city at war, fear and confusion reigned, inventories of weapons, troop movements and sacrifices, possibly human, to the gods were recorded (Chadwick 1976). Yet in this confusion a scribe draws this exact and difficult geometrical structure, perhaps a private prayer. This structure does suggest that it was drawn from the center, indicating that a mnemonic device was used. The palace of Pylos did not survive the war and it was leveled to the ground. Its very existence was forgotten until the excavations of Carl Blegen that begun in 1938.

The Cretan labyrinth reemerges again and again throughout history. In a tomb near the ancient city of Caera north of Rome, a seventh century BC Etruscan wine pitcher was found. On this wine pitcher is a Cretan labyrinth. The Etruscan labyrinth is round, and not square like the Pylos tablet, but they both have the same level sequence (see Fig. 2). The center of the labyrinth has a distinct cross and the placement of the turning points of rows 3 – 2, 2 – 1, 5 – 6, and 6 – 7 are equally placed in relation to the central cross. The cross and the equal placement of these points are in distinct contrast to the rough execution of the rest of the labyrinth. This strongly suggests that here too a mnemonic device was used to draw this labyrinth.



Figure 2. The Etruscan 'Cretan Labyrinth' seventh century BC

For over six hundred years from the fifth century BC the labyrinth was used on coins from Crete. The symbol is used on the coins as a symbol of Crete (see Figure 3). Although the earliest literary reference to the term 'labyrinth' is on a small clay tablet found at Knossos, dated 1400BC, no other labyrinth survives on Crete prior to these coins. The tablet has been translated to be "One jar or honey to all the gods, one jar of

honey to the Mistress of the Labyrinth”(Chadwick 1976). However, the tablet gives no clue as to what the labyrinth is or its meaning.

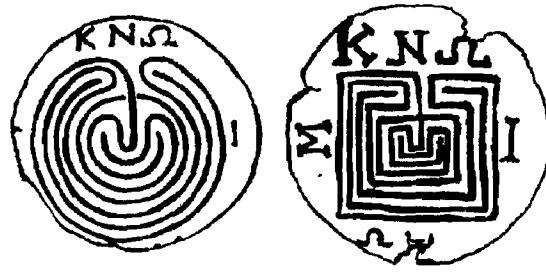


Figure 3. Cretan Coins (a) c190-100BC (b) c200-267BC

Graffiti found on the surface of a crimson-painted pillar, in the peristyle of a villa at Pompeii, depicts a Cretan labyrinth (see Figure 4). It was preserved under the lava from Vesuvius in 79AD. The labyrinth is accompanied by an inscription ‘Labyrinth. Here lives the Minotaur’. The graffiti was scratched with a nail or stylus; one assumes that it was executed with some speed given the insulting nature of the inscription.



Figure 4. Graffiti for Pompeii 79AD

Moreover, the Cretan labyrinth was used in Biblical manuscripts, as a symbol of the fall of the walls of Jericho. Figure 5 shows a page of a ninth century manuscript. Alongside the labyrinth is the inscription Uruem Gericho, a misspelling of Urbem Jercho, City of Jericho. The Cretan labyrinth remains in Biblical manuscripts for at least a thousand years (Kern 2000).

This symbolic representation of the Cretan labyrinth has been used unchanged in its structure for thousands of years. The Cretan labyrinth is a complex structure, and it is difficult to draw freehand, yet it is used in graffiti that would have been executed with

some speed. The structure does suggest that it was drawn from the center with the assistance of a simple symbol that was expanded out to the more complex labyrinthine symbol. This simple symbol or symbols acted as a mnemonic and kept the Cretan labyrinth alive throughout the millennium.

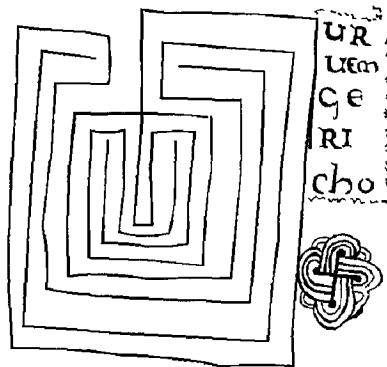


Figure 5. Cretan labyrinth representing the walls of Jericho in a nine century Biblical manuscript.

