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## **Money — from virtual reality to the real thing: Emerging national currencies and the transformation of traditional peasant economy in Northwest Germany**

### **(1) Introduction**

Scholarly research has discovered lots of resistances during the introduction of the decimal system, and shown that this resistance seems to be as widespread all over Europe as the decimal system itself. This paper adds a microhistorical perspective based on the huge collection of peasant written sources preserved at archives of the Open Air Museum Cloppenburg, in order to understand, why the resistance was rational or what was rational in these patterns of refusal and obstruction.

Only very few people are crazy enough to try to understand private records of pre-decimal times. Such as e.g. these three pages of a private notebook of a northwest German peasant, written during the second half of the eighteenth century. Its entries read like

- “1766 5<sup>th</sup> April Berndt Aschenbeck 5 pistolettes or 25 reichstalers in gold. Owing for honey in 1772 8 reichstalers 5 grote in gold.<sup>1</sup>
- 1771 November 29<sup>th</sup> a pig sold to Albert Kopman for 13 reichstalers 36 grotes. Paid instantly 8 reichstalers in gold, the rest he will pay in Dutch guilders, around saint jacob’s day, i.e. 5 reichstalers 36 grotes. John, the servant, paid 5 reichstalers gold 1772 april 5<sup>th</sup> on his wages. The blood of Jesus Christ washes away all our sins. Amen.<sup>2</sup>
- 1778 December 21<sup>st</sup> Lüdecken on Rade lent 5 Louisd’ors
- 1790 in May Eylert Wohler in Dötlingen will start on the Batbarts farm, where H. Muhle was before, for 6 Dutch guilders
- 1757 June 24<sup>th</sup> Johann Holthusen [...] lent 20 reichstalers in 6 and 12 groten coins  
1774 August 7<sup>th</sup>  

Johann Holthausen	paid 3 reichstalers current
must still have	4 reichstalers which is gold
for 1768.69.70.71.72.73.74	7 reichstalers, due on St. John’s day
Anno 1775 in November the 20 reichstalers in gold repaid”. <sup>3</sup>	

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<sup>1</sup> “1766 d. 25. Aprils berndt Aschenbeck 5 Pistoletten oder 25 rt in golt und 1772 vor Honig schuldig blieben 8 rt 5 gr in gold.”

<sup>2</sup> “1771 d. 29 November albert Kopman Ein schwein, verkauffet vor 13 rt 36 gr mir hat fordrt bezahlet 8 in Goldt daß überig wil bezahlen in hollanschen Güllden Gegen Jacobe 1772 ten Jahr nemlich 5 rt 36 gr Johann Knecht 5 rt goldt vor 1772 d. 5 April bezahlet auf sein verdienete lohn daß Blut Jesu Christi des sohnes Gottes machet Unß Rein von allen sunden Amen”

<sup>3</sup> “1757 d. 24 Junius Johann holthusen lehnet 20 rt. in 6 un 12 gr. stück  
Johann holthausen - - - - 3. rt. in Cor bezahlet  
mus also noch haben - - - - 4 rt. Welches golt ist  
vor 1768.69.70.71.72.73.74 - - 7 rt. auf Johanni fallig  
Ann. 1775. im Nov. die 20 rt. in Golde  
Wieder bezahlet”

These three pages seem to reveal the whole complexity of pre-modern currency for us, whereas they were rather convincing by their simplicity for all contemporary readers and writers.

Money lending is a considerable element in this farmstead's daily economy. Some loans are given in golden coins, as for example the five pistolettes, valueing 25 reichstalers, or the five Louisd'ors for Lüdecken on Rade. Or it is given in small silver coins, as for Johann Holthusen, a member of the lower class, who would have had no use for golden coins in his daily life. The rent he has to pay annually is 5% or 1 reichstaler, and we can be sure, that he paid the sum also in silver grotes, or in Dutch guilders, as Albert Kopman did. As much as there may be written about gold in these annotation books, it only means real golden coins in the two first cases of the pistolettes and the Louisd'ors. In all the other cases it's just a fictional currency unit, and the real transactions are done in a large variety of silver coins — groten, guilders, stuivers etc.

## (2) Parish communities and local economies

The Aschenbeck farm was situated in the northwestern part of Germany, not far from Bremen, on the territory of the count of Oldenburg, which was since 1667 governed by the kingdom of Denmark. The regional map of northwest Germany at this time shows the typical pre-modern patchwork of territories, every territory with its own customs, law and currency, a situation that seemed to be unbearable for every 19<sup>th</sup> century economist.

