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The Banality of Fragments

Metal Fragmentation through the Ages and the »European Exception«

ABSTRACT

This article explores the phenomenon of metal fragmentation across Western Eurasia, with a focus on the European Bronze Age, challenging the often-supposed uniqueness of fragmentation practices in Europe. By comparing fragmentation patterns in Bronze Age Mesopotamia, the Roman Republic, and Viking Age economies, the study highlights the centrality of weight-regulated systems in the production and use of metal fragments. Fragmentation is shown to align primarily with the »monetary theory of fragmentation«, where deliberate breakage produced unstandardized fragments used as money in weight-based economies. Ritual interpretations account for only a minor portion of the evidence. The study argues that the primary purpose of fragmentation was economic pragmatism, facilitating exchange and integration into complex trade networks. Additionally, the study discusses the overlap between monetary and social theories, emphasising the performative role of metal fragments in creating economic and social bonds. In conclusion, the article argues that metal fragmentation in Bronze Age Europe aligns with broader Eurasian practices, contradicting its characterisation as a unique phenomenon. While the monetary theory of fragmentation emerges as the most robust explanatory framework, the study underscores the need for further research to disentangle the interplay of economic, ritual, and social factors. This nuanced understanding highlights the multifaceted roles of metal fragments in past societies, bridging quantitative data with theoretical interpretations.

KEYWORDS

Bronze Age Europe | Ancient Near East | Roman Republic | Viking Age | fragmentation | metals | money | ritual

The deliberate fragmentation of metal objects is a recurring phenomenon in archaeological records across diverse times and places, from the Bronze Age to the Medieval period. This practice has been interpreted in many ways, reflecting the varied cultural, economic, and symbolic roles of metal within different societies. In Western Eurasia, the fragmentation of metals, particularly bronze and silver, appears repeatedly in contexts where weight-regulated systems of exchange were prevalent. Fragmentation has been linked to trade, wealth redistribution, ritual practices, and even interpreted as a mechanism to establish social ties through the symbolic or practical use of fragments.

The motivations and mechanisms behind metal fragmentation remain a subject of debate. While some argue that fragmentation was primarily a utilitarian response to the demands of weight-based economies, others emphasise its ritual or symbolic significance. These perspectives are not mutually exclusive, as both economic and symbolic functions can coexist, shaping the practices and meanings associated with metal use.

This article explores the fragmentation of metal objects across Western Eurasia between c. 3000 BCE and c. 1000 CE, investigating the interplay between monetary and ritual theories of fragmentation. Drawing on evidence from hoards, sanctuaries,

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and archaeological contexts, it evaluates patterns of fragmentation in Ancient Near Eastern economies, Roman Republican practices, and Viking Age hacksilver economies. The article then examines the »European exception« in the Bronze Age, where fragmentation has often been interpreted primarily through ritual frameworks. By comparing these contexts, the study challenges the view that European Bronze Age fragmentation represents a unique phenomenon disconnected from broader Eurasian traditions of weight-regulated metal use.

The findings underscore that, at least based on current research, the »monetary theory of fragmentation« provides the most comprehensive explanation for the largest part of the statistical variability observed in the archaeological record. While symbolic and ritual interpretations should not be entirely ruled out, the data predominantly support the hypothesis that fragmentation served pragmatic economic purposes.

Metal Fragmentation across Time and Space in Western Eurasia

Silver Fragmentation in the Ancient Near East

Silver served as the primary medium of exchange in the economies of the Ancient Near East from the Early Bronze Age (c. 3000 BCE) onward. Its role extended beyond a mere standard of economic value to an essential element of the economic system, deeply integrated with trade networks and public administrations. A distinctive feature of silver in this period was its utilitarian fragmentation and monetary use in weight-regulated transactions.

Silver as a Weight-Based Currency

The use of silver in the Ancient Near East revolved around its role as a medium of exchange, assessed strictly by weight. Transactions involving silver often entailed breaking down larger objects – ingots, jewellery, and other items – in order to obtain smaller fragments, whose value in weight was equivalent to the price of the good or service being purchased. This required thorough metrological control, ensuring its value was determined by its mass rather than its shape or condition (Powell 1996; Peyronel 2010; Rahmstorf 2016; Ialongo et al. 2018). Administrative texts dating to the early 2nd millennium BCE explicitly use the terms »scrap« (Akkadian *šibirtum*) and »portion« (*sankuttum*) to indicate some of the most common forms in which silver was used in economic transactions (Arkhipov 2012).