2.1 MNEMONIC DEVICES.

Using mnemonic devices in training the memory was common in classical times. In a world devoid of printing and notepaper a highly trained memory was of paramount importance to an orator and rhetoric was an importance part of the classical education. Texts on training the memory for oratory have survived. The earliest treatise, was written c.86-5BC, was by an anonymous writer who came to be known as Ad Herennium, this name came from the dedication. Ad Herennium refers to Greek writings on the art of memory but these accounts have not survived. It is impossible to say how far back these mnemonic systems for an orator go. However, the texts such as Ad Herennium were written as if the knowledge of these mnemonic systems was common place (Yates 1966).

In general a mnemonic is a device used to remember something that is otherwise hard to recall in detail. The classical orators used devices than involved memorizing a background and images. The background was like a wax tablet or papyrus and the arrangement of the images on the background was like the script. This type of mnemonic was short term and private. The orator would follow rules given in the rhetoric texts. However, each speech would comprise of different backgrounds and images according

to the orators own personal experience. A visual mnemonic for a symbolic depiction would be far more suitable than training the memory. The longevity of the Cretan labyrinth would depend upon its simplicity of the mnemonic and the clarity of the algorithm that explained that mnemonic.

2.2. POSSIBLE MNEMONIC SYMBOLS FOR THE CONSTRUCTION OF THE CRETAN LABYRINTH.

One symbol and method of construct is continually pointed to as being the easiest way to draw a Cretan labyrinth (Attali 1999; Kern 2000) (see Figure 6). Denote symbol Figure 6.a as M(a). To expand M(a) beginning at the top vertical of the cross then inserting a right angle or arc between the vertical of the cross and vertical of the L-shape on the right hand side (see Figure 6b). Second, begin with the vertical on the left-hand side and follow the path made in the last step and terminate at the dot in the right-hand quadrant (see Figure 6c). The proceeding steps shown in Figure 6 continue to build up the labyrinth by beginning with the dot or line on the left-hand side, leaving the lines that have terminated at the dots. Then traversing the symbol in the same direction and terminating at the first dot or line on the right-hand side, again leaving the lines that have terminated at the dots. Denote this algorithm A(1).

The nucleus M(a) to the expansion into the complete labyrinth has been reported to have been a game called “Walls of Troy” that was well known at the beginning of the twentieth century (Heller 1946) p.133. It is also claimed that this exact game continues to be played in India (Phillips 1992) p.322. However, is M(a) the mnemonic that the labyrinth on the Pylos tablet, the Etruscan wine pitcher or the Pompeii graffiti were drawn from?

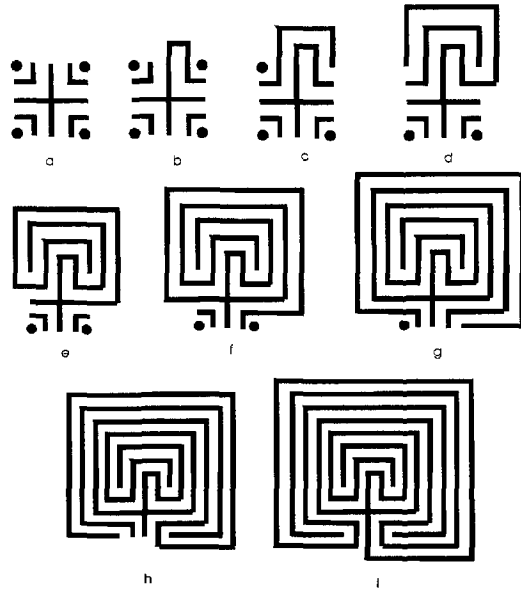


Figure 6. (a) Is the mnemonic Symbol denote $M(a)$,
(b-i) are the expansion $A(1)$ for $M(a)$

