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Counting in Action: On Early Baltic Computational Practises and Their Possible Near Eastern Influence

Dominykas Barusevičius

Vilnius University, Faculty of Philosophy,
Institute of Philosophy
Universiteto str. 9, LT-01122 Lithuania, Vilnius
dominykas.barusevicius@fsf.stud.vu.lt
ORCID: https://orcid.org/0000-0002-5947-4636

Abstract. This paper proposes that early Baltic computational practices emerged in action, through gesticulation with clay figurines of various shapes and sizes, and were possibly influenced by the Near Eastern token traditions. To substantiate this hypothesis, the phenomenon of counting in action is examined through considerations of ontological grounds and analysis of relevant archaeological evidence. This reveals that a hylomorphic ontology poses challenges to understanding the phenomenon of counting, as it requires reducing counting to an immanent faculty arising within intelligence. In contrast to this reduction, a relationalistic ontology is suggested, proposing that, despite limitations or contradictions imposed by the participants in the relationship, counting emerges in action through technical gesticulations with things. Building on this relationalistic perspective, the computational nature of Baltic clay figurines is inferred from analogies with Near Eastern material counting tokens, resulting in a typology that includes biconoids, concaves, discs, miniature vessels, spheres, tools, and miscellaneous items. This inference is supported by the important case of biconoid figurines from the Nevieriškės fortified settlement, which serve as direct evidence of their potential computational nature. Additionally, if Baltic clay figurines were indeed used as counting tools influenced by Near Eastern token traditions, this supports the claim that Near Eastern computational prototechnologies could have spread beyond their geographical origins.
Keywords: relational ontology, counting in action, Baltic clay figurines, Near Eastern tokens, counting tools

Skaičiavimas veiksme: apie ankstyvąsias baltiškasias komputacines praktikas ir Artimųjų Rytų įtakos galimybę

Anotacija. Šiame straipsnyje teigiama, kad Pietryčių Baltijos regione ankstyvosios komputacinės praktikos atsirado kaip skaičiavimas veiksme, gestikuliuojant su įvairių formų ir dydžių molinėmis figūrėlėmis, ir galbūt buvo paveiktos Artimųjų Rytų skaičiavimo naudojant daiktus tradicijų. Siekiant pagrįsti šią hipotezę, keliamas skaičiavimo veiksme ontologinių pagrindų klausimas ir analizuojami relevantiški archeologinai duomenys. Tai atskleidžia, kad hilomorfistinė ontologija įpareigoja redukuoti skaičiavimą į intelektui priklausantį imanentinį gebėjimą, todėl tampa iššūkiu. Priešingai šiai redukcijai, siūloma reliacionistinė ontologija, kuri leidžia teigti, kad, nepaisant santykio dalyvių formuojamų apribojimų ar prieštaravimų, skaičiavimas taip pat iškyla veiksme – per techninę gestikuliaciją su daiktais. Remiantis šia reliacionistine perspektyva, Pietryčių Baltijos regiono molinių figūrėlių skaičiavimo paskirtis grindžiama analogijomis su Artimųjų Rytų skaičiavimo materialiais *token*'ais, sudarant dvikūgių, įgaubtų, diskų, miniatiūrinių indų, sferų, įrankių ir įvairių figūrėlių tipologiją. Tokį pagrindimą sutvirtina svarbus Nevieriškės įtvirtintoje gyvenvietėje aptiktas dvikūgių figūrėlių atvejis, kuris suteikia tiesioginį įrodymą apie figūrėlių potencialų skaičiavimo pobūdį. Be to, jei Pietryčių Baltijos regione molinės figūrėlės iš tiesų buvo naudojamos kaip skaičiavimo įrankiai, paveikti Artimųjų Rytų skaičiavimo naudojant daiktus tradicijų, tai remia svarstymą, kad Artimųjų Rytų skaičiavimo prototechnologijos galėjo plisti už jų ištakų geografinių ribų.
Reikšminiai žodžiai: reliacionistinė ontologija, skaičiavimas veiksme, baltiškosios molinės figūrėlės, artimųjų rytų skaičiavimo daiktai, skaičiuokliai

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Introduction

The phenomenon of counting in action can be positioned by the historical dispute between abacists and algorists (Stone, 1972), two sides that embodied distinct approaches to computation. Counting in action aligns with the abacists, who enacted counting operations through the gesticulation of such material objects as boards, sand, sticks, fingers, or pebbles. In contrast, algorists relied on the well known Hindu-Arabic numeral system, performing calculations by scribing combinations of the zero and nine digits. Despite their common goal of enacting operations like addition, subtraction, and multiplication, these two perspectives engaged with different computational technologies: one based on interaction with material objects, the other on symbolic notation.

Althouh counting in action, a phenomenon rooted in human interactions with material objects, has been widely studied (Besserat–Schmandt 1992a, 1992b; Malafouris, 2010; Overmann, 2019; Overmann, Wynn, 2023), there are cultures in which the computational nature of specific archaeological artefacts remain open to question. For instance, various shapes of plain and marked figurines have been found in the contemporary territory of Lithuania, located in both fortified and unfortified Bronze Age settlements, such as Aukštadvaris (Daugudis, 1958, 1959, 1960, 1961), Nevieriškės (Grigalavičienė, 1977, 1978, 1979), Paveisininkai (Kulikauskas, 1963), Pajevonys–Kunigiškės (Kulikauskas, 1965), Kaukai–Obelytė (Kulikauskas, 1968), Narkūnai (Kulikauskienė, 1976, 1977; Kulikauskienė, Luchtanas, 1978, 1979), Bradeliškės (Pranckėnaitė, 2008), Nemenčinė (Kulikauskienė, Kulikauskas, 1953), Guogai–Piliuona (Tautavičius, 1956), Punia (Volkaitė–Kulikauskienė, Merkelevičius, 1963), and Sokiškis (Grigalavičienė, 1981, 1982, 1983, 1984). Nevertheless, the presence of these figurines is most likely not constrained to the contemporary territory of Lithuania. Potentially, based on the quantity of finds, they were spread across the wider "so called" Eastern Baltic region.

The archaeological reports cited and the subsequent scientific publications (Grigalavičienė, 1986a, p. 75; Grigalavičienė, 1986b, p. 119; Kulikauskienė–Volkaitė, 1986 p. 40–41; Luchtanas, 1992, p. 69, 73) examining these artefacts allow us to say that the nature of the figurines still puzzles scholars. They have been interpreted as objects with pragmatic purposes, such as weights for fishing nets and weaving looms, pendants, or as (un) finished spindles. They have also been considered items used in magical rituals or games. Despite these interpretations, a resemblance between these clay figurines and Near Eastern tokens—well known for their use in counting practices—suggests an alternative explanation. Analogous finds could be traced and categorized within a typology of biconoids, concaves, discs, miniature vessels, spheres, tools, and miscellaneous figurines (Fig. 1). In many cases, Baltic clay figurines and Near Eastern tokens are nearly identical. This typology highlights the correspondences in appearance, form, size, and material with Near Eastern tokens, implying a potential computational nature for the Baltic clay figurines.

