Prehistorical accounting markings on bone fragments in Kozarnika Cave, present day Bulgaria

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Abstract

In most recent exploration of the Kozarnika cave, located in the northwestern part of Bulgaria, researchers have uncovered an ancient horse bone with unusual markings in the lower layer 12, predicament aged 1.4-1.6M years. The bone markings appeared to be human made as the patterns are too precise and parallel to each other. In this paper, we take a scholastic approach and hypothesize whether this could be interpreted as an attempt of prehistorical accountants to record an ownership of stock or present-day 'recording of an asset'. This has critical implications on our current understanding of the origins of accounting history.
Keywords**:** Kozarnika, bone markings, prehistorical accounting, Bulgaria, caves

Introduction

Accounting has a long history and it has been labeled as one of the critical components necessary in the development of humankind [(Carmona, 2007), (Mattessich, 2012)]. It assisted people in capturing, managing and controlling resources and eventually in the development of critical thought (Sangster, 2010). In time, accounting has transformed itself from a simple recording of counted items using stick markings to more sophisticated methods relying on assumptions for adjusting journal entries to reflect economic events [(Apostolou, 2008), (Baxter, 1989)]). The 'storage record' has also changed its form over time. In the past, 'prehistorical accountants' used simple means of communicating economic activities such as stick markings on bones, clay tablets and cave drawings [(Sy and Tinker, 2006), (Petkov, 2020)]. In time, specifically with the introduction of the written language, the mobility of people and the needs to share information, accounting as a 'business language' has greatly changed. As such, it is important to note that when analyzing prehistorical accounting records, we need to be aware of the level of continuous advancement and development of the accounting language. However, we should not lose track of the intent of the accounting function which in time has always remained the same – to record economic events over time. Therefore, any further arguments and conclusions about prehistorical accounting records should exclude or limit any contemporary bias. Otherwise, we are bound to exclude any findings irrespective of their significance.

For the purposes of this paper, we analyze some of the recently excavated bone fragments, found in the lower layer 12 of an ancient cave, called Kozarnika, near the city of Belogradchik, present day Bulgaria (see Figure 1). This cave has been subject to recent explorations by joint venture research teams led by Prof. Sirakov and Prof. Guardelli, Bulgarian and French archeologists, respectively (Sirakov and Guadelli, 2010). During their exploration of the cave, they uncovered an ancient horse bone

fragments with unusual markings in the lower layers “composed of rather compact orange loamy sediments, blotched with dark manganese and more or less rich in coarse sediment fractions” (Sirakov and Guadelli, 2010). The composition is a predicament of 1.4-1.6M aging (Sirakov and Guadelli, 2010). The bone markings appeared to be human made as the patterns are too precise and parallel to each other. As a result of its location and geological characteristics, it has been dated back to almost 1.4 million years (Sirakov and Guadelli, 2010). This aging is based on the “dirty or block and calcareous pebbles” analysis which “show more alteration, the darker silty fraction containing flint and quartz gravels and coprolite fragments”, more predominant in technical layer 12 (Sirakov and Guadelli, 2010). As part of their research, Prof. Sirakov and Guardelli concluded that the markings appeared to be too precise and therefore the theory of “accidentally made” during “meat processing” was abandoned (Sirakov and Guadelli, 2010). This paper stands on the validity of the contents of, and the interpretation offered by the works of Sirakov and Guadeli’s teams.

We believe these fragments contain a key historical accounting record and might be labeled as accounting attempt of ‘prehistorical accountants’ to count an item. As such, the purposes of our paper, and based on the significance of the bone markings in layer 12 of the Kozarnika cave, we form the following hypothesis (from an accounting perspective):

H: The markings found on the horse bone dated 1.4 million years could be interpreted as attempts of prehistorical accountants to record ownership of an item or present day ‘recording of an asset’.

To test such hypothesis, we need to answer questions such as how do we know counting was involved and whether such counting is for economic-related items. As part of this, we analyze the potential reasons for anyone to mark a bone. We would link such marking to accounting and compare it to similar finds such the bone found in Africa. We would then compare similar findings and look for their purpose and presence. In addition, we would analyze whether some of the conclusions reached on similar bones found around the world could be extrapolated to the Kozarnika Cave. We are aware that such claims, irrespective of their validity, are bound to be challenged. To claim that these bone markings represent an accounting record would stir an opposition. As part of this paper, we would analyze such counterarguments against the claim of accounting record in order to ensure that the theoretical hypothesis could stand.