The symbol $M(a)$ does date back into history but this does not make it a mnemonic for the Cretan labyrinth. $M(a)$ has been found on Babylonian seals that date back to 2000BC. A pottery shard, dated 604BC, found in Ashkelon in Israel has $M(a)$ as a part of its design (see Figure 7a). The exact dating of the shard, can be established because of the destruction of the city by Nebuchadnezzar, King of Babylon was recorded. The pottery shard is of wild goat style and the wild goat style has lots of box type designs. Figure 7b-d show other wild goat shards found at the same archaeological excavation at Ashkelon. The pattern of $M(a)$ may not have been used as a mnemonic in ancient times since it is not complicated and it is an attractive symmetrical symbol that is easily replicated accidentally. Moreover, $M(a)$ gives the appearance that it was developed as a mnemonic well after the Cretan labyrinth was established.



Figure 7(a) the Ashkelon Shard containing M(a).
7(b-d) Examples of Wild Goat Pottery

The first noticeable thing about M(a) is that the algorithm to expand it is very simple. The continuous joining of end points in the same direction is very straightforward. However, the L-shapes do appear to be redundant, by removing the L-shapes the steps of the algorithm are reduced. The Cretan labyrinth can be expanded from a simple cross and four dots in the quadrant of the cross, (see Figure 8a), denote this symbol M(b). First, begin with the top on the vertical of the cross moving right traverse the dot, following a path between the central point and the dot. Then return to the left side and terminate at the dot in that quadrant (see Figure 8b). Second, begin at the dot in the upper right quadrant, follow the path made by the last arc then traverse the last terminating point and proceed around to the horizontal of the cross on the right-hand side (see Figure 8c). Third, begin at the horizontal of the cross on the left-hand side follow the outside existing shape, traverse the dot following a path between the central point and the dot on the lower right quadrant. Then return and terminate at the dot on the left-hand quadrant (see Figure 8d). Finally, repeat the second step but begin at the dot on the lower right-hand side (see Figure 8d). M(b) and this simple algorithm complete the Cretan labyrinth in only a few simple steps. Denote the algorithm A(2).

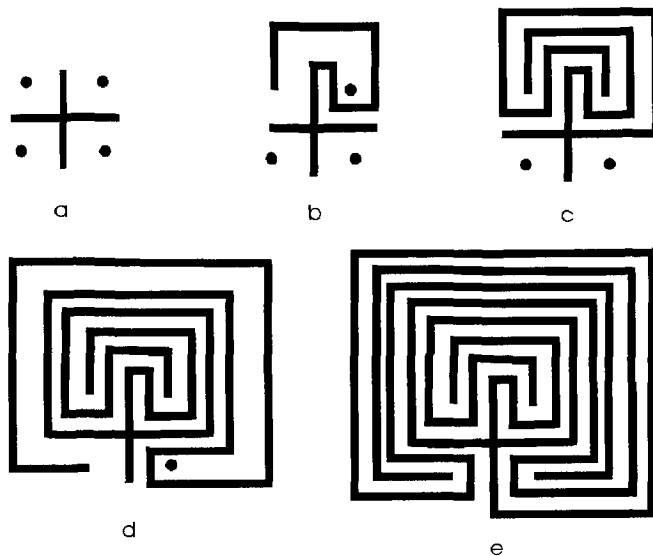


Figure 8. (a) Is the mnemonic Symbol denote $M(b)$, (b-e) are the expansion $A(3)$ of $M(b)$

A third possible mnemonic consists of the four L-shapes (see Figure 9a); denote this symbol $M(c)$. The algorithm begins from the vertical line from the upper left-hand side and then arcs over to the right quadrant and terminates in the center of this quadrant (see Figure 9b). Second, begin at the horizontal line from the upper right-hand side return to the left-side traversing the path created in the last step and terminate in upper left quadrant level with the right terminating point (see Figure 9c). Third, begin at the horizontal line from the upper left side; follow the path created in the last step until the horizontal path between the quadrants is reached. Cross that path then continue around the outside of the upper half and terminating at the horizontal line of the lower right-hand quadrant (see Figure 9d). Fourth, begin at the horizontal line on the lower left-hand side, traverse the path created in the last step and terminate in the center of the lower right-hand quadrant (see Figure 9e). Fifth, begin at the vertical line on the lower right-hand side traverse the path created in the last step and terminate in the center of the lower left-hand quadrant (see Figure 9f). Finally, begin with the vertical of the lower left-hand side traverse the entire symbol until the vertical path between the quadrant is reached proceed through the center and terminate at the vertical of the right-hand side (see Figure 9g). This completes the symbol of the Cretan labyrinth. Denote this algorithm $A(3)$.