But the pre-modern society with its rural majority, whose everyday economy is reflected in our peasant's notes, was nothing less than static and immobile. The rigid legal monopoly of peasant property turned the demographic flood into valleys of underclass existence. Indivisibility of farmsteads being the political complement of the early modern monarchies in their typically scattered German form, the continuous and accelerating population growth since the end of the devastating Thirty Years War produced an ever extending social sediment of small tenants and workers, of small local crafts and migrant labour.<sup>4</sup>

At the end of the 18<sup>th</sup> century in most of the Northwest German parishes about 70 % of the population was more or less dispossessed, living under the communal or parish rule of a small class of owners of hereditary estates. Although partly submitted to the regional nobility or the church, this group of "heirs" was able to create traditional dynasties often dating back to late medieval times and to form a local semifeudal peasant upper class.<sup>5</sup> Strongly determined by confessional marital patterns, this unequal allocation of wealth and money established a vivid local exchange of labour and goods.

A second aspect to be mentioned is the regional network of peasant economies, following a division of labour among neighbouring geographical units. In our case, the case of Gerhard Aschenbeck, an outstanding example is cattle breeding or fattening up cattle on the marshlands along the shores of the river Weser. Compensating the shortcomings of his own — sandy and poor — land and pasture, this peasant creates and uses a kind of medium range mobility to improve the terms of farming in an unfavourable environment.

And last but maybe most important to remember is the enormous system of temporary markets and trading posts, which may in this perspective represent the sphere of the "international", the "global" economy. We will return to this point later on.

Annotation books are a widespread example of this complex system of peasant economy and a mirror of its different layers and scopes. Detailed scholarly research in England, the Netherlands, Germany, and Scandinavia in the last twenty years has shown the growing ubiquity of this system of recording in peasant economies in these countries since the 17<sup>th</sup> century. Farming, the dominant and decisive part of pre-modern economy, gradually became a systematically managed business during the

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<sup>4</sup> Cf. Ernst HINRICHS, Rosemarie KRÄMER, Christoph REINDERS, *Die Wirtschaft des Landes Oldenburg in vorindustrieller Zeit. Eine regionalgeschichtliche Dokumentation für die Zeit von 1700 bis 1850*; Oldenburg 1988).

<sup>5</sup> Detailed research has been done for northwest Germany by Christoph REINDERS-DÜSELDER, *Ländliche Bevölkerung vor der Industrialisierung. Geburt, Heirat und Tod in Steinfeld, Damme und Neuenkirchen 1650 bis 1850. (Materialien & Studien zur Alltagsgeschichte und Volkskultur Niedersachsens 25; Cloppenburg 1995)*; Christoph REINDERS – DÜSELDER, *Das Artland. Demographische, soziale und politisch-herrschaftliche Entwicklungen zwischen 1650 und 1850 in einer Region des Osnabrücker Nordlandes. (Materialien und Studien zur Alltagsgeschichte und Volkskultur Niedersachsens 32; Cloppenburg 2000)*.

18<sup>th</sup> century, and budgeting the economical resources of a farmstead was an inevitable prerequisite for its success.<sup>6</sup>

### (3) Mysterious money

With Gerhard Aschenbeck's annotation book as with any other similar examples of this kind of economic reports we are thrown into the pre-modern northern German reichstaler economy at the eve of Napoleon's first — and short — introduction of the decimal system in currencies, in weights and measures. What follows is more than a half century of currency reform, and an even longer time until decimal systems were accepted as the dominant units of economic calculation. Using the Aschenbeck example, we can briefly try to explain this enormous, albeit silent longtime resistance.

Every reader of German historical documents believes to know the "Reichsthaler", but no one ever asks what kind of coins were given when an account book reports the spendings and receipts of certain amounts of Reichstalers. The funny period, when real Reichstaler coins corresponded to what had been created as a Reichstaler-currency, was pretty short.

The gold standard gave way to the development of the well-known Taler-currency since the late 15th century. Although equaling the value of the gold florin, it was a silver currency, born with the new Bohemian silver mines and assimilating the name of Joachimsthal, one of the main places of the flourishing silver ore-mining. In 1566 a Diet of the Holy Roman Empire successfully established the Taler as the leading German currency, thus giving way to persistent regional currencies for the following centuries.<sup>7</sup>

And this system of regionally differentiated systems is what we meet in our rural documents of the 18th century. To mention only six important regions in the Northwest, we see the embodiment of late medieval and early modern currencies in regionally different units of account. The standard of Munster e.g. — 1 Taler = 28 shillings = 336 pennies — relates to the devaluation times of the 16th century, when the confessional conflicts hampered economic relief. In Osnabrueck and Oldenburg we meet the groten currency, dating back to the medieval French "gros tournois". And the swaren in Oldenburg reveal the strong neighbourhood of the city of Bremen, where five new swaren made a grote from 1374 until the currency reform of 1873/75.<sup>8</sup> Stübers or stuivers, a unit which is common in Jever and East Frisia, reminds us of the influence from the West, from Holland and Flanders, where these coins were produced since the end of the 15th century. Here in these most western German territories we have a rather complicated and meaningful combination of units, one Taler equaling 9 shillings, 54 Stüvers, 108 Cifferts and 540 Wittes, which is the smallest unit.