Based on this, a hypothesis is proposed that early Baltic computational practices emerged in action, through gesticulation with clay figurines of various shapes and sizes, and were possibly influenced by the Near Eastern token tradition. This paper aims to substantiate this hypothesis by addressing the phenomenon of counting in action through consideration of ontological grounds and analysis of relevant archaeological evidence. When approaching the phenomenon of counting in action, a commitment to ontological frameworks like hylomorphism poses a challenge, as it requires reducing counting to an immanent ability emanating from intelligence. This means that a priori pure principles, ideas of numbers, or mathematical (pre)conceptions are necessary to enable counting operations.

In contrast to hylomorphism, this paper proposes a relationalistic ontology that, rather than isolating the participants in relationships and focusing on the internalist-externalist opposition, is informed by the notions of Simondon's milieu dependent individuations (2020), T. Ingold's material ecologies (2012) and correspondences (2016), L. Malafouris' material engagements (2013), and A. Leroi–Gourhan's technical gestures (1993). From this perspective, counting does not necessarily emerge from an immanent domain of intelligence. Despite the limitations or contradictions imposed by the participants in the relationship, counting also emerges in action—

through technical gesticulations with things. This implies that counting in action, and probably relevant numerical values, are constituted by various types of ever-emerging relations.

By acknowledging relational ontology, I aim to analyze the possibility of early Baltic counting practices based on archaeological evidence. This analysis is framed by five working arguments: (1) adopting and explicating a relational ontology to ground the study; (2) determining the relevant notions that clarify considerations regarding the Baltic clay figurines; (3) at a logical level, grounding the theoretical possibility of an interface between the Baltic and Near Eastern cultures; (4) providing a brief overview of Near Eastern token studies to structuralize the archaeological data from the contemporary territory of Lithuania; and (5) presenting Baltic clay figurines related to computational practices, including a discussion of important archaeological case that suggests biconoid-shaped figurines were used as counting tools. This case offers direct evidence of the figurines' computational nature, moving beyond previous interpretations of these objects as weights, magical, or gaming items. This discovery further substantiates the connection between Baltic material culture and Near Eastern computational traditions. The author of this paper has not been able to find any other scientific studies proposing such considerations, thereby highlighting the relevance and importance of this research.

The Origins of Counting Beyond Hylomorphism

Let us address hylomorphism once more. This ontology, known for its isolationist nature, distinguishes between form and matter, subject and object, and intelligence and milieu, prioritizing the former in each pair. Although never explicitly referred to by Aristotle, hylomorphism is aligned with his philosophy. In particular, it is related to Aristotle's ontogenetical premise that all things are combinations of form (*morphe*) and matter (*hyle*) (2016, p. 115, *Metaphysics*, Book Zeta), suggesting that the becoming of things begins as inner form in the mind, unfolding directly toward external matter. This idea implies that an active inner form—i.e., a mental representation—is imposed upon inert matter, indicating that emergence occurs within the domain of form rather than matter. In this framework, the isolated subject with inner mental representation, becomes a beholder of intelligence, solely determining actions within a related milieu. Consequently, the origins of counting are located in the immanent domain of intelligence, disregarding any conditions arising from the distinguished domains of milieu, action, or materiality. This perspective implies that mathematical (pre)conceptions, a priori pure principles, or ideas of numbers are essential for enabling counting operations. But does counting solely exist as an ideal and in an immanent plane? To approach such question, one should introduce a critique of hylomorphism.

One of the more explicit criticisms of hylomorphism was stated by Simondon. Instead of relying on the idea of prioritezed form, he proposes (Simondon, 2020, p. 25) that matter has a deformable reality, which "… contains all forms indefinitely and dynamically" and unfolds "… itself on its own once the conditions have been created" (Simondon, 2017, p. 249). Such considerations are reinforced by the famous example of brick-making (Simondon, 2020, p. 23). The distinction between a mould and a clay represents that matter is fully organized by form. However, the mould's geometric shape must also be crafted from special woods and other tools, and its surface must be prepared with oils to prevent the clay from sticking. Furthermore, the clay must be excavated, cleaned of pebbles and roots, dried, wetted, sifted, and crushed, among other processes. Therefore, technical preparations are prior to any changes in form or matter, suggesting that becoming originates in the relation between them. Later in the 21st century, this relational dimension came to the attention of anthropologists.

Building on Simondon's critique of hylomorphism, Ingold, a widely acknowledged anthropologist and philosopher, began to analyze relational dependencies, particularly the material conditions in social formations. Ingold proposed that, rather than studying materials by merely defining their qualities, individuals should establish ever-emerging and active relationships with materials, thereby creating new and transformable ecologies. These ecologies, also as termed "correspondences" by Ingold, are "… the drawing out or bringing forth of potentials

immanent in a world of becoming" (Ingold, 2012, p. 435). This "… is the way of relating of a being that dwells in habit, whose agency is ever-emergent and whose stance is attentional" (Ingold, 2016, p. 20). Nevertheless, philosophy and anthropology were not the only disciplines to recognize the importance of the dimension of relations.

By questioning isolations and acknowledging relations, cognitive archaeologist Malafouris developed his Material Engagement Theory (2013), which analyzes the material conditions shaping the human mind. Material Engagement Theory is rooted in Clark's and Chalmers' (1998) extended mind philosophy, offering an alternative to hylomorphism by proposing the notion of a hylonoetic field (*hyle* – form, *nous* – mind). This notion signifies "… a mindscape quite literally extending into the extra–organismic environment…" (Malafouris, 2013, p. 227), in which matter itself is potentially "*co–extensive and consubstantial with mind*" (Malafouris, 2013, p. 77). Malafouris demonstrates that qualities such as flexibility, resilience, density, and softness of materials are affordances—i.e., "possibilities for action" (2013, p. 252). These possibilities, along with the networks they form within their milieu, mutually shape both technicity and cognitive abilities (not all of which are purely mental). While Malafouris engages more extensively with issues of cognitive abilities, I propose expanding the discussion of technicity by incorporating Leroi–Gourhan's theoretical insights from *Gesture and Speech* (1993).