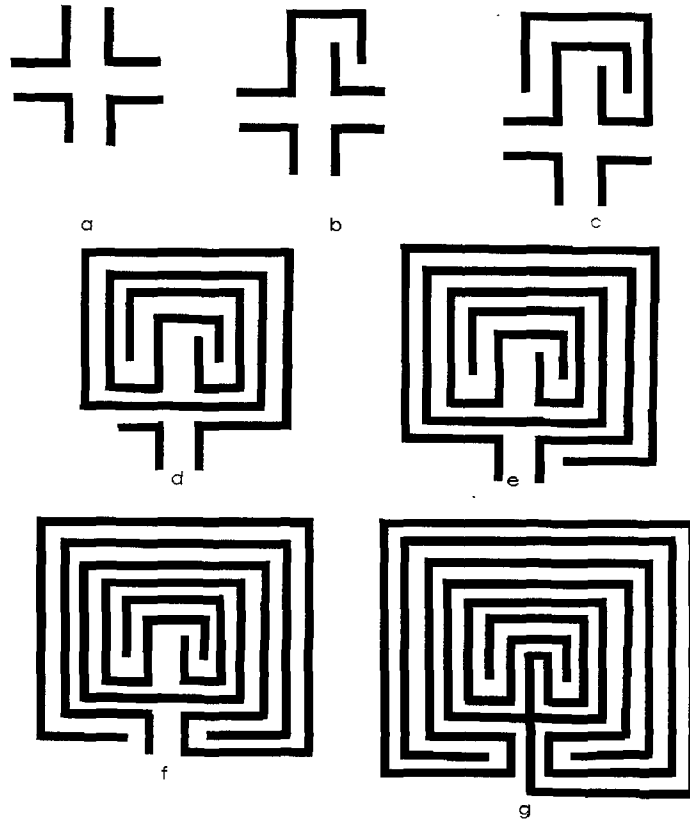


Figure 9. (a) Is the mnemonic Symbol denote $M(c)$, (b-e) are the expansion $A(3)$ of $M(c)$

The mnemonic symbols $M(a)$, $M(b)$ and $M(c)$ are expanded by different types of algorithm. However, these symbols have variations and use algorithms $A(1)$, $A(2)$ and $A(3)$. The mnemonic Figure 10a, is constructed with nine dots, denote this mnemonic $M(d)$. $M(d)$ is expanded by using $A(1)$. The dots can be reduced to five dots, (see Figure 11a), denote this mnemonic $M(e)$ and expand using $A(2)$. Five dots and a vertical line through the middle also form a mnemonic, (see Figure 11b), denote this mnemonic $M(f)$ and expand using $A(3)$. A cross and eight dots, two in each quadrant (see Figure 11c), denote this mnemonic $M(g)$ and use $A(1)$ to expand it. Also $M(c)$ can include four dots, denote $M(h)$ and using the same algorithm, (see Figure 11d). Finally a vertical line a dot or broken at the center and eight dots four on each side (see Figure 11e), denote this $M(i)$ and this is expanded using $A(1)$. These nine suggested mnemonic devices are variations on the same central region of the Cretan labyrinth. However, the prime

purpose of this investigation is to consider what could be the mnemonic that the ancient labyrinths were drawn from and if there were any developments of the mnemonic itself.