Fragmentation was not a random process but complied with established weight standards. Analyses of hoards, such as the Middle Bronze Age silver hoard from Tell Mardikh/Ebla in Syria (c. 2000–1700 BCE), demonstrate that fragmented pieces comply with the Mesopotamian *shekel* of c. 8.3 g (Ialongo et al. 2018). This compliance highlights the sophisticated economic networks that relied on silver as a medium of exchange, integrating local and regional trade systems.

Silver and the Ancient Near Eastern Economy

Silver was embedded in a complex economic framework that combined market exchange, redistribution, and ceremonial gifting. It functioned simultaneously as a standard of value, a store of wealth, and a medium of payment. For example, Old Assyrian trade texts from Kültepe (prov. Kayseri/TR) (c. 2000–1700 BCE) reveal that silver was central to both small- and large-scale trade, enabling merchants to import goods such as tin and textiles, which were then exchanged for silver in Anatolia (Dercksen 2021).

This economic model required silver to be universally recognizable and divisible, leading to the

widespread fragmentation of silver items. The valuation of fragmented silver depended on the accuracy of scales and adherence to regional weight standards. This dual reliance on weight and standardisation allowed silver to circulate freely across diverse cultural and economic zones, from Mesopotamia to the Levant and beyond (Dercksen 2021; Peyronel 2010).

Hoards and the Evidence for Silver Fragmentation

Hoards provide critical insights into the use and fragmentation of silver. These deposits, often consisting of ingots, jewellery, lumps and fragmented pieces, reflect both the practical and symbolic roles of silver in ancient societies (Peyronel 2019).

Hoards such as those from Acemhöyük (prov. Aksaray/TR) and Ebla typically contain a mix of intact and fragmented silver items. The Acemhöyük hoard, for instance, includes ingots and fragmented jewellery, likely kept for further monetary circulation (Özgüç 1995). The Ebla hoard, with its 171 items primarily composed of fragments and ingots, underscores the adaptability of silver for weight-based transactions (Ialongo et al. 2018).

Differences in hoard compositions across regions might reflect the local adaptation of silver use. While urban centres often housed standardised ingots, rural or frontier areas relied more heavily on fragmented silver, highlighting its utility in less formalised economies (Peyronel 2014).

Ritual and Symbolic Uses of Silver

Beyond its economic utility, silver held significant ritual and symbolic importance by virtue of its value. Deposits in sanctuaries and burial contexts often included silver items, fragmented or intact, suggesting their use in votive offerings or funerary practices. For example, the inclusion of fragmented silver in sanctuaries could symbolise wealth dedication to deities, reinforcing the societal and spiritual value attributed to silver (Özgüç 1995; Peyronel 2014). Such ritual uses underscore the multifaceted role of silver in Ancient Near Eastern societies. While it functioned as a practical medium of exchange, its symbolic associations with wealth and prestige elevated its status in ceremonial contexts. Silver, however, does not seem to have ever been ritually fragmented.

Bronze Fragmentation in Italy during the Republican Age

The Roman Republic's monetary system was characterised by the coexistence of weight-based practices and emerging coinage. Non-coined bronze currency in various forms – the so-called *aes* – was fragmented and used in weight-regulated transactions. Here I briefly review the role of fragmentation, the interplay between coins and weight-based bronze, and the evidence from hoards and sanctuaries, highlighting the economic and symbolic significance of bronze fragments.

Fragments and Coins in the Same Economy

Weight-regulated bronze currency remained central to the Roman economy even as coinage gained prominence. Early legal texts prescribe the payment of taxes and fines through unstandardised forms of *aes*, whose value was assessed through weighing. *Aes* was often fragmented to meet specific transactional needs. This fragmentation was not incidental but deliberate, reflecting the flexibility and adaptability of the weight-based system (Murgan 2014; 2020; Ialongo 2024).