A critique of hylomorphism is also present within his paleoanthropological canon. This critique allows to assert that phenomena like counting, being inherently technical, "... would appear not as a consequence of 'intelligence' with its currents and waves, but as the result of the accession to a highly organized motricity, as the product of a new bodily conditioning" (Leroi–Gourhan as quoted in Utaker, 2020, p. 23). In this context, considerations center around the notion of technical gesture (Leroi–Gourhan, 1993, p. 237–238, 240), understood as ongoing interactions between various relations of tools and gestures. Tools refer to the field of virtual action possibilities, existing as real and concrete, while gesticulation expands and limits the range of this field. Interpreters of Leroi–Gourhan have noted that the gesticulatory nature of technics "generates" (Noland, 2009, p. 102) and that "… intelligence lies in the gesture itself, as a synergy of human being, tool, and raw material" (Ingold, 1999, p. 413).

Thus, based on these theoretical perspectives and in opposition to isolationism and the internal/external distinction, this paper adopts a relational ontology that emphasizes technical gestures, affordances, and ecologies as active and generative. Then, if counting does not emanate from inner intelligence but instead arises in action–so that action would be a significant characteristic of counting–then we could argue that the origin of counting lies in technicity, gesticulations, and material objects. It seems that this stance is also supported by anthropologists and cognitive archaeologists. For instance, Longo and Viarouge state (2010, p. 25) that mathematics, and therefore the ability to count, are based on active experiences, such as "… movement, action, retention, protension". It must be kept in mind that this action is not considered pure and independent but rather entangled with various factors, such as materiality. As noted by cognitive archaeologist Overmann (2019, p. 5), then material structures provide "…the very mechanism of elaboration. New devices for representing and manipulating numbers extend some of the capabilities provided by older devices, resolve some of their limitations, and inject new limitations that at some point may motivate the incorporation of even newer devices". In light of this, relevant notions and archaeological data will be presented to clarify the discussion and to bridge the study fields of Baltic and Near Eastern early computational practises.

Relevant notions

To determine the relevant notions that clarify our understanding of Baltic clay figurines, two registers must be considered: material composition and scholarly terminology. Regarding material composition, the notions used to describe can vary depending on how artefacts were made. This leads to referring to the Baltic figurines as *clay*. An alternative notion, such as ceramic, can be applied if the figurines were fired at high temperatures, as clay

undergoes physical and chemical changes and becomes a different material. When exposed to relatively low temperatures, only liquids evaporate, and the material structure of the clay remains unaltered (de Lima et al., 2021).

It appears that the Baltic figurines were exposed to high temperatures (Fig. 1: (a) (3, 5, 6), (c) (5), (d) (1, 3), (e) (1)) and relatively low temperatures (Fig. 1: (a) (1, 2), (b) (1–4), (d) (2), (e) (2, 4)), suggesting they were either baked in a kiln, hearth or sun-dried. However, these may not have been the only processes involved. An experiment conducted by scientists on Near Eastern clay tokens revealed that placing an unfired figurine near the opening of a kiln causes it to bake and acquire the same appearance and hardness as a sun-dried one (Baird, 2016). This experiment suggests that placing an unfired figurine near the opening of a kiln may only evaporate the liquids, thereby leaving the material structure of the clay unaltered. Until scientific research is conducted on the Baltic clay figurines, it can only be assumed that they were either sun-dried, baked near the kiln opening or hearth edge, or fired inside the kiln or hearth. Therefore, I propose referring to them simply as clay, emphasizing the materials involved and avoiding misrepresentation of the making processes conducted.

Regarding scholarly terminology, when referring to such artefacts, it is suggested that the notions *clay object* and *clay figurine* can be used synonymously. The notion clay object is motivated by its functional neutrality, and disregarding presumption of a specific use (Bennison–Chapman, 2018: 1). This notion avoids assigning misleading meaning to artefacts whose archaeological contexts have not been fully identified and analyzed. However, Bennison–Chapman (2018, p. 4) contrasts the notions object with figurine, associating the latter with the representation of an entity, such as a human or an animal. In my view, this distinction is unnecesarry, as figurine also refers to a small three dimensional object, model, or thing. Therefore, even if the artefact is geometric and not a representation of an entity, it can still be called a figurine.

When the archaeological context and organization of artefacts implies that Baltic clay figurines were used in computational practices, and considering the incorporation of Leroi–Gourhan's insights on technical gestures, these figurines will be referred to as *counting tools*. The notion counting tool retains some of the significance of jetons (Costello, 2011, 2002) and tokens (Besserat–Schmandt, 1992a, 1992b; Overmann, Wynn, 2023; Overmann, 2019), commonly used in archaeological literature to describe Near Eastern clay figurines. Both jetons and tokens are material objects that bring forth information. A jeton refers to a material marked device used in an administrative domain. However, if used carelessly, this notion might include figurines that do not belong to the administrative domain. A token etymologically derives from Old English *tǽcean*, meaning to show or to teach. Latter meanings highlight the active nature of clay figurines, avoiding a reductive, instrumentalist view of them as mere passive tools for predetermined purposes. From Simondon's philosophical perspective (2017, p. 139), a counting tool can be seen as a medium through which information reaches the individual, engaging a process of mutual determination. The use of figurines, therefore, simultaneously transforms computational procedures and enhances relevant human cognitive abilities.

Additionally, a counting tool can be viewed as an integral part of what Leroi–Gourhan calls (Leroi–Gourhan, 1993, p. 237–238, 240) a technical gesture. Regarding this view, a counting tool is a field of virtual action possibilities, existing real and concrete, while gesticulation expands or limits the range of these possibilities. Such possibilities are partially determined, manifesting in various ways, such as through tension or inertia, dynamism or stillness of movement, and the softness or hardness of surfaces. This suggests that counting tools engage in counting procedures, and this engagement gradually transforms depending on combinations of gestures, material compositions, forms, and possibly markings involved. As is evident, a counting tool is that through which one counts, while the things being counted will be referred to as counting subjects. A counting subject is content independent because it is still impossible to determine exactly what was counted through Baltic figurines. Later in this text, it will be shown that counting subjects can include products, time, wishes, possessions, or goods.

Lastly, I propose introducing a Lithuanian translation of counting tool into the contemporary discourse of Lithuanian archaeological literature. The suggested translation is *skaičiuoklis*, meaning a device made for counting (Ulvydas, 1981, p. 653). Other alternatives were considered, such as "skaitytuvas" (Ulvydas, 1981, p. 654)

and “skaitiklis” (Ulvydas, 1981, p. 671), which carry the same meanings. Also, “skaityklas” (Ulvydas, 1981, p. 670) refers to a small ball used for counting in an abacus-like device. However, these alternatives, due to the common part *–skait*, evoke connotations of abacus-like devices where counting occurred only by sliding small balls back and forth. Therefore, the least connotative and most fitting term actually is “skaičiuoklis”.