There are some significant conceptual and historical difficulties we need to recognize as part of the discussion of this paper. First there is the difficulty or rather impossibility of attributing any specific meaning to markings made on durable objects by humans before writing. The known use of tally sticks before writing (a category into which the bone fragment discussed here might just possibly fall) gives us a basis for speculating that some series of events or objects is being counted, typically via incisions in the surface of the ‘stick’. However, the naming of what was being counted can only be a matter of speculation precisely because that would have taken place through the evanescent medium of speech. However, such limit should not restrict us from continuing and moving this topic further as we have an item that has measurable qualities and it subject to a count. That is, regardless of this limitation, we need to be coterminous with the language and culture of the group involved.

Secondly, we need to recognize the fortiori difficulty of our attempt to discern any accounting meaning to such markings. Some could argue that such attempts can only be marked as an assertion. We are aware of the dangers of our attempt and its likability to have recourse to some anachronistic application of modern accounting forms and terminologies. So for the purposes of this research, here the objects putatively counted are named as ‘assets’: which 'assets' are then envisaged as being deployed in some form of ‘economic’ management or planning.

In addition, we need to mention that there might be questions on the lack of any engagement with the systematic differences in life as lived before the agricultural revolution that took place some 10 to 12 millennia ago. The hunter-gathering or transhumant ways of life have a different relation to ‘resources’ than any way of living centered on a more or less permanent settlement. There is also the issue of the range of things sayable and thinkable before writing, and limits to any form of numerical or arithmetical activity. Tally sticks go beyond forms of counting on bodily parts (usually fingers), but still can only count not name (until used in a written culture as is the case in their use in states like medieval and post-medieval England). So any kind of analysis of what a bone with markings ‘says’ needs to begin from a consideration of the limits of the sayable. pre-writing, or before the emergence of accounting using visible signs that combine or bring together the naming and counting functions.

Currently, the oldest recorded evidence mimicking a count is in Africa, on bone fragments, called Blombos Ochre (Sy and Tinker, 2006). It is aged at 75,000 B.C. and it is a predecessor to the sachets noted by Schmandt-Besserat (dated at 8,000 B.C.) (Sy and Tinker, 2006). The markings on these bones have cross markings and have been interpreted as an asset count of sorts (Sy and Tinker, 2006). As a result of this research, Sy and Tinker established a direct relationship between ancient markings and accounting records (2006). Therefore, any markings found on ancient artifacts, such as ancient bones, need to be analyzed from such perspective to determine their accounting pathology.

This paper is organized by first providing a brief overview of Kozarnika cave, its location and its aging. This is followed by a scope limitation section. In this section, we exclude certain items, such as those influenced by contemporary bias, limitation with respect to relying on the work of others, and most importantly on the specificity of the items counted. This is followed by comprehensive literature review of ‘prehistorical accounting’ with more emphasis on the early recordings of accounting records and their relevance to the bone markings at Kozarnika. This is then used as a basis to form a hypothesis and prove it through an analysis (by testing the underlying assumptions of assets recordings, etc.).

Kozarnika Cave

Kozarnika is an ancient cave located in the north-western part of Bulgaria, in the Belogradchik region. It is relatively small in size with a length of around 200 meters. It has an opening on its southern side overlooking the plains and valleys from an overall high viewing point. Even though it is relatively small, it is considered one of the most significant prehistorical sites in Bulgaria and Europe. It has been studied in the past few years, and there are more than “21 geological layers containing archaeological complexes” from different ages of the human development (Sirakov and Guadelli,

2010). There is evidence of human presence from the “Early Lower Paleolithic, Middle Paleolithic, Early Upper Paleolithic, as well as the Kozarnikian, Early Neolithic, Late Copper Age, Late Bronze Age, Medieval and Late Medieval periods” (Sirakov and Guadelli, 2010). To come up with these conclusions, researchers decomposed and evaluated the soil compositions into 13 different layers, each predominant for a time in history (Sirakov and Guadelli, 2010). Their findings, as well as the artifacts, seem to indicate that humans were present in the Balkans much earlier than some have thought. Therefore, their findings have great implications for our understating of human movement and its timing. Such discoveries could also have a great implication for our understanding of the development of the art of counting and therefore, the existence of accounting.