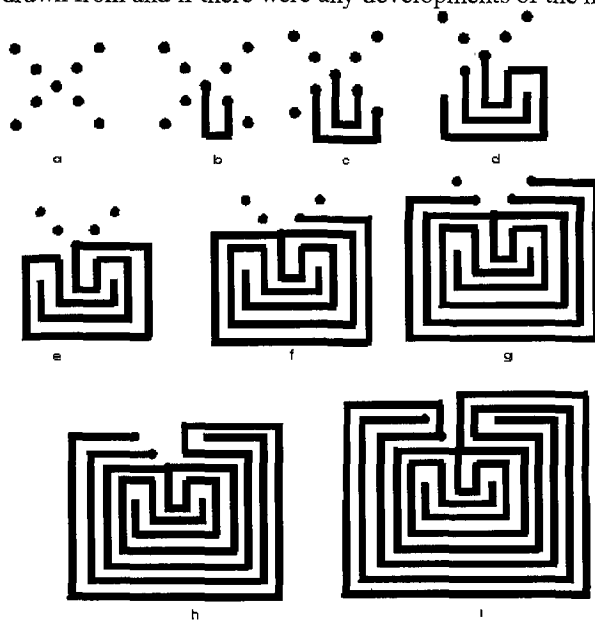


Figure 10. (a) Is the mnemonic Symbol denote $M(d)$,
(b-e) are the expansion $A(1)$ of $M(d)$

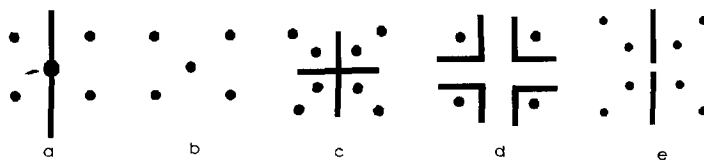


Figure 11. Further possible mnemonics

3. HOW WERE THE ANCIENT LABYRINTHS DRAWN?

It would be very satisfying to discover an explanation that would clearly link a mnemonic to the Minoan culture of ancient Crete. Assuming that the Cretan labyrinth was originally of ritual significant, the mnemonic would be more in keeping with this significance if it was based on a Minoan religious object or symbol. The swastika was an

ancient symbol well known to the Minoans, it has been found on early Minoan seals and sealings (Evans 1964 Vol. 4. p.570). A swastika can easily be constructed from the mnemonic symbol M(b), (see Figure 12).



Figure 12. Left M(b) and right M(b) expanded into a swastika

On close examination of the seventh century Etruscan labyrinth, (see Figure 2) the center of the labyrinth has a distinct cross and the placement of the turning points of rows 3 – 2, 2 – 1, 5 – 6, and 6 – 7 these are equally placed in relation to the central cross. Looking at the way this labyrinth was drawn the cross and turning point were precisely placed then the walls of the labyrinth were drawn. The execution of the labyrinth is in stark contrast with the center where it was very roughly drawn. The cross and the equally placed turning point are M(b). The curve that traverses the turning point excludes the mnemonics that contains the L-shape and the distinct pre-drawn cross in the central exclude all those mnemonics without a cross in the center. The only other possibility is M(g), however it would be more suited to a square labyrinth, rather than the inaccurate curves that traverse the terminating points of the Etruscan labyrinth.

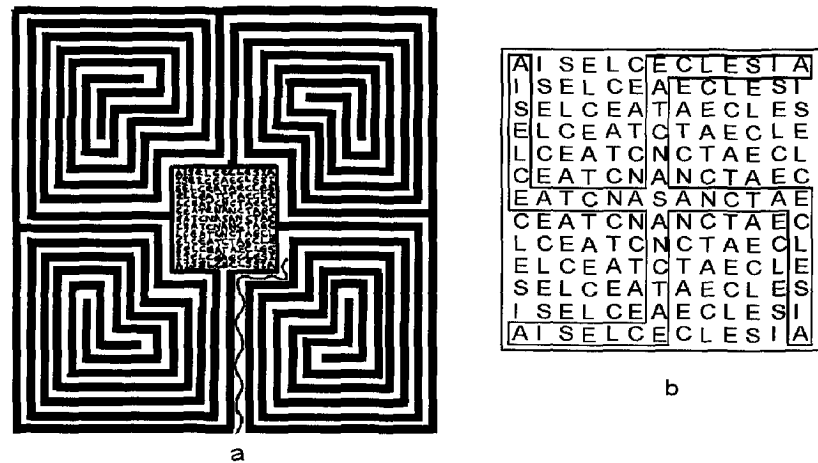


Figure 13. (a) The labyrinth in the Cathedral (b) the center of the labyrinth with the swastika highlighted.