A Possible Interface between Baltic and Near Eastern Cultures

Before moving on to the specific archaeological data and examples, I would like to consider the possibility of an interface between Baltic and Near Eastern cultures. If this is possible, the token practices originating in the Near East will help substantiate that Baltic clay figurines were used as counting tools. This is grounded by a three-layered argument. First (I), analogies are drawn between Near Eastern tokens and Baltic clay figurines, as presented in Fig. 1. Second (II), although only vague dates can be suggested, it is evident that the chronological periods of Near Eastern tokens and Baltic clay figurines overlap. Third (III), artefacts made of Baltic Sea (located west of Lithuania) amber, found in Near Eastern territories, imply some form of mutual or unidirectional contact.

Regarding (I), the works of Besserat–Schmandt (1992a, 1992b) will be referred. These works present both a typology and a catalogue of Near Eastern tokens possibly used in counting operations. Through this reference, it is possible to identify analogies with clay figurines found in the contemporary territory of Lithuania: biconoids (Fig. 1, a) (Schmandt–Besserat, 1992a, p. 222, in catalogue 9: 1–4), concaves (Fig. 1, b) (Schmandt–Besserat, 1992a, p. 213, in catalogue 4: 28; p. 230, in catalogue 15: 16; p. 232, in catalogue 16: 13), discs (Fig. 1, c) (Schmandt–Besserat, 1992a, p. 208–211), miniature vessels (Fig. 1, d) (Schmandt–Besserat, 1992a, p. 228, in catalogue 13: 35–36), spheres (Fig. 1, e) (Schmandt–Besserat, 1992a, p. 206–207), and tools (Fig. 1, f) (Schmandt–Besserat, 1992a, p. 229).

With regard to (II), based on the unstratified archaeological contexts of the finds and the unclear descriptions in 20th century reports, I can only offer vague considerations about the chronology of the Baltic clay figurines found in Lithuania. However, it is important to note that possibile plain tokens in the Near East have been present from the 10th millennium BC to the 1st millennium CE (Overmann, 2019, p. 160), which may offer a comparative framework for understanding the potential time range of the Baltic clay figurines. The Bronze Age in the Eastern Baltic can be dated between 1700 cal BC and 530/520 cal BC (Podėnas, 2022, p. 20–21). To link the Baltic clay figurines to the Bronze Age, we should mention Lake Luokesai Settlement I, which was inhabited only during this period. Dendrochronological analyses suggest that the settlement was in use between 625 and 535 BC (Bleicher, 2014, p. 363). Excavations in this settlement yielded clay figurines—specifically, a punched small disc (Kraniauskas et al., 2016, p. 474) and a miniature vessel (Kraniauskas et al., 2015, p. 546). Thus, the disc and miniature vessel types can be associated with the 7th and 6th centuries BC.

Another source for considering the chronology of the finds, along with their locations, is striated pottery. This pottery making technique gives its name to the culture that inhabited the Eastern Baltic during this period. In the mentioned archaeological (un)fortified settlements, clay figurines and striated pottery have been found within the same contexts, raising questions about the relationship between the clay figurines and striated pottery culture. Could the appearance of clay figurines coincide with the striated pottery culture? Although there is currently no established typology or chronology for the striating technique, some data reveal interesting results that may suggest that clay figurines possibly belong even to earlier times. According to dendrochronological dates based on materials from the Žalioji settlement, the striating technique was present around 2470 ± 50 cal BC (Podėnas, 2022, p. 199), suggesting that clay figurines could have already existed at that time.

Regarding (III), at a logical level, the possibility of contact between these cultures can be based on amber finds from the Near East. On the northern coast of Israel, at the archaeological site of Akhziv, amber artefacts, such as beads and small figurines, have been discovered. Scientific and molecular tests conducted in the Netherlands revealed that the amber originated from the Baltic Sea, located to the west of Lithuania. Therefore, it is

most likely that amber was a traded commodity between the Baltic and the Mediterranean, as indicated by Heltzer (2000). These amber artefacts are from a time similar to the Bronze Age in the Eastern Baltic, dating back to around 1200 BC (Todd, 1985, p. 294). The earliest dates may be associated with two amber beads from Assur, circa 1800 BC, or amber finds from Tell Asmar, circa 2400 BC (Singer, 2008, p. 18). However, it is difficult to determine whether the amber from the Baltic Sea traveled through the Eastern Baltic or Scandinavian regions. The nature of such contact could have been part of economic exchanges, or perhaps the amber traveled through various locations and routes for entirely different reasons. Let us now turn to archaeological data and examples, starting with a brief overview of Near Eastern token studies.

A Brief Overview of The Near Eastern Token Studies

Since I rely on Schmandt–Besserat's catalogue, let me briefly introduce Schmandt–Besserat's (1992a, 1992b) interpretation of the token phenomenon in the Near East. She proposes that clay tokens served as administrative counting tools in agricultural societies, evolving through distinct phases until culminating in writing. Schmandt–Besserat distinguishes between two main categories of tokens: plain tokens and complex tokens. Plain tokens, which first appeared around 8000 BC, are small, undecorated geometric figurines made of clay. By the 4th millennium BC, complex tokens emerged, which were marked or/and pierced. By the mid-4th millennium BC, plain tokens began to be encapsulated in clay envelopes, or "balls", sometimes marked upon impressions of the figurines. This development continued with the introduction of clay tablets around 3300 BC, which had imprints of the token forms and later featured drawn pictograms.

Despite her significant contributions, some aspects of Schmandt–Besserat's interpretation require revision. For instance, the chronology of tokens has changed. Contemporary research indicates that possible plain tokens may have been in use from the 10th millennium BC until the 1st millennium CE (Overmann, 2019, p. 160). Furthermore, the tokens presented in her catalogue do not necessarily imply a universal function as administrative counting tools (Bennison–Chapman, 2018, p. 1). Schmandt–Besserat also assumes that figurines used before the emergence of imprints of plain token forms on tablets and the development of writing (post mid–late 4th millennium BC) served as administrative counting tools. This assumption is problematic because she did not analyze the archaeological contexts of all catalogued figurines, which is crucial for understanding the computational operations involved.

It must be noted that the distinction between plain and complex tokens has also been a subject of discussion. However, these discussions primarily focus on the empirical referents attributed to these categories rather than the terminology itself. It has been observed that Schmandt–Besserat applies the same empirical referents to both plain and complex tokens in her catalogue (Zimansky, 1993, p. 515). While earlier plain tokens are sometimes considered counting tools due to their association with later plain tokens encased in envelopes, classifying complex tokens, which resemble plain tokens in form, as counting devices remains challenging. For instance, complex tokens have been found in the graves of children (Englund, 1998, p. 258), suggesting that their operations may differ from that of counting tools.