The actual exploration of the Kozarnika cave began in 1984 (Popov, 2007). Later on, these excavations have been continued by the “joint venture of the National Archaeological Institute of the Bulgarian Academy of Sciences in Sofia and the Institute of Geology and Prehistory of the Quartet in Bordeaux” (Wikipedia, 2019). These teams were led by Nikolay Sirakov and Jean-Luque Guadelille, respectively. Both researchers are considered experts in their fields. Based on their initial work, they found evidence that Paleolithic culture existed in this cave, dating back to 37-34 millennium BC (Sirakov and Guadelli, 2010). However, as they digged further, they found greater evidence of human presence in the lowest layers (layer 12) of the cave. These layers (as previously noted, based on their geological compositions) “are dated at the age of 1.4 million years” (Sirakov and Guadelli, 2010). As part of their findings, they were able to extract a “tooth of a representative of the Homo family”, perhaps “Homo erectus” (Sirakov and Guadelli, 2010). As they noted in their research, this seems to be the oldest information about the presence of people in Europe (Sirakov and Guadelli, 2010).

These significant findings change our current understanding of the origin of human presence on the European continent (Sirakov and Guadelli, 2010). Specifically, it appears that prehistoric men came to Europe from the Balkans, instead of the Gibraltar Straits, which is the gateway to Europe [(Sirakov and Guadelli, 2010), (Vallverdu, 2014), (Parés, 2013)]. This conclusion is groundbreaking as it changes the human settlement map of Europe [(Vallverdu, 2014), (Parés, 2013)]. In addition, this finding, combined with the bone markings, seems to provide undisputable evidence that Europe migration originated much earlier than the predominant conception, that “symbolic thinking only appeared in Homo sapiens 50,000 years ago” (Sirakov and Guadelli, 2010). So based on these findings, it appears very plausible that humans were present (*къде, кога*), and they used various methods to manage and plan their day to day activities [(Vallverdu, 2014), (Parés, 2013)].

The name Kozarnika comes from the words “The Goat Shed”, as this cave was used as a hunter’ shelter in the early ages of mankind. It was also a resting spot for people migrating from Africa to Europe in the early human settlements. The cave is surrounded by a located in a region where other ancient caves have been researched and explored. One such cave is called Magura and it is approximately 26.7 km away from Kozarnika. In that cave, there are drawings which have been shown to depict economic events and

subsequently a stock owned by people at prehistoric times. These drawings have been dated to approximately 42,000 years ago [(Kirilov, 2016, 2017), (Peshev, 2017), (Petkov, 2020)]. As a result of these findings, it was asserted that some of the drawings found represented prehistorical attempts of accounting (Petkov, 2020). Since there is proximity between the two caves, it appears plausible that both caves were inhabited in similar times. In addition, some of the findings in the Magura cave, specifically the depictions of stock counts could also be presented at Kozarnika. These, as well as other assertions, would be analyzed in this paper.

Scope limitations

As part of this paper, we rely on the archeological finds by the recent works of Prof. Sirakov and Prof. Guadille, specifically their joint publication titled 'An ancient continuous human presence in the Balkans and the beginnings of human settlement in western Eurasia: A Lower Pleistocene example of the Lower Paleolithic levels in Kozarnika cave (north-western Bulgaria)' published in Elvisier, *Quaternary International* in 2010. These researchers are considered experts in their respective fields. As part of their research, they uncovered a horse bone with mystical parallel markings in the lower 12 layer of the cave (refer to Figure 1). As mentioned earlier in this paper, based on the dirt composition and its location, this bone and its markings have been dated to at least 1.4 million years. Most of our assumptions used to form our hypothesis are based on the conclusions and findings reached by these researchers. As such, we need to place scope limitation and acknowledge that our theoretical underpinnings are solely based on the validity of the findings and conclusions reached by these researchers and their teams. In order to mitigate the vulnerability of the findings and interpretations made in this paper, we state that Dr. Sirakov an Prof. Guadille are considered experts, their works have been published in academically recognized and peer reviewed journals and further their works have been widely acknowledged by the scientific community.

In addition, we note that our analysis of the bone markings is from an accounting perspective only (using contemporary understanding of the language). That is, we would use our own contemporary understanding and purpose of recording economic events and apply it to the prehistorical settings. This is a critical scope limitation as it shows a certain degree of bias used in the development of the hypothesis later in the paper. That is, in order to come up with our theoretical underpinnings regarding the purpose of the markings found on the bone, we use our current (contemporary) understanding as to what the reason for someone would be to create such markings. Under the contemporary belief, such markings would be an expression of an event of great significance. There might be another trigger (reason) for these recordings, such as conceptual imagination for non-existing event. However, as part of this paper, we need to exclude such variations of expressions. It is our understanding that whenever an artist draws an object, expresses an objection, or an event, there might be skeptics arguing that this output does not measure ownership. It might just show their understanding of the world at the time. The drawing could be just an impression and nothing more. Therefore, we need to exclude such cases for the purposes of this paper.