The swastika does have a connection with a labyrinth in Algiers. A mosaic floor labyrinth now in the Cathedral of Algiers is the oldest surviving floor labyrinth in a church. It was originally at the Basilica of Reparata, which was founded in 324AD in Al-Asnam Orleansville and the labyrinth is dated approximately the same age. The labyrinth is a standard Roman layout of four quadrants, and in the center is a box that contains a matrix of letters, thirteen across and thirteen down (see Figure 13a). The center letter is 'S' on close inspection there is an inscription. From the center letter 'S' reads Sancta Ecclesia, Holy Church, in all four directions forming a swastika, (see Figure 13b). The letters in the matrix are not well lined up so that the swastika is not visibly clear immediately. Moreover, the swastika was relatively unknown in North Africa and perhaps this is indicative of a strong Roman influence in the design and also in its meaning. The connection between the labyrinth and the swastika is obscure. Nevertheless, the inscription in the shape of the swastika in the center of the labyrinth in Algiers does have a sacred meaning.

It is generally accepted that the origins of the word labyrinth is labyrinthos - laburifos and this has a direct association with an ancient cult symbol the 'double axe' – labrys - labrud (Evans 1964 Vol. 3. p.283). The symbol of the double axe is carved into the walls of Knossos, it is on Minoan pottery and seals, in frescos, painted on sarcophaguses and it is a character in the writing of the Minoans and Mycenaeans. There were sacred knots in the shape of the double axe (Evans 1964 Vol. 1 p.430). Caves were used as religious sanctuaries; here votive objects were left including small minute double axes (Hogarth 1900). The double axe dates back to the borders of the Neolithic Age (Evans 1964 Vol. 1. p.57) and some of the mnemonics are in the shape of a double axe.

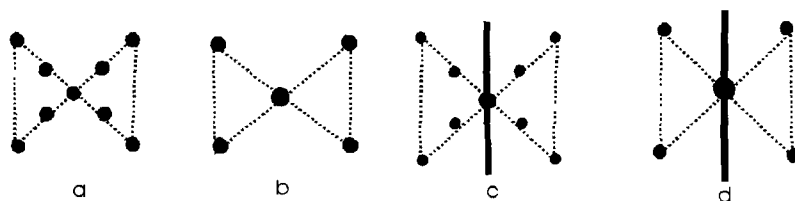


Figure 14. Mnemonics that are in the shape of the double axe

In Figure 14 there are four variations of mnemonics that have the shape of the double axe, Figure 14a and 14b have the shape of the double blades while 14c and 14d have the added vertical, the shaft of the axe. While the vertical line is the only difference between the mnemonics 14a – 14c and 14b – 14d it does represent a visual difference in the flow of the finished drawing of the labyrinth.

Figures 14b and 14d are more suitable for a circular labyrinth, because the inner dots in the quadrants restrict the flow of the curve around the turning points. Nevertheless, it does not exclude them. Any of these four mnemonics in Figure 14 could have been the bases of the square Pylos labyrinth, which was drawn in an era when the symbol of the double axe appears to have been the most revered religious symbol. However, there is something more satisfying about the mnemonic 14c as it appears more complete as an image of the double axe.