As far as I know, there is no univocal consensus in archaeological literature on what principles and exactly how tokens have been used in counting operations. This discussion can be highlighted by two perspectives. On one hand, Schmandt–Besserat (2010, p. 31) posits that each token type corresponds to a single type of product. In contrast, an alternative viewpoint suggests that this relationship is not universally applicable to all tokens (Overmann, 2019, p. 162–163). In my view, such polarized discussion can be explained by considering the question on the token values. In the context of this question, relying on Friberg's suggestion (1994, p. 483) that impresions of plain tokens (protoliterate number sign) values are context-dependent, "… depending on which commodity it was counting or measuring", we can hyphothesize that token values themselves were context dependent. This interpretation can be reinforced by a relational approach, suggesting that tokens depended on the interactions they engaged in, where affordances like materials, sizes, types, counting subjects, and usage combinations de-

termined their value. Therefore, the discussion on what principles and exactly how tokens were used in counting operations may never be fully resolved, given the possibility that token values changed depending on various networks of relations across different times and places.

To further explore such considerations, I would like draw once more on Leroi–Gourhan's *Gesture and Speech* (1993) and on Malafouris' Material Engagement Theory (2013). Regarding Leroi–Gourhan's premises, I suggest viewing tokens as being engaged in counting operations through technical gestures. In this case, technical gestures presuppose memory stored programs (Leroi–Gourhan, 1993, p. 238), which serve "...as the medium for action sequences" (Leroi–Gourhan, 1993, p. 413). The notion of program, etymologically meaning recording and forward movement, implies an interplay between retrospection and anticipation. Retrospection schematizes token usage by establishing patterns of gesticulation related to token types and counted subjects. These schemes reduce the need to remember each action taken, thus shaping a tradition that can be consistently relied upon. In contrast, given the new, unfamiliar counting operations, individuals begin to anticipate new combinations of tokens and gestures, thereby expanding computational techniques and creating new values.

Malafouris asserts that humans possess a preverbal, nonsymbolic numerical cognitive ability, shared with animals, enabling intuitive approximation and comparison of quantities of physical objects up to three or four (2013, p. 106–107). This implies that the gesticulation with tokens enhance this innate numerical ability and improoves understanding of quantities, allowing individuals to remember and fix greater amounts of information. In other words, such development led to the emergence of at least two computational gestures: addition and subtraction. In the Lithuanian language, the term "sudėtis" (addition) refers to the act of arranging objects in a plane, while "atimtis" (subtraction) signifies the gesture of removing items by hand. This linguistic example further highlights how early counting practices were entanlged with physical actions.

Despite the discussions surrounding Schmandt–Besserat's interpretation, her contributions are significant. Importantly, her work has produced a comprehensive catalogue presenting a typology of Near Eastern possible tokens, highlighting analogies with figurines from other cultures, such as Baltic. This provides a framework to consider the Baltic clay figurines as integral part of a potential computational prototechnology. Thus, Schmandt–Besserat's interpretation is reliable in two complementary ways: first, as a reference point for drawing analogies, and second, as a foundation for structuring the analysis of archaeological data from the contemporary territory of Lithuania.

Archaeological Data Related to Early Baltic Computational Practices

Let us start with motivation. Schmandt–Besserat's (1992a) interpretation suggests that counting with tokens in the Near East led to the emergence of writing, raising an intriguing question about the origins of writing in the Eastern Baltic. It is accepted that Baltic writing did not develop here, as Latin and Slavic scriptures were adapted under the influence of Christianity (Zinkevičius, 1988, p. 15). Interestingly, Zinkevičius (1998, p. 14) also proposed that before Christianization, mnemonic signs were "used to indicate ownership of various things, the things themselves, or to count time," and that "they didn't even need any other kind of writing then". While Zinkevičius did not expand on this idea, I aim to explore similar possibilities by examining clay figurines as tools for early counting practices. As will be evident in the discussion section, these figurines may have even functioned as administrative recording technology.

This approach is grounded in the premise, in my view, that there is a distinction between writing as scripture and writing as gesture. The former signifies text, sacred books, or imprinted and drawn syntactic statements, while the latter refers to processes like scribing, cutting, drawing, marking, or imprinting on a medium. In this sense, gestures fix information through interaction with a material surface or object. Since writing is gestural and counting can emerge through action, I propose that gestures such as placing clay figurines in containers, arranging them in piles, or tying them with string can be considered variations of writing. These gestures not only enact computational procedures but also transmit computational information, similar to the way writing do.

To better imagine this, let us draw on two sources: one historical and the other ethnographic. A historical account by Pretorijus from the 17th century (2003, p. 283) describes a farmer from the village of Nadruva who, unable to read or write, tracked time by planting a tree on his son's birthday. Each year, he made a hole in the tree and placed a pebble inside to mark his son's age. This practice is echoed by Jucevičius in the 19th century (1959, p. 304–305), suggesting a continued tradition of using material objects for counting and recording time. An ethnographic source from the early 20th century (Dundulienė, 1982, p. 201) shows that people counted trade goods by organizing physical items—such as straws, beans, peas, or eggs—into piles. These gestures highlight how the organization and handling of material objects can serve as a medium for counting and recording quantities of interest. In light of these examples, I want to turn to Baltic clay figurines.

Based on the established logical interface, it is possible that some Baltic clay figurines were used in computational practices similar to those in the Near East. This connection is further highlighted by the fact that Baltic artefacts also fall under the distinction between plain and complex figurines. However, it remains uncertain whether this distinction in appearance carries significant implications for their usage or if plain figurines preceded complex ones. The typology of clay figurines is illustrated in Fig. 1:

However, due to imprecise excavations in the mid-20th century, many of these discoveries were poorly documented, often noting only location, square, and depth. Some excavations involved removing layers as thick as 20 cm (Daugudis, 1956), while others ranged from 10 cm to 60 cm (Grigalavičienė, 1976), complicating the reconstruction of the precise archaeological context of these artefacts. The finds I have studied are archived in the National Museum of Lithuania, and based on their quantity, it remains promising that clay figurines may also be stored in other Lithuanian museums. By presenting this visual typology, I aim to guide future research and emphasize the importance of accurately documenting the context of such discoveries, which will facilitate more precise interpretations and explanations regarding the usage of these figurines.

In the cited excavations reports and subsequent archaeological articles (Grigalavičienė, 1986a, p. 75; Grigalavičienė, 1986b, p. 119; Kulikauskienė–Volkaitė, 1986 p. 40–41; Luchtanas, 1992, p. 69, 73), these Baltic figurines are primarily associated with household purposes. For example, miniature discs without a hole have been described as unfinished spindles. Smaller, pierced, and marked spheres as spindles. Larger discs and spheres have been identified as weights for weaving looms and fishing nets, while biconoid-shaped items and concaves are also considered weights for fishing nets. Miniature vessels have been interpreted as salt or medicine containers, lamps, or children's toys. Tools and marked spheres are defined as objects used in magical rituals. Additionally, archaeologists conventionally identify artefacts like those presented in Fig. 1 as gaming objects. Nevertheless, nearly all of these figurines are made from clay, with the exception of one made of stone (Fig. 1, f (1)), and their dimensions range approximately from 2 to 8 centimeters. Given these characteristics, it can be questioned whether at least some of the clay figurines were unsuitable for pragmatical purposes such as weighing or sinking.