More structured forms, such as *aes signatum*, introduced an element of standardisation through cast bars featuring symbols or motifs. Despite their uniformity, these bars were frequently fragmented, illustrating the persistent reliance on weight for valuation. Even cast coins like *aes grave*, which embodied state efforts to regulate monetary systems, were sometimes fragmented to fit the demands of a hybrid economy where weight-based practices coexisted with coinage (Neri 2004; Jaia/Molinari 2011).

Evidence from Hoards

Hoard compositions provide crucial insights into the coexistence of fragmented bronze and coins. These

deposits reflect the layered nature of the Republican monetary system. Hoards from urban and rural contexts typically contain a mix of fragmented *aes* and coins. Deposits from peripheral areas often lean heavily on fragmented bronze, highlighting the continued reliance on weight-regulated practices (e. g. Bertol/Farac 2012; Bertol 2014). In contrast, urban hoards show a more prominent presence of coins (Jaia/Molinari 2011; Murgan/Kemmers 2016).

The inclusion of fragmented coins within hoards underscores the practical need for flexibility in transactions. The deliberate fragmentation of *aes grave* demonstrates how weight-based practices persisted alongside the increasing use of standardised currency. This adaptability ensured that both older and newer forms of currency could meet diverse economic needs (Crawford 1985; Yarrow 2021).

Bronze Currency in Sanctuaries

Sanctuaries provide a distinct perspective on the use of bronze currency, bridging economic and ritual contexts. The deposition of bronze objects in sacred spaces underscores their dual role as both practical currency and symbolic offerings.

Sanctuaries such as Sol Indiges in Torvaianica, near Rome, and Bitalemi (Gela/IT) have yielded deposits of *aes rude*, *aes signatum*, fragmented bars, and coins. These finds suggest that bronze currency was not only used for economic transactions but also held symbolic value. Fragmentation within these deposits indicates that weight-based valuation remained important even in ceremonial contexts (Jaia/Molinari 2011; Tarditi 2016).

The presence of bronze in sanctuaries often reflects votive offerings, whereas the economic value of both *aes* and coins blended into its symbolic significance. Bronze fragments and coins deposited in these contexts may represent dedications intended to demonstrate wealth, fulfil vows, or seek divine favour. This symbolic role complemented the practical functions of bronze in economic settings (Murgan/Kemmers 2016; Tarditi 2016).

Silver Fragmentation in the Viking Age

The Viking Age, spanning the late 8th to early 11th centuries CE, was a period of remarkable economic dynamism and cultural interaction in Northern Europe. At the heart of the Viking economic system was silver, which functioned both as currency and as a medium of social exchange. Hacksilver, in particular, circulated as weight-regulated currency together with silver coins produced in Islamic polities in Europe.

The Role of Hacksilver

The term »hacksilver« refers to pieces of silver, often fragmented from larger objects such as coins, ingots, or jewellery. These pieces were cut or broken to serve as currency within a largely monetary economy in which the value of silver was quantified by weight (Kruse 1988; Kershaw 2014).

Archaeological evidence from sites such as Kaupang (Vestfold County/NO) and Hedeby (Kr. Schleswig-Flensburg/DE) demonstrates that weighed silver, including hacksilver, was a cornerstone of economic transactions. The widespread use of standardised weights highlights the sophisticated systems in place for regulating silver trade (Kilger 2008).

Silver Coins and Hacksilver: Complementary Systems

In Viking Age Scandinavia, hacksilver and silver coins coexisted, reflecting the interplay between bullion and coin economies. While regions such as England operated primarily within a coin-based system, the influx of foreign coins, especially Islamic *dirhams*, into Scandinavia led to their frequent fragmentation. This practice transformed coins into hacksilver, integrating them into the weight-based economy (Merkel 2016; Kershaw 2017).

The dual-currency system of the Danelaw in England, where both bullion and coins circulated, exemplifies this integration. Here, Scandinavian settlers maintained their traditional weight-based practices while adapting to the local coinage systems. Coins often served as a reserve of silver that could be melt-

ed down or fragmented to meet the demands of the weight-based economy (Kruse 1988; Kershaw 2017).