In addition, we need to place scope limitation on the items being counted. As we note later in the paper, we cannot identify the actual item being measured. We can only speculate that such item possesses measurable characteristics and therefore it could be counted. Such limitation should not preclude us from exploring the hypothesis that the item subject to the count possesses the qualities features and/or meets the definition of an asset. To prove this, we would analyze from contemporary point of view the characteristics of measurable items and whether they meet the criteria for an asset.

The intent of this paper is to analyze the prehistorical attempts of humans at the Kozarnika Cave. In order to accomplish such analysis, we provide limited, but relevant to the topic, literature review the purpose of which is not to be all-inclusive but rather serve as a basis for the hypothesis and the analysis to follow.

Literature Review

We refer to accounting as a language of expression of economic activities. It allowed people to express their understanding of an economic event and record it. The premise to record economic activities is the trigger for the creation of accounting. As history has thought us, the accounting language has developed in time, but the premise has always stayed the same. We can initially trace accounting as independent practical activity. At a later stage of its development, through its complexity and interpretations, it obtains its own theoretical attributes. It is precisely thanks to the successful penetration and interaction between empirical and theoretical, between applied and fundamental research, that accounting becomes an important part of people's activity. Regardless of ‘this collaboration’, during the various historical epochs, accounting evolves and improves at every stage of the development of society and the social relations of production, with different factors influencing its formation.

Although there are different perceptions as to the dating of accounting, it has been suggested that the roots of accountability have been hidden in ancient times. At that time, it was a part of ancient mathematics and was practiced/developed by highly educated people with a high social status that achieved great respect in society. An important factor for the occurrence of accountability in primitive societies is the social division of labor. The purpose of reporting focused on the means of production and consumption of resources available to the society. In these times, the simplest means were used - work, grooves, records on clay plates, etc. The calculations were carried out using handy materials: binding of knots to a string, rods, stones, etc.

It is common belief that accounting was a result of the emergence of writing and arithmetic, the availability of appropriate means of recording economic facts, the development of trade, and the division of labor (Glay, 1988). These are all important prerequisites that lead to accountability. One of the first pieces of evidence of ideographic texts dates to the Sumerians, around 4,000 B.C. They were advanced enough to conduct and record business transactions, account for state revenues and expenditures, or some events of meaningful economic nature (Ezzamel, 2002). Categorically enough, the first forms of accountability have been discovered in the most ancient states that have their own scripture. To evidence their accountability,

‘accountants’ used papyruses to record the movable inventories using tables (respectively, our current periodic inventory). From a relative point of view, this ‘common sense accounting’ showed the movement and value of possessions owned by rulers such as goods, slaves, armaments, etc.

The lands of Mesopotamia are universally recognized as the source of origination of accounting. Specifically, they are the place of some of the first recordings of transactions depicting economic events using soft clay in the form of slabs (Ezzamel, 2002). These slabs contained multiplication tables and were also used to calculate complex percentages. In addition, there is evidence that some contained work orders, accounts broken down by type of work; specifically identified units necessary to produce an item, the worker's qualification, gender and age (Ezzamel, 2002). In Babylonia, chronological and systematic records appear simultaneously. Babylonia is the first to have an open legislation on accountability - the laws of Hammurapi (1790-1792 BC) (Ezzamel, 2002). These laws required traders to keep an independent account, churches - public accountability, and money transfers without receipt were considered invalid (Ezzamel, 2002).

Historically speaking, one of the first counting tools is the “net and linear (positional) numerical system”, developed in Ancient Greece (Mattessich, 1989). During these times, money, in terms of coins, started to be widely used in exchange transactions (Mattessich, 1989). For the purposes of accounting, money was initially used as an independent reporting object (in the form of a material or commodity) and then as a calculation tool (Mattessich, 1989). Finally, it became a measure of the value used in an exchange relation. The banking system also has its roots in Greece (Harris, 2008). At that time, accountants used two logs record balance in the banks’ records - for the income and expenditure operations (Harris, 2008). This shows that the ancient Greeks were assertive of duality of the transactions. That is, for an item to be obtained (be it good or service), we need to give up something in exchange. In time, this duality of transactions continued to be used and was further developed by the Romans (Anandarajan, 2004).