Even though there might have been many weaving or fishing techniques and technologies, the small size and light weight of the disc-shaped or biconoid-shaped figurines suggest they may not have worked well for holding fishing nets or could easily become entangled in weaving threads. It seems likely that larger and heavier objects

Fig. 1. (Photos taken by the author). (a) – biconoids, (b) – concaves, (c) – discs, (d) – miniature vessels, (e) – spheres, (f) – tools, (g) miscellaneous. Section (g) represents finds that, despite being solitary, have analogues in the Near East: (g, 1, 4) (Schmandt–Besserat, 1992a, p. 211, in catalogue 3: 81); (g, 3) (Schmandt–Besserat, 1992a, p. 232, in catalogue 16: 17; (g, 5) (Schmandt–Besserat, 1992a, p. 220–221, in catalogue triangles); (g, 4) concaves(?); I was not able to find analogues with (g, 7, 8). Therefore, the artefacts in section (g), rather than belonging to the Bronze Age, may belong to other periods. If at least some of these finds were indeed used for counting, their rarity could be explained either by the infrequency of the subjects being counted or by the uncommon nature of the counting procedures themselves. (a) (1, 2, 3, 5, 6) and (e) (1, 2) were found at the Nevieriškės fortified settlement (i.e., hillfort); (c) (1, 2, 4), (d) (2), (e) (3, 4), (f) (1, 2, 3), and (g) (2, 3) at the Narkūnai fortified settlement (i.e., hillfort); (a) (4), (b) (1, 2, 3, 4), and (c) (6) at the Sokiškės fortified settlement (i.e., hillfort); (c) (3), (d) (1, 3), g (1) at the Aukštadvaris fortified settlement (i.e., hillfort); and (c) (3), (g) (7) and (d) (1) at the Kunigiškės fortified settlement (i.e., hillfort); (g) (4) at the Paveisininkai fortified settlement (i.e., hillfort); (g) (8) at the Nemenčinė fortified settlement (i.e., hillfort); (g) (5, 6) at the Guogai unfortified settlement (i.e., hillfort). These findings are preserved in the National Museum of Lithuania.

1.pav. *(Nuotraukos padarytos autoriaus). (a) – dvikūgiai, (b) – įgaubti, (c) – diskai, (d) – miniatiūriniai indai, (e) – sferos, (f) – įrankiai, (g) – įvairūs. Sekcijai (g) priskiriami radiniai, kurie yra pavieniai, bet turi analogų Artimuosiuose Rytuose: (g, 1, 4) (Schmandt-Besserat, 1992a, p. 211, kataloge 3: 81); (g, 3) (Schmandt-Besserat, 1992a, p. 232, kataloge 16: 17); (g, 5) (Schmandt-Besserat, 1992a, p. 220-221, kataloge trikampiai); (g, 4) įgaubti (?); nepavyko rasti analogų (g, 7, 8). Todėl sekcijoje (g) esantys dirbiniai, užuot priklausę bronzos amžiui, gali priklausyti kitiems laikotarpiams. Jei bent dalis šių radinių iš tiesų buvo naudojami skaičiavimui, jų retumą galima paaiškinti arba skaičiuojamų dalykų retumu, arba pačių skaičiavimo procedūrų neįprastumu. (a) (1, 2, 3, 5, 6) ir (e) (1, 2) buvo rasti Nevieriškės įtvirtintoje gyvenvietėje; (c) (1, 2, 4), (d) (2), (e) (3, 4), (f) (1, 2, 3), ir (g) (2, 3) – Narkūnų įtvirtintoje gyvenvietėje; (a) (4), (b) (1, 2, 3, 4) ir (c) (6) – Sokiškių įtvirtintoje gyvenvietėje; (c) (3), (d) (1, 3), (g) (1) – Aukštadvario įtvirtintoje gyvenvietėje; (c) (3), (g) (7) ir (d) (1) – Kunigiškių įtvirtintoje gyvenvietėje; (g) (4) – Paveisininkų įtvirtintoje gyvenvietėje; (g) (8) – Nemenčinės įtvirtintoje gyvenvietėje; (g) (5, 6) – Guogų neįtvirtintoje gyvenvietėje. Šie radiniai saugomi Lietuvos nacionaliniame muziejuje.*

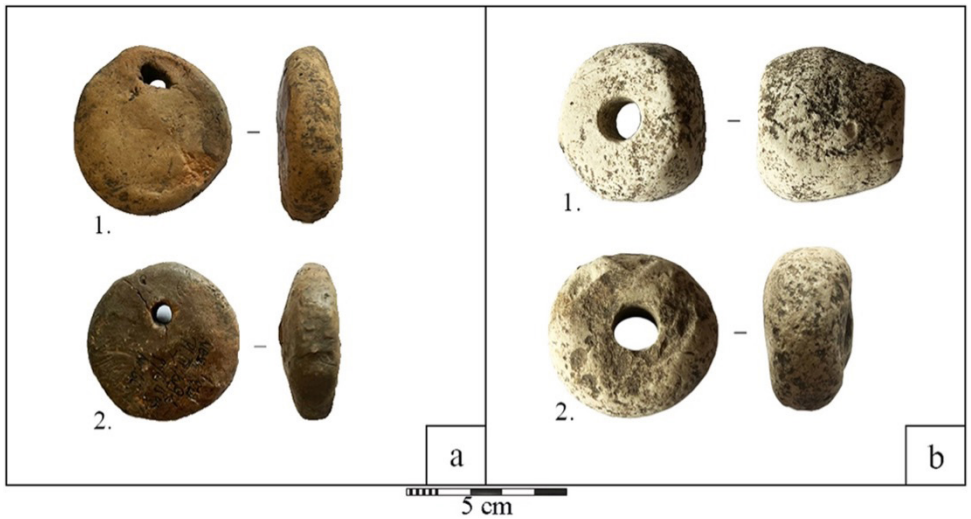

Fig. 2. (Photos taken by the author). (a) – possible clay weights, (b) – possible stone weights. (a) (1, 2) were found at the Nevieriškės fortified settlement (i.e., hillfort); (b) (1, 2) at the Narkūnai fortified settlement (i.e., hillfort). These findings are preserved in the National Museum of Lithuania.