Hacksilver in Hoards

Hoards typically contain a mix of coins, ingots, jewellery, and hacksilver. Their composition provides insights into the economic practices and cultural values of Viking societies. The Barrow-in-Furness (Cumbria/GB) and Silverdale hoards (Lancashire/GB), for instance, illustrate the accumulation of wealth through plunder, trade, and tribute. The inclusion of fragmented silver alongside intact objects suggests both the practical and symbolic roles of silver in Viking society (Kershaw 2014). Similarly, hoards from the large settlements of Kaupang and Hedeby highlight the use of silver as a versatile medium for both large-scale and everyday transactions (Kilger 2008; Merkel 2016).

In many hoards, the deliberate fragmentation of silver is evident, with pieces cut to specific weights. This practice aligns with the use of standardised weights and indicates a high degree of economic sophistication. The variability in hoard composition across regions further underscores the adaptability of Viking economic systems to local conditions (Kruse 1998; Kilger 2008).

Regional Variations and Long-Distance Trade

The Viking Age economy was deeply interconnected with long-distance trade networks that extended from the Islamic Caliphate to the British Isles and the Baltic. Islamic *dirhams*, often found in fragmented form, played a crucial role in these networks, serving as both currency and a source of raw silver. At Kaupang, the inflow of *dirham* silver marked a shift towards greater reliance on weighed silver. This trend mirrored broader economic changes in Scandinavia, where increased silver availability from eastern trade routes facilitated economic expansion and urbanisation. Hedeby, another major trading hub, also underscores the significance of imported silver. Archaeometric analyses reveal extensive recycling and refining of foreign silver to meet local economic demands (Merkel 2016).

The »European Exception«

Fragmentation theories on diverse pre- and protohistoric contexts in Western Eurasia are remarkably aligned in interpreting metal fragments as money. The act of fragmentation serves the main purpose of producing easily manageable pieces of metal – any metal, precious or less so – whose exchange value was assessed through weighing. At the same time, hackmetal money still retains symbolic value and occurs in ritual contexts.

The scholarly tradition on metal fragmentation in Bronze Age Europe follows a different path. The deliberate destruction of objects has been predominantly interpreted as a symbolic or ritual act, reflecting social, religious, or cosmological meanings rather than economic pragmatism (Brandherm 2018). Studies emphasising the economic underpinnings of fragmentation also have a long tradition, but they always remained somehow on the fringes of the academic discourse, at least until very recently. Here I do not address the connection between fragmentation and recycling. In recent times, such a connection has not been the focus of interpretive syntheses, and lost much of its popularity in favour of ritual interpretations. Nonetheless, the recycling hypothesis is usually considered a likely option alongside the prominent ritual explanation, although with some exceptions (e. g. Hansen 2016).

This section critically examines these interpretations, focusing on well-known, influential studies addressing ritual theories of fragmentation, enchainment, and monetary frameworks. By comparing the European case to the broader Eurasian framework, it builds the groundwork to evaluate whether the European Bronze Age truly represents an exception or if similar economic mechanisms underlie the fragmentation phenomenon.

The Ritual Theory of Fragmentation

The deliberate fragmentation of metal objects during the European Bronze Age is often seen as a symbolic practice deeply embedded in the social and religious fabric of the period. The intentional breaking of metal objects is often thought to transform them from functional items into symbols of social, ritual, and cosmological significance.

Objects like swords, axes, ornaments, and tools, which held practical value in daily life, were deliberately rendered unusable. This act of breaking signified the »death« of the object, allowing it to transcend its functional role and take on a new identity within a ritual or symbolic context. According to some scholars, fragmentation could mirror human life cycles, with objects undergoing a process of destruction akin to death and a subsequent rebirth in the spiritual or communal sphere (Metzner-Nebelsick 2012; Bruck 2016).

An important symbolic dimension of fragmentation is the *pars pro toto* argument, where a part of the whole object, representing its entirety, is dedicated in hoards. The deliberate separation of fragments may have allowed certain pieces to circulate as symbols or retain the power of the original whole. This practice imbued individual fragments with a shared or residual connection to the complete item, creating a physical and symbolic link across time and space (Bradley 2013; Hansen 2016).