An important role in the development of accountability is the introduction of the Arabic numerals in 1202 by the Italian L. Fibonacci. The use of such numbers in a descriptive and chronological order allowed transactions to be better documented and therefore the usefulness of the ‘financial statements’ was greatly enhanced (Nigrini, 2012). In addition, with increasing the complexity of the business activities, accountants have to rethink and reinvent the accounting process as it did not meet the demand for on time, in-time consistent and relevant data. As a result, the double entry accounting system was developed.

By the currently accepted definition, accounting is a systematic process of recording economic events over a period of time, and it is used to present an account of ownership. In the present day, we use double entries to record these economics events. The aggregation of these journal entries over a period of time results in the formation of a trial balance. This balance is then used to create the financial statements of the

company at any point of time. However, looking simplistically on this process and its sourcing, we can argue that accounting is just a business language of recording past economic events. We can further argue that the ability to express ownership and record activities is the root for the development of this business language. So, any prior expressions of ownerships and measures of controlled units should be incorporated in the history of accounting.

There should be a clear separation between what we consider pre- and post- historical accounting. By “pre-“, we refer to the accounting prior to the ability of humans to write and express abstract thought. As language and writing have evolved in time, accounting switches in time from “pre-“ to “post” rather rapidly. We can trace this to the Sumerians, back to 7,000 years ago. Their use of sachets and drawings of economic activities are widely recognized in accounting textbooks and journals as it allowed individuals to record activities and ownership. At that time, the recording of activities was basic in comparison to today’s use. The majority of the activities represented ownership of stock at a period Just as with any language, accounting has transformed over time. Based on our historical analysis, it appears that the first accounts of this language seem to indicate that it was only used to count items of interest (Schmandt-Besserat, 1996). As humankind developed and with the increase in the complexity of transactions, there was a greater need to advance the language. As Petkov (2020) mentions in his research, the recent development of accounting is due to “the rapid development in trade, the emergence of commercial capital and a banking system”. With the further development, “there was a great need to further formalize the accounting process so that it could be used to make decisions” (Petkov, 2020). As there was a greater need to record these more complex transactions, an Italian monk by the name of Luca Pacioli came up with the double-entry system of recording transactions. As a result of this, he was named as the “Father of Accounting” or the creator of present-day accounting.

However, we, as others, believe that the double entry accounting system is just a variation of a much older “pre” system of recording economic events [(Schmandt-Besserat, 1992, 1996), [(Sy and Tinker, 2006), (Petkov, 2020)]. This system had existed many thousands of years earlier than the Sumerians (and the use of written language) and therefore, it is “pre” by definition. For example, there is evidence to suggest that some of the drawings found at the Magura Cave in Bulgaria represent one of the first attempts of prehistorical accountants to depict economic events (Petkov, 2020). Specifically, there is a hunting scene, which shows people collectively using their labor in exchange for animals hunted. This scene is surrounded by two others which have been argued to represent stock counts (refer to Figure 3) and understanding of the timing principle (Petkov, 2020). As it has been concluded, these drawings have estimated aging of around 42,000 years B.C. [(Kirilov, 2016, 2017), (Peshev, 2017), (Petkov, 2020)]. The combination of these finds in one location, at such an earlier time, seems to indicate accounting has a much greater historical past.

To further this argument, in a recent research performed by Tinker and Sy (2006), the authors concluded that accounting existed almost 77,000 years B.C. in the African continent. In their paper, they analyzed the Blombos Ochre which “represented a

primitive counting aged at 75,000 years B.C." (Refer to Figure 2) [(Petkov, 2020), (Sy and Tinker, 2006), (Schmandt-Besserat, 1992)]. It appears that this bone does not look "nature made or the result of people consuming an animal (teeth markings)" (Petkov, 2020). The markings seem to be very "methodological and well crafted" [(Petkov, 2020) (Schmandt-Besserat, 1992)]. The person or people who did the "markings were aware of the purpose and their abilities to create them" (Petkov, 2020). This shows that the people occupying the "lands of Africa understood items and were able to measure their quantity over time" (Petkov, 2020). The finding changed the understanding of accounting history and this evidence "flatly contradicts the old view that modern human behavior has its origins with a human revolution in Europe 40,000 years ago" [(Petkov, 2020) (Sy and Tinker, 2006)].

In this paper, we believe that there is a place in the accounting history for the recently excavated bone and its markings, found in the Kozarnika Cave (refer to Figure 1). This artifact clearly indicates a measurement of sort similar to the Blombos Ochre found in Africa (Figure 2). Some of the arguments used in that research could be extrapolated here. However, prior to jumping into the analysis of the actual bone markings, it is important to analyze who were the people who were present on Earth 1.4-1.6 million years ago. More specifically, whether such people could use tools and objects.