2. Pav. *(Nuotraukos padarytos autoriaus). (a) – moliniai galimi pasvarai, (b) – akmeniniai galimi pasvarai. (a) (1, 2) rasti Nevieriškės įtvirtintoje gyvenvietėje; (b) (1, 2) – Narkūnų įtvirtintoje gyvenvietėje. Šie radiniai saugomi Lietuvos nacionaliniame muziejuje.*

(as in Fig. 2 (a, b)) would have been more suitable for such operations, as they would be more capable of tensioning threads or holding the ends of fishing nets to the bottom, while, for example, increasing the chances of catching fish. The larger objects shown in Fig. 2 (a, b) were found at the same fortified settlements as some of the clay figurines presented in Fig. 1. Especially the clay weights in Fig. 2 (a), based on analogies with finds from rooms housing weaving looms (in Europe and the Near East), most likely date to the same Bronze Age period (Podėnas, 2022, p. 215).

The classification of Baltic clay figurines as gaming or magical objects can be also questioned. There is a lack of archaeological or historical evidence substantiating the hypothesis that all or any of these clay artefacts were designed for gaming or magical rituals. No gaming boards, constructed of clay, wood, or other materials, have been retrieved, nor did the organization of finds indicate their use in games. Therefore, it is equally plausible that some of the clay figurines could have been used for gaming, and some could have been used for counting operations. Even though some of the clay figurines were used for magical practises, ethnographic evidence suggests that magic could also have been related to counting. Lovčikas (1992, p. 103–104) documented that in 20th century Žemaitija, where a mother, preparing to marry off her daughter, made as many small feather crowns as she wished grandchildren, secretly placing them in her daughter's pillow. After commenting on archaeological data from the territory of Lithuania, I will now turn to an important case of biconoid-shaped figurines.

Discussion. An Important Case of Biconoid-Shaped Figurines

In the contemporary territory of Lithuania, most biconoid-shaped clay figurines were found at the Nevieriškė fortified settlement (hillfort), with a total of 45 pieces documented (Grigalavičienė, 1976). These figurines vary in size, ranging from a minimum diameter of 1.8 cm to a maximum of 4.2 cm at the center, and from a minimum length of 2.5 cm to a maximum of 7.8 cm. Regarding shape variations, two figurines are particularly notable. One has rubbed-off ends (Fig. 1, a (6)), measuring 3.7 cm in diameter and 4.7 cm in length. Another figurine

from the Sokiškis fortified settlement (hillfort) (Grigalavičienė, 1980, p. 111) stands out due to its four longitudinal imprints along the center of its side (Fig. 1, a (4)), with a diameter of 3.3 cm and a length of 7.3 cm.

In the Nevieriškė fortified settlement, biconoid-shaped figurines were found in relation with individual concentrations of striated pottery sherds. Located side by side and undispersed, five (no. 3–7) concentrations containing fragments of broken vessels were discovered *in situ* (Grigalavičienė, 1976, p. 20). However, this does not mean that only five vessels were present at this location. For example, concentration 3 contained fragments of at least two different pottery styles—bucket-shaped and curved vessels—suggesting that there were likely more than five vessels placed overall. In this concentration, 23 pieces of biconoid-shaped figurines were found (Grigalavičienė, 1976, p. 24, 49), while two additional figurines were located near concentration 6 (Grigalavičienė, 1976, p. 49), and several related to further concentration 1 (Grigalavičienė, 1976, p. 24). The bucket-shaped pottery style, in particular, is crucial for interpreting the role of the clay figurines. This style, emphasizing wide openings and large volumes, suggests that rather than cooking, as they would not have been able to withstand high temperatures, bucket-shaped vessels were likely used for storing products.

Bennison–Chapman references archaeological investigations at the "burnt village" of Late Neolithic Sabi Abyad in Syria (Akkermans, Verhoeven, 1995; P. Akkermans et al., 2012) to suggest that the clay figurines discovered alongside pottery, which was possibly used for storage, likely were used in"...the sphere of administration, in activities linked to secured and stored goods" (Bennison–Chapman, 2018, p. 27). This connection between clay figurines and storage vessels implies that the figurines were not magical or gaming objects but may have had used as counting tools in recording and handling stored resources. Additionally, as Akkermans and Duistermaat (1996, p. 19) indicate, the organization of finds at Sabi Abyad, along with their relation to administrative sealings (which conveyed information about stored goods), suggests that miniature vessels and discs may have also served administrative purposes. Drawing on analogies between Near Eastern tokens and Baltic clay figurines, it is plausible that miniature vessels and at least some discs in the latter culture were used in similar administrative contexts.

Unfortunately, the lack of preservation details complicates understanding of the archaeological context, as the physical circumstances could have determined the organization and use of the biconoid-shaped figurines. Grigalavičienė's (1976) report and probably the mixed characteristics of the excavated area do not provide accurate information about the conditions under which the nests were preserved—whether they were inside a building, or placed somewhere outside. She only mentions (Grigalavičienė, 1976, p. 19–20) that, under the pottery sherds no. 3–7 and concentrating at the same area, unsystematic holes (diameters 7 cm, 10 cm, and 10x15 cm; distances between them 5–15 cm) of previously embedded poles were discovered. Additionally, in 2–2,5 meters away, similar holes (diameters 5x10 cm, 12x15 cm) appeared, forming a curved line. Evidently, these details imply the presence of a possibly related structure. Yet, with only these details, the interpretation of the biconoid-shaped figurines remains partly uncertain. Given this, at least three interpretative discussions can be suggested regarding potential uses of biconoid-shaped figurines: administrative, vital, and transactional.

(A) If the vessels were stored indoors, it is possible that they were part of the administrative procedures related to ownership. In this case, the biconoid-shaped figurines may have been used to indicate the quantity of stored items, such as vessels or particular foods. Perhaps, these figurines helped to keep track of stock, verifying whether any vessels or foods had been stolen from the storage place or lost during transportation.

(B) If the vessels were stored indoors, the vital domain of survival can be emphasized. In this case, biconoid-shaped figurines may have indicated rations, specifying how many goods should be consumed over a certain period of time. Bucket-shaped figurines might have also been used to indicate whether goods were mature enough, how long it could be preserved, or when it might spoil and become unuseful. In this context, it is likely that time was implied, potentially counting seasons for planting, harvesting, or other season-sensitive activities. Perhaps, in a identitary manner to what we now perceive as months, weeks, or days.

(C) If the vessels were stored outdoors, biconoid-shaped figurines usage might belonged to a transactional domain–indicating an exchange between at least two agents in a sale-purchase relationship. In this context, biconoid-shaped figurines could have been used to record or track the quantities of goods being exchanged, ensuring accurate transactions and reducing the risk of mistakes or dishonesty by the seller or buyer.

In the case of biconoid-shaped figurines, which may have been placed inside a vessel, it is likely that some were associated with an additional material media. This material media, similarly to counting tools, may have enacted counting processes or recorded the subjects being counted. Presumably, the additional media was an integral part of the counting technology, influencing the choice of figurines, the gestures used in counting, and the specific quantities involved. Such material media could have also served to preserve the counted quantities in time and space, enabling future reference or consumption.