Such symbolism is sometimes connected to the broader worldview of Bronze Age societies, where material objects were often imbued with life-like qualities. Fragmentation, then, may have been seen as a way of »freeing« an object's essence or spirit, allowing it to participate in rituals meant to mediate between humans and the divine (Nebelsick 2000; Bradley 2013).

Ritual Violence and Performance

L. Nebelsick (2000) introduces the concept of »ritual violence« to describe the deliberate and often dramatic destruction of metal objects in Bronze Age hoards. In a few cases, weapons, tools, and ornaments exhibit signs of systematic and purposeful damage – bent swords, shattered axes, and twisted bracelets are common features in these assemblages. Such destruction was systematic; it often involved methods that showcased skill and intention, such as heating and bending metal until it fractured or delivering precise blows to specific parts of an object (Bradley 2013; Hansen 2016).

This alleged ritualised violence is assumed to carry significant symbolic weight. The act of breaking an object could serve as a performative gesture, expressing themes of sacrifice, transformation, and renewal. By destroying valuable items in controlled and visible ways, participants in these rituals reinforced communal identities and social cohesion (Metzner-Nebelsick 2012; Bradley 2013). The intentionality of these acts, as argued by R. Bradley, aligns with broader ritual practices where destruction was not wasteful but rather deeply meaningful.

Fragmentation and Social Hierarchies

Fragmentation is generally thought to have been orchestrated by social elites who controlled the production and use of valuable metal objects. As C. Metzner-Nebelsick (2012) argues, these elites often directed rituals involving the destruction of wealth, using these acts to display their power and reinforce their status (Metzner-Nebelsick 2012; Bradley 2013). By breaking and offering valuable items, they demonstrated their ability to transcend material wealth and act as intermediaries between their communities and the divine (Metzner-Nebelsick 2012; Brück 2016).

This control over fragmentation could also serve to redistribute social value. In societies with significant economic inequalities, the destruction of high-value items in public rituals may have functioned as a means of levelling wealth disparities, at least symbolically. The act of fragmentation thus carried both social and political implications, reinforcing communal ties while legitimising the authority of those who directed the rituals (Nebelsick 2000; Bradley 2013).

The Relationship between Fragmentation and Deposition

Although the act of fragmentation can be studied in isolation (Brandherm 2018), it is often considered to be deeply intertwined with the practices of deposition and hoarding. Fragmented objects were rarely left in isolation; they were typically collected and deposited in rivers, bogs, or dryland hoards. This interplay between fragmentation and deposition would underscore the deliberate and meaningful nature of both practices (Bradley 2013; Hansen 2016).

Fragmentation is also sometimes seen as a prerequisite for deposition. By breaking objects, their creators or owners prepared them for their final journey, removing them from the sphere of human use and rendering them suitable for the divine or ancestral realms (Bradley 2013; Brück 2016). In some cases, fragmented items were deposited alongside intact objects, suggesting a complex interplay of meanings. As Bradley notes, the juxtaposition of broken and complete items in hoards may reflect differing ritual purposes or stages of an object's life cycle (Metzner-Nebelsick 2012; Bradley 2013).

The Enchainment Theory of Fragmentation

J. Chapman's »Fragmentation in Archaeology« (2000) presents a comprehensive framework for understanding fragmentation in prehistoric contexts, emphasising its social and symbolic dimensions. Chapman's focus on deliberate breakage as a key element of material culture aligns with several ideas in the articles analysed previously but also diverges in meaningful ways, particularly regarding the theoretical underpinnings and the integration of the concept of enchainment.

Alignment with Ritual and Symbolic Interpretations

Chapman's argument that fragmentation is central to the social practices of prehistoric communities resonates strongly with the views expressed by authors such as Brück (2016), Nebelsick (2000), and Metzner-Nebelsick (2012). Like these authors, Chapman rejects the notion that fragmentation was purely accidental or utilitarian. Instead, he emphasises the structured nature of fragmentation and its deliberate use in creating and reinforcing social relationships.

Chapman's notion that fragmented objects maintain a connection to their original whole aligns closely with the *pars pro toto* argument presented in Brück's and Bradley's works. For Chapman, the fragmented parts of objects act as material extensions of relationships, connecting individuals across time and space.