There are many studies the purpose of which is to theorize the origins of humans. Most of these studies encompass various academic disciplines ranging from genetics, linguistics, history and anthropology ranging from god's creation to big bang theory. In part, some of these studies analyze the stage of human development and specifically when they were able to start using objects (Smithsonian, 2019). To a certain extend this is indicative of intelligence and the capacity of people to understand possession and ownership. However, it is difficult to point out when humans started using objects. The problem lies in the fact that the more primitive the objects (for example, stones with pointed edges), the more difficult it is to assess whether they are of natural or anthropogenic origin. Some research suggests that broken bones were used for different (various) activities 5-6 million years ago (Semaw, 2000). There are theories linking the use of objects and the relative increase in the size of the brain (Allman, 1999). They noted the hominids were under pressure to enhance their ability to create objects in order to plan and manage activities. However, based on historical evidence, the earliest use of stone objects dates back 2.6 million years ago (Allman, 1999). Therefore, our findings in the Kozarnika Cave are in line with these previously established findings.

Analysis

Accounting, as stated earlier in the paper, is an expression of a recordable event at a predefined period. As history has shown, even though there are different outputs of such an expression – be it markings, drawings, counts, double entries, financial statements – all share a common objective. This objective is to record an economic event from the past. This event has a certain significance to the "accountants" and the interested parties. This significance is promulgated in the objective of showing ownership, or the lack thereof, over time. People from the past felt they needed to

express such ownership of their actions in order to properly plan their livelihoods and well beings. We must make the assertion that people have to plan, take care of their day-to-day activities, which might involve planning ahead. In order for a person to plan ahead, they need to be aware of time; they need to understand that certain past activities, if carried in a certain way, could result in some future action. In addition, in order for people to undertake some of their day-to-day activities, such as hunting, they need to possess certain tools. These tools could, in a sense, be considered “assets” as they are used by the hunters. So, even in prehistorical times, people used tools (as evidenced by the bone markings) and, therefore, the premise for accounting is present. However, in order for accounting to exist, there needs to be a recordkeeping of such activities. This brings our discussion to few very important and critical questions:

a. Can the markings found on the bone at the Kozarnika cave be interpreted as such outputs of an expression and, therefore, recording of an event?
b. Could such drawing be economic in nature or just an expression out of boredom?

To analyze this, we would look at similar finds around the world. Such ‘expressions could provide us with greater understanding of the intent and purpose of people to express themselves. As previously argued by Petkov (2020) and by many others, it has been shown that in the past prehistorical accountants used drawings in caves to record economic events and provide a record of ownership. This ownership was shown by drawings of stick markings and/or hunting scenes. For example, in this research, Petkov linked some of the hunting scenes found at the Magura Cave near Belogradchik to depict one of the first recorded economic events (2020). In this paper, Petkov further argued that prehistorical accountants used drawings to record transactions related to using collective labor to capture an animal stock (2020). In addition, in that cave, it was argued that the use of “stick markings” was an approach used by prehistorical accountants to count items (refer to Figure 3), (Petkov, 2020). The measurement and counting were done again using vertical markings. It was argued that this measurement represented a count of stock owned and therefore measurement of an assets controlled at a point of time (Petkov, 2020). Could similar methods be used at the Kozarnika Cave? To test this, we would analyze the potential reasons for anyone to mark a bone. We would link such marking to accounting and compare it to similar finds such the bone found in Africa (as previously discussed in the paper). We would than compare the two and look for any similarities in intent and presence. In addition, we would analyze whether some of the conclusions reached on that specific bone could be extrapolated to the Kozarnika Cave.

As a starting point of this analysis, we need to define “an item of interest” and whether such item can be controlled. It is our belief that people would record an item of interest only if it is something that can be controlled. That is, we argue that an individual would only mark an item to show ownership, control, and ability to use it in the future. This prehistorical purpose of recording closely resembles the rationale to record contemporary assets on the balance sheet of the company. As per our current accounting framework, an asset is an item that 1) can be controlled, 2) is a result of past events and 3) provides future benefits. Dissecting this contemporary definition, it is

plausible that “an item of interest” could meet it. However, let’s determine first, what would compel prehistorical people to mark a bone? The simple answer is to measure an item. However, why would people at such an early time of human development be interested in counting an item? Why would anyone take the time to measure a unit – be it an asset, liability, or simply time? It appears a person would be interested to go to such great lengths to measure these units, only if there is ownership present. The ability to own, control and manage an item is the reason to record its quantity. The ownership could be at an individual or group level. That is, human beings mark and measure unit quantity of an item to show their ownership at a point of time. It is important to note that for something to be measured and counted it needs to possess measurable characteristics. This could be stock counts, such as animal counts, to name a few. In addition, people need to be aware that ownership as a physical possession is present. Nevertheless, the ability to count an item and record its quantity is a basis used in the accounting language. It shows the ability to demonstrate ownership of an item at specific period. Based on this, with a certain level of confidence, using the above analysis, we can assert that the bone markings are clearly an accounting record.