Now that we can more confidently assert that biconoid-shaped figurines were used as counting tools and that one of them was marked, it is possible that the marking held specific value. If this is indeed the case, markings on other clay figurines, when used as counting tools, may have also carried significance. The literature on Near Eastern tokens suggests that different token sizes corresponded to different values (Friberg, 1994, p. 485). For example, a larger token could represent *x* quantity of smaller tokens or *vice cersa*. In this regard, even subtle differences between figurines—such as variations in shape, size deviations, or binary opposition (e.g., large *vs*. small)—may indicate that the Baltic figurines also held varying values depending on their characteristics.

Conclusions

Based on a relational ontology and the analogies between Near Eastern tokens and Baltic clay figurines, the case of biconoid-shaped figurines suggests that, rather than being weights or objects with unknown purposes, these figurines can be more accurately identified as counting tools. Additionally, the archaeological example of Sabi Abyad suggests that at least some of the Baltic discs and miniature vessels were also used as counting tools. Hopefully, in the future, it will be possible to place the remaining types—concaves, spheres, tools, and at least some of the miscellaneous—under the same or similar identification.

These considerations further substantiate the idea that contact between Baltic and Near Eastern cultures was likely real. However, determining the exact nature of this contact—whether it involved mutual exchanges or unidirectional journeys—remains difficult. Nevertheless, if, as the analysis suggests, some Baltic clay figurines were actually used as counting tools, then the phenomenon of Near Eastern computing technology spreading to distant territories beyond its geographical borders becomes highly probable.

If no contact existed between Baltic and Near Eastern cultures, the resemblance between Baltic clay figurines and Near Eastern tokens would be coincidental, providing an opportunity for further theoretical reflection. For example, if archaeological evidence supports the use of Baltic clay figurines for counting, we might reconsider the origins of counting from an additional perspective. Instead of viewing counting as an innate human ability based on approximation, it's possible that the shared material characteristics and geometric shapes of Baltic figurines and Near Eastern tokens were the actual reasons that enabled the emergence of early counting practises and computing technologies.

Building on Leroi–Gourhan's considerations, I propose that counting in action— counting through gesticulations with variously shaped material counting tools—is an integral part of memory. In this context, counting in action is interpreted as a mnemonic technology that not only aids in remembering larger amounts of information but also actively alters memory by restructuring the duration of retentions. This restructuring occurs when new combinations of gestures and counting tools become involved in counting practises, mutually determining both the counting process and the formation of memory itself.

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Skaičiavimas veiksme: apie ankstyvąsias baltiškasias komputacines praktikas ir Artimųjų Rytų įtakos galimybę

Dominykas Barusevičius

Santrauka

Šiame darbe keliama hipotezė, kad Pietryčių Baltijos regione ankstyvosios komputacinės praktikos atsirado kaip skaičiavimas veiksme ir galbūt buvo paveiktos Artimųjų Rytų skaičiavimo naudojant daiktus tradicijų. Hipotezė substancijuojama keliant skaičiavimo veiksme ontologinių pagrindų klausimą ir analizuojant relevantiškus archeologinius duomenis. Pristatomos hilomorfistinė ir reliacionistinė ontologijos. Siūloma, kad hilomorfistinė ontologija įpareigoja redukuoti skaičiavimą į intelektui priklausantį imanentinį gebėjimą, todėl tampa iššūkiu. Tokia redukcija implikuoja, kad matematinės (pre)koncepcijos, skaičių grynieji aprioriniai principai ar idėjos yra būtinos įgalinti skaičiavimo operacijas. Priešingai hilomorfizmui, siūloma reliacionistinė ontologija, kuri leidžia tvirtinti, kad, nepaisant santykio dalyvių formuojamų apribojimų ar prieštaravimų, skaičiavimas taip pat iškyla veiksme – per techninę gestikuliaciją su daiktais.

Pripažįstant reliacionistinę ontologiją, straipsnyje archeologinių duomenų pagrindu siekiama ištirti ankstyvosios skaičiavimo praktikos galimybę Pietryčių Baltijos regione. Įžvalgų apie šią galimybę suteikia įvairių formų nežymėtos ir žymėtos molinės figūrėlės, rastos dabartinėje Lietuvos teritorijoje, tiek įtvirtintose, tiek neįtvirtintose bronzos amžiaus gyvenvietėse (pvz., Aukštadvaris, Nevieriškės, Narkūnai, Sokiškis, Nemenčinė). Būtent šių figūrėlių panašumas į Artimųjų Rytų *token*‘us – gerai žinomus dėl jų naudojimo skaičiavimo praktikose – leidžia baltiškąsias figūrėles interpretuoti kaip potencialius skaičiavimo įrankius. Sprendžiant pagal ankstesnes archeologines publikacijas, parašytas atlikus kasinėjimus, galima sakyti, kad dėl figūrėlių paskirties nebuvo vienareikšmiškai sutariama. Jos interpretuotos kaip pragmatinių paskirčių daiktai, pavyzdžiui, pasvarai žvejybos tinklams ar audimo staklėms, kabučiai ar (ne)užbaigti verpstukai. Figūrėlės taip pat interpretuotos kaip objektai magiškiems ritualams ar žaidimams.

Straipsnyje hipotezė grindžiama penkiais argumentais: (1) naudojant ir eksplikuojant reliacionistinės ontologijos argumentus tyrimui įrėminti; (2) svarstant relevantiškas sąvokas, kurios nuskaidrina Pietryčių Baltijos regione rastų molinių figūrėlių analizę; (3) loginiu lygmeniu pagrindžiant Pietryčių Baltijos ir Artimųjų Rytų kultūrų kontakto galimybę; (4) trumpai apžvelgiant Artimųjų Rytų *token*’ų tyrimus, siekiant įvertinti šiuolaikinėje Lietuvos teritorijoje aptiktus archeologinius duomenis; ir (5) pristatant Pietryčių Baltijos regione rastas molines figūrėles, potencialiai susijusias su skaičiavimo praktika. Taip pat įtraukiama svarbaus archeologinio atvejo diskusija, kuri leidžia manyti, kad dvikūgės formos baltiškosios figūrėlės iš tikrųjų buvo naudojamos kaip skaičiavimo įrankiai. Straipsnyje pateikiama analizė galiausiai leidžia sakyti, kad, kadangi Pietryčių Baltijos regione ankstyvoji komputacinė praktika pasirodė kaip gestikuliavimas su įvairių dydžių ir formų molinėmis figūrėlėmis, veikiausiai paveikta Artimųjų Rytų skaičiavimo naudojant daiktus tradicijų, Artimųjų Rytų ankstyvosios skaičiavimo prototechnologijos plito toliau už jų ištakų geografinių ribų.