Divergence in Theoretical Frameworks

Despite these similarities, Chapman's approach diverges from other authors in significant ways, particularly through his theoretical emphasis on enchainment and accumulation. While others primarily focus on the symbolic and ritual dimensions of fragmentation, Chapman frames it within a broader anthropological context, drawing on concepts such as inalienability and the fractal nature of social identities.

Chapman's concept of enchainment introduces a dynamic framework where fragmented objects are not merely symbolic but serve as active agents in creating social bonds. This perspective goes beyond the ritual emphasis found in Nebelsick (2000) and Metzner-Nebelsick (2012) by suggesting that fragmentation is integral to the negotiation of social relationships over time. In this sense, fragmentation is not just an endpoint but a process that continuously reshapes social and material networks.

Unlike the authors who emphasise deposition and ritual contexts, Chapman dedicates significant attention to the role of accumulation in prehistoric societies. He argues that fragmentation allows for the creation of »object sets« that are key to both individual and collective identity formation. This idea diverges from Bradley's (2013) focus on deposition as the culmination of fragmentation, proposing instead that fragmented objects retain agency even within accumulated contexts.

The Monetary Theory of Metal Fragmentation

The monetary theory of fragmentation assumes that the deliberate breakage of bronze objects in the European Bronze Age was closely tied to the commodification of metal and its use as weight-regulated money. By breaking objects into standardised fragments, communities created divisible and portable units of exchange that facilitated trade and the accumulation of wealth.

Fragmentation as a Mechanism for Commodification

The intentional breaking of bronze objects into smaller, manageable pieces allowed metal to transition from a material used for tools, weapons, and ornaments to a commodity with standardised value. Ch. Sommerfeld (1994) emphasises that fragmented pieces from hoards often conform to specific weight standards, indicating their use as a form of money. This standardisation of fragments enabled communities to use them as a medium of exchange in trade, much like *aes* and early coinage in later periods (Primas 1986; Sommerfeld 1994).

This practice also correlates with the adoption of weighing technologies across Europe. Ch. Pare (2013) highlights the importance of weighing scales and standard weights, which were first introduced in Mesopotamia and later adopted in Europe during the Bronze Age. These tools allowed communities to quantify fragmented metal precisely, facilitating its integration into complex trade systems. The deliberate fragmentation of objects, when combined with weighing, created a shared system of value that enabled efficient and consistent transactions (Pare 2013; Rahmstorf 2016).

Weight-Based Regulation

Weight-based regulation was central to the commodification of fragmented metal. R. Peroni (1998) suggested that many fragmented pieces found in European hoards conform to consistent weight units. M. Primas (1986) discusses the intentionality of weight calibration in Bronze Age hoards. She notes that several hoards contain fragments that correspond to multiples or fractions of recurrent weight values, underscoring their function as tradable units. For example, sickle fragments in Northern Europe frequently match specific weight categories, suggesting their deliberate fragmentation for use in economic transactions (Malmer 1992; Primas 1986).

Weight-based regulation also highlights the technological advancements of Bronze Age societies. Ch. Pare (2013) and L. Rahmstorf (2006) argue that the use of fine balances and small weights indicates an increasing emphasis on accurate measurement. These tools facilitated the creation of fragments that adhered to recognized standards, ensuring their acceptance across diverse trade networks.

The Role of Fragmentation in Trade

Fragmented metal played a vital role in facilitating long-distance trade by providing a portable and divisible means of exchange. Sommerfeld (1994) notes that many hoards containing fragmented objects are located near possible trade routes or resource-rich regions, suggesting that fragmentation was integral to interregional trade networks. For example, the distribution of sickles and torcs across Central and Northern Europe would align with key trade hubs, reinforcing their role as standardised commodities (Sommerfeld 1994; Peroni 1998).

Pare (2013) argues that fragmented metal served as a medium of exchange, particularly in the trade of high-value goods such as tin, amber, and exotic materials. By enabling the quantification and commodification of metal, fragmentation allowed Bronze Age communities to establish more complex and efficient economic systems (Pare 2013).