4. CONCLUSION

The ancient rock carvings of the Cretan labyrinth are all circular. They are very precisely carved and this precision leaves no hint as to how they were laid out before carving. Furthermore, in most cases the dating has been inadequate. Many have been dated to the early Bronze Age, purely on the evidence of the symbol itself. An example of this inadequate dating was the Hollywood Stone. The Hollywood Stone was found in Ireland it is inscribed with the Cretan labyrinth. It was originally dated to the early Bronze Age, 2500-2000BC; however, it is now believed to be connected with the early Celtic Church. The Cretan coins with the Cretan labyrinth are also too accurately executed to reveal their pattern layout. In fact, the overall shape of the labyrinths, on the coins are a square, rectangle or a circle while the graffiti and the drawing of the Etruscan pitcher has a very defined raised entrance on one side. It is in the graffiti, of the Pylos tablet and on the column of Pompeii and the rough drawing on the Etruscan wine pitcher that hint at clues to their construction.

The graffiti from Pompeii has a distinct cross in the center, the turning points are equally placed around this cross and vertical of the L-shapes are level with the opposite side. The center has an extra heel to it, which make the labyrinth more squat. Nevertheless the equally placed turning points and vertical of the L-shape around a precise cross suggest that M(a) was used in the center. This is in complete contrast with the Etruscan labyrinth where the orderly cross and the equally placed turning point are well defined but the rough drawing and placement of the curve that traverses the turning points indicates that the mnemonic M(b) was used and it was expanded by A(2). The swastika can also easily be constructed from M(b) and the swastika is a symbol that is found on Etruscan funeral urns dating to the same time that the labyrinth (Figure 2) and this wine pitcher was found in a tomb.

Although the swastika was a religious symbol of the Minoans and Mycenaeans, the symbol of the double axe permeates both cultures. The Pylos labyrinth does have a distinct cross, the turning points are equally place around the central point yet the verticals that traverse the turning points are not at all level, this is particularly evident at

the verticals closest to the entrance. However, central endpoints of these verticals are equally placed around the central point or cross. This indicates three possible mnemonic M(d), M(g) and M(i) and using A(1) to expand. The cross would be formed by the application of the algorithm and on a square labyrinth it would be impossible to say which was used by visual evidence. Nevertheless, the deep religious significance of the double axe would indicate M(d) and M(i) are the stronger contenders as being the mnemonic device for the Pylos labyrinth. Also the general accepted etymology of the word labyrinth is directly related the cult symbol the double axe – labrys and it would be difficult to believe that the words layrinthos and labrys are not cognate.

Over thousands of years the Cretan labyrinth has remain unchanged in it structure, sometimes round, sometime square yet the level sequence remains the same. This static symbol has crossed time and cultural diversity. However, by examining the possible different mnemonics and algorithms it become evident that what appears to be static on the surface was undergoing continuous change. The continuous evolution of the mnemonics of the labyrinth emphasizes the constant change in its meaning and its religious significance as compared to the meaningless and rather pointless game it has now become.

References

- Attali, J. (1999). *The Labyrinth in Culture and Society*. Berkeley, North Atlantic Books.
- Chadwick, J. (1976). *The Mycenaean World*. Cambridge, Cambridge University.
- Evans, A. (1964). *The Palace of Minos at Knossos, Volume 3*. New York, Biblo and Tannen.
- Evans, A. (1964). *The Palace of Minos at Knossos, Volume 4*. New York, Biblo and Tannen.
- Evans, A. (1964). *The Palace of Minos at Knossos, Volume I*. New York, Biblo and Tannen.
- Heller, J. L. (1946). "Labyrinth or Troy Town?" *The Classical Journal* Vol. 42: p.175-91.
- Heller, J. L. (1961). "A Labyrinth from Pylos." *American Journal of Archaeology* Vol. 65: p.57-65.
- Hogarth, D. G. (1900). "The Dictaeon Cave." *The Annual of the British School at Athens* Vol. VI: p. 94-116.
- Kern, H. (2000). *Through the Labyrinth*. Munich, Prestel.
- Morrison, T. (2001). "The Geometry of History: 03217658." *Vismath* Vol 3(4):
<http://www.mi.sanu.ac.yu/vismath/>
- Phillips, A. (1992). "The Topology of Roman Mosaic Mazes." *Leonardo* Vol. 25(3/4): p.321-329.
- Yates, F. A. (1966). *The Art of Memory*. London, Routledge and Kegan Paul.