Some could argue that the Linear A tablets found in Crete remain undecipherable despite years of effort. There are more than a thousand such specimen found throughout the years. However, it has been determined that many (most) of the tablets are records with persons and items and amounts noted. Since there is sufficient quantity of them and they are similar enough to other major collections of tablets from other times and language groups, it is easier to draw the conclusion that accounting originated in Mesopotamia. This brings us to Kozarnika Cave and the only one bone with markings found. Some could argue that this is not sufficient to be used as evidence. However, we need to keep in mind and perspective the timing of the bone. This bone is aged at 1.4M years and there are not so many archeological sites to draw comparison. However, this should not preclude us from making the assertion that such markings might be economically based. However, if only one tablet had been found, no conclusion could have been reached.

As previously stated in the scope limitation paragraph, we would rely on aging the bone marking on the works of Prof. Sirakov and Guadille. In their research regarding the bone fragments, they conclude the following (Sirakov and Guadelli, 2010):

> Recent excavations have brought new light to human activities. Several bone fragments with cuts that are not the result of butchering were discovered. Among them is the shaft part of a bovine shinbone from layer 12 with 4 regular series of 4 cuts….From the typological aspect, there is one more important direct use of the flakes and the un-retouched pieces from flaking, which correlates with the analysis of the non-Acheulian lithic industries of Italy (Peretto et al., 1998). However, the retouched forms from Kozarnika, flakes being most numerous, core-tools, a few typical side scrapers, rare end-scrapers and borers, are generally better represented than in the Italian sites.

From their works, it is apparent, the horse bone and its marking are a significant find. The ability for someone to so precisely mark an item, be it a bone, is a critical steppingstone in the human development. In this paper, we would exclude ourselves from making any interpretation as to the actual number counts. That is, the quantity being measured. In addition, we exclude ourselves from naming the item subject to the count. Such limitation should not preclude us from exploring the hypothesis that the item subject to the count possesses the qualities (features, characteristics) and/or meets the definition of an asset. We can only assert (on the basis of our contemporary bias) that this 4-regular series of 4 cuts is an attempt to consistently count an item. We use specifically the word “consistently” as the markings are consistent and within similar distance apart from each other (refer to Figure 1). Therefore, any sporadic theories of accidental containment should be excluded from such an analysis. Furthermore, it is critical to put into perspective human development and the “foods” people ate millions of years ago. Referring to some historians [(Larsen, 2003), (Simpson, 1951)], millions of years ago, people ate horse meat. Therefore, it is not surprising that such markings are found on a horse bone. In addition, by composition, horse torso bones are considered to be very strong and durable. Therefore, the choice to use such bones for inscriptions is not accidental by any means.

Furthermore, it is important to assert the mobility of the found bone and its markings. At these ancient times, prehistorical accountants picked a highly movable object to record the markings over time. They did not write their counts on permanent structures such as the walls of a cave. They picked a bone. This in itself is another interesting circumstance that warrants further discussions. Simply said, the bone could be carried out of the structure, potentially used to count an item against its established benchmark markings. Once, this has been achieved, the record could then be safely stored at the repositories, such as a cave.

We need to be aware that there some systematic differences in life as lived before the agricultural revolution that took place some 10 to 12 millennia ago. The hunter-gathering or transhumant ways of life have a different relation to ‘resources’ than any way of living centered on a more or less permanent settlement. In addition, ability to communicate verbally and in writing needs to be considered as part of this analysis. However, the issue of range of things sayable and thinkable before writing, should not restricts us to conclude or limit ourselves from deriving to the notion that the markings are a form of numerical or arithmetical activity. Tally sticks go beyond forms of counting on bodily parts (usually fingers), but still can only count not name (until used in a written culture as is the case in their use in states like medieval and post-medieval England). So any kind of analysis of what a bone with markings ‘says’ needs to begin from a consideration of the limits of the sayable. pre-writing, or before the emergence of accounting using visible signs that combine or bring together the naming and counting functions.