The Intersection of Economy and Ideology

The use of fragmented metal as money would reflect not only economic pragmatism but also ideological shifts. Pare (2013) and Sommerfeld (1994) suggest that the deliberate fragmentation of objects into tradable units was influenced by both practical and cultural factors. Fragmentation could also have

allowed communities to redistribute wealth within groups and facilitate the negotiation of social or religious obligations through the exchange of standardised pieces. This process bridged the economic and social spheres, reinforcing the role of metal as a carrier of symbolic and practical value (Sommerfeld 1994; Malmer 1992).

Primas (1997) argues that the creation of weight-standardised fragments represents an early form of economic ideology, where value became abstracted from the object itself and linked to its measurable properties. This abstraction marked a significant departure from earlier forms of wealth exchange, such as gift-giving, and laid the groundwork for more formalised economic systems in later periods.

Quantitative Patterns in Metal Fragmentation in Bronze Age Europe: Archaeological Evidence

Here I briefly introduce recent evidence of metal fragmentation in Europe during the Bronze Age, emphasising measurable characteristics and statistical patterns observed across Europe. The focus is on quantitative data, including fragmentation rates, weight distributions, spatial analyses, and hoard compositions.

Fragmentation Rates and Chronological Trends

Quantitative studies reveal an increase in the rate of fragmentation over time. In continental Europe, during the Early Bronze Age (2300–1500 BCE), hoards typically contained complete objects, comprising over 90 % of recorded assemblages. By the Late Bronze Age (1300–800 BCE), fragmented items accounted for 75–80 % of deposits (Lago 2020; Ialongo/Lago 2021). This shift coincides with the spread of weighing technology, suggesting a relationship between metal fragmentation and evolving economic systems.

Knight's (2019 and in this volume) analysis of British assemblages supports these findings, documenting a marked increase in the deliberate destruction of weapons, particularly swords and spearheads, during the Late Bronze Age. These objects exhibit signs of bending, crushing, and deliberate breakage prior to deposition.

Weight-Based Regulation and Standardisation

Statistical analyses of fragmented bronze objects demonstrate strong alignment with weight systems. The Cosine Quantogram Analysis (CQA) of hoards in Central and Southern Europe identifies recurring weight peaks at intervals of c. 10 g, corresponding to a pan-European weight unit (9.4–10.2 g) consistent with balance weights from the same period (Ialongo/Lago 2024; see also Lago in this volume).

Experimental studies corroborate these findings. G. Lago et al. (2023) conducted controlled fragmentation of replica sickles, producing fragments that conformed to established weight intervals. These results match data from 1,500 archaeological sickle fragments, confirming that weight regulation was a deliberate practice in the fragmentation process. The widespread adoption of this practice across diverse regions indicates a shared metrological system, likely tied to the development of long-distance trade networks.

Finally, quantitative analyses reveal regular statistical patterns in fragments. The weight values of metal fragments in hoards are log-normally distributed, an outcome that simulations demonstrate cannot be due to chance (Ialongo/Lago 2024).

Fragmentation and Hoard Composition

Objects in British hoards appear to be randomly collected, with no clear evidence of selection criteria (Wiseman 2018). This suggests that hoards reflect a statistically significant sample of all the forms in which bronze circulated at the time of their deposition.

By the Late Bronze Age, fragmented objects accounted for the majority of items in hoards. Analyses of Italian hoards (Lago 2020) and Central European deposits (Ialongo/Lago 2024) indicate that fragments typically constituted 75–80 % of the total assemblages.

The data show that every object could be fragmented, with no exception (see Lago, this volume). Tools (e. g. sickles, chisels) and ingots are the most commonly fragmented items in many hoards. Weapons, including swords and spearheads, are also frequently found as fragments, particularly in Northern and Western Europe. Knight's (2019) experimental studies demonstrated that such weapons were often intentionally damaged through bending or crushing prior to deposition, suggesting consistent fragmentation practices across regions.

One striking pattern is the low occurrence of matching fragments within the same hoard. N. Ialongo and G. Lago (2021) report that less than 5 % of fragmented objects in Italian and Central European hoards can be reassembled, indicating that fragments were widely circulated before deposition. This suggests a complex life cycle for fragmented objects, involving multiple exchanges or uses before their final deposition.

Discussion and Conclusions

Metal fragmentation across Western Eurasia reflects a blend of economic and symbolic practices, but the evidence strongly supports weight-regulated monetary use as the primary driver. Here I summarise the findings, emphasising the monetary theory's ability to explain the majority of the data while acknowledging the potential coexistence of ritual practices.

The data from Bronze Age Europe show that:

1) metal fragments comply with multiples of a weight unit;
2) hoards rarely contain matching fragments of the same object (c. 5 %);
3) the selection of fragmented objects in hoards is random;
4) all known object types are fragmented;
5) the weight values of bronze fragments are log-normally distributed.

The role of theory is to explain the observed data. It follows that a reliable theory of fragmentation must provide satisfactory explanations for the observed archaeological evidence. The monetary theory of fragmentation is clearly the best-suited one to fulfil this criterion. Bronze fragments comply with weight systems because weight was the measure of their value. Matching fragments in hoards are rare because the purpose of fragmentation was circulation, not deposition. All types of objects are fragmented because the original shape was irrelevant to determine the monetary value of fragments. And finally, their weight values are log-normally distributed because supply, demand, income, and consumption were as well (Ialongo/Lago 2024).

The ritual theory, on the other hand, explains very little. Weight-based regulation is never mentioned, and hence has no role in this theory. It assumes selection of the objects to be fragmented, but all objects eventually are. It also assumes that fragmentation is random, but the data clearly show that it is not. The ritual theory only offers explanation for the rarity of matching fragments in the same hoard, through the *pars pro toto* argument. This argument, however, relies on a circular argumentation: *pars pro toto* of symbolically-charged objects are buried in hoards because hoards are votive depositions, and hoards are votive depositions because they contain *pars pro toto* of symbolically-charged objects. The ar-

gument is, at the same time, proof and consequence of the ritual nature of hoards.

In summary, there is no evidence that the fragmentation phenomenon in Bronze Age Europe has a different explanation than metal fragmentation in any other historical period across Western Eurasia. That is, the main function of metal fragmentation in Bronze Age Europe was likely to produce weight-regulated fragments to be used as money.

The ritual hypothesis, however, must not be dismissed altogether (Brandherm 2018). The data exclude that ritual fragmentation was the rule, but this neither means that hackmetal money could not have been employed in rituals, nor that ritual fragmentation never occurred. In other words, the evidence simply shows that monetary fragmentation is responsible for the largest part of the statistical variability of the data, but it does not exclude that different processes were concurrently at work. We might not be able to pinpoint these different processes yet because their quantitative footprint is hidden behind the stronger visibility of monetary patterns of fragmentation. As fragmentation patterns in Bronze Age Mesopotamia, Republican Italy, and Early Medieval Northern Europe demonstrate, hackmetal money often finds its way in ritual contexts, and is always charged with symbolic meaning simply by virtue of it being money. The current difficulty in pinpointing statistically-relevant, ritual fragmentation patterns might simply depend on the fact that quantitative research aimed at disentangling different purposes of fragmentation is still in its infancy (Knight 2021; Lago 2020; Lago et al. 2023).

Enchainment theory, on the other hand, has a remarkable point of contact with the monetary theory of fragmentation. While it still does not account for the statistical variability of the data, the idea that fragments fulfil a performative role in creating bonds between human agents pretty much describes what money does in practice. Money was never the cold and impersonal tool that many archaeologists believe it to be. It creates bonds between individuals that are mediated by power, trust, and kinship, and it does it through one of the most common – and frankly banal – instances of social relationships: economic transactions (Bloch/Perry 1989; Beckert 2011; Baron/Millhauser 2021).

In conclusion, while the monetary theory of fragmentation emerges as the most robust framework for explaining the majority of the evidence, this does not negate the complexity of the phenomenon. Future research should continue refining methodologies to disentangle the interplay of economic, ritual, and social practices. By bridging the gaps between quantitative data and theoretical interpretations, we can deepen our understanding of the nuanced roles that metal fragments played in the societies of Bronze Age Europe and beyond.

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