As previously concluded in the works of Tinker and Sy (2006), some of the bone fragments containing count marking found in Blombos Ochre (Africa) can be attributed to the history of accounting as they have been dated to almost 77,000 years B.C. (Sy

and Tinker, 2006). In the extracted bones, it is evident that people cross marked them to measure some sort of an item (as seen in Figure 3). It is evident that items measured and counted were owned and controlled by the humans. Therefore, as the result of this condition and the count, and based on 1.4-million-year aging (as established by Sirakov and Guadelli in their 2010 publication), we can assert that this is an attempt of humans to account for items, i.e. an accounting record. Therefore, such finding, and interpretation is bound to have its significance in the accounting literature and many of the historians' textbooks need to be consider such inclusion.

Conclusion

In this paper, we analyzed the bone fragments' markings found in the Kozarnika cave to determine whether it would be deemed appropriate to include them in the prehistorical accounting antiquity. As has been concluded by others, the estimated dating of the bone is around 1.4 million years (Sirakov and Guadelli, 2010). The assessment is based on the location and the chemical composition of the layer surrounding this finding. As others have noted, the markings appear to be human made as they are too precise and parallel to each other (Sirakov and Guadelli, 2010). That is, the theory of accidental motifs was excluded. Using this basis, we formulated our hypothesis that these markings represented an attempt of prehistorical accountants to record an ownership of stock or present-day record of an "asset". To test this hypothesis, we analyzed the potential reasons for anyone to mark a bone. We linked such markings to accounting and compared to similar finds. To provide comprehensive analysis on this topic, we provided a brief overview of Kozarnika cave, its location and on-going research and aging. As part of the research, we excluded certain items such as those influenced by contemporary bias, limitation related to relying on the work of others, and most importantly, to the specificity of the items counted. We are aware that such analyzes is bound to be influenced by contemporary bias and therefore, we tried to exclude it as much as possible. This is followed by comprehensive literature review of 'prehistorical accounting' with more emphasis on the early recordings of accounting records and their relevance to the bone markings at Kozarnika. This is then used as a basis to form a hypothesis and prove it through an analysis (by testing the underlying assumptions of asset recordings, etc).

Based on our theoretical work, we can assert that in some manner humans spent at least part of their time (perhaps annually) living in a cave and they were engaged in some form of managing resources and probably devising and implementing plans to acquire and preserve the means of subsistence. These humans used the markings to measure quantity of sorts. Such marking represents a significant attribution to accounting and as such deserve their rightful place in the accounting historians map.

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Figure 1: Ancient bone's markings at the Kozarnika Cave in the lower layer 12, predicament of 1.4-1.6 million years

Note: Picture obtained with the copyright permission (to reuse in journal/publication) of National Institute of Archaeology and Museum, Bulgarian Academy of Sciences. The photo was taken by K. Georgiev (employee at National Institute of Archaeology and Museum, Bulgarian Academy of Sciences) (Georgiev, 2009)

Figure 2: Ancient bone markings in Africa – Blombos Ochre, aged at around 77,000 years

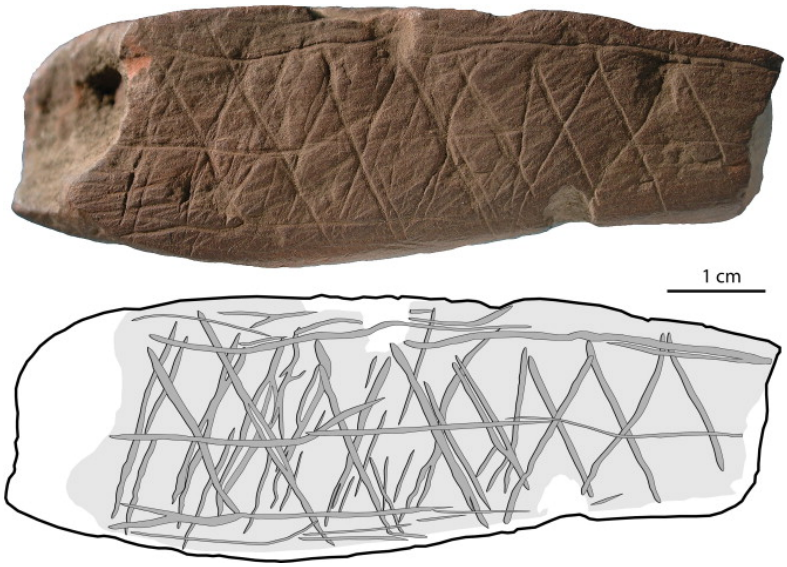

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Figure 3 The counts of stock found in the Magura Cave

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