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<sup>6</sup> Cf. Bernard Hendrik Slicher van BATH, "Accounts and Diaries of Farmers before 1800 as Sources for Agricultural History", *A.A.G. Bijdragen* 8:1962, p. 5–33; Bjarne Stoklund, "On Interpreting Peasant Diaries: Material Life and Consciousness", in: *Ethnologica Europaea* XI:1979/80, p. 191–207; Karen SCHOUSBOE (ed.): *Bondedageboger - kilder til dagliglivets historie*. Copenhagen 1980; Helmut OTTENJANN, Günter WIEGELMANN (eds.), *Alte Tagebücher und Anschreibebücher. Quellen zum Alltag der ländlichen Bevölkerung in Nordwesteuropa*. (Beiträge zur Volkskultur in Nordwestdeutschland 33; Münster 1982); Alexander FENTON, "Farmer's Diaries and their Interpretation", in: Alan Gailey (ed.), *The Use of Tradition. Essays presented to G.B. Thompson* (Cultra 1988), p. 123–130; Marie-Luise HOPF-DROSTE (ed.), *Katalog ländlicher Anschreibebücher aus Nordwestdeutschland*. (Volkskunde 3; Münster 1989); Jan PETERS, Hartmut HARNISCH et al., *Märkische Bauerntagebücher des 18. und 19. Jahrhunderts. Selbstzeugnisse von Milchviehbauern aus Neuholland*. (Veröffentlichungen des Staatsarchivs Potsdam 23; Weimar 1989); Klaus-Joachim LORENZEN-SCHMIDT, Bjørn POULSEN (eds.), *Writing Peasants. Studies on Peasant Literacy in Early Modern Northern Europe* (Copenhagen 2002).

<sup>7</sup> Cf. Bernd SPRENGER, *Das Geld der Deutschen. Geldgeschichte Deutschlands von den Anfängen bis zur Gegenwart* (Paderborn, München, Wien, Zürich 1991); Michael NORTH, *Das Geld und seine Geschichte. Vom Mittelalter bis zur Gegenwart* (München 1994); Gerd DETHLEFS, "Mark – Schillinge – Groten – Taler. Das Rechnen mit Geld in Nordwestdeutschland von den Anfängen bis zur Einführung der Markwährung 1873/75", in: Wolfgang HASE, Gerd DETHLEFS, *Damit mußten sie rechnen... auch auf dem Lande. Zur Alltagsgeschichte des Rechnens mit Münze, Maß und Gewicht* (Cloppenburg 1994); Heinz ZIEGLER, *Studien zum Umgang mit Zahl, Maß und Gewicht in Nordeuropa seit dem Hohen Mittelalter*. (Sachüberlieferung und Geschichte. Siegener Abhandlungen zur Entwicklung der materiellen Kultur 23; St. Katharinen 1997).

<sup>8</sup> DETHLEFS (1994), *cit. op.*, p. 110.

<b>Munster</b>	1 taler	28 shillings			336 pennies
<b>Osnabrück Osnabr./Hannover</b>	1 taler	21 shillings 36 mariengroschen 24 gutegroschen			252 pennies 288 pennies 288 pennies
<b>Oldenburg</b>	1 taler	72 groten			360 schwaren
<b>Jever</b>	1 taler	27 schaafs	54 stübers		540 wittes
<b>East Frisia</b>	1 taler	9 shillings	54 stübers	108 cifferts	540 wittes

But this is only the calculated half of the currency heaven. Being made out of gold or silver or even lesser valued metals (the so-called “Scheidemünze” e.g., made of copper), coins themselves had a real value to be dealt with. Every discovery or import of precious metal, every shift in mining technology could affect the real value of gold and silver coins, and thus the need for administrative regulations grew steadily.

When e.g. the local officer of the archbishop of Munster in Cloppenburg was asked to report about the common coins in his town in 1665, he mentioned no less than 17 pieces of different value of the East Frisian stüber coinage and of groten from Oldenburg and Bremen, everyone of them carefully converted into the Munster shilling standard in his specification.

Thus, the bullion balance became a regular companion of every professional trader or customer since the late 17<sup>th</sup> century. And every active participant in any part of this economic network not only needed to have an elaborate understanding of the duodecimal system, but also a permanently upgraded knowledge of current coins and their value.

#### **(4) The Market — a training-ground for economic behaviour**

Commercial acts in this pre-modern economy required a complex ritual environment to assure the many highly reasonable steps from calculation to real cash. Markets, the annual trading grounds in most of the larger villages and small towns in Northwest Germany, like through a magnifying glass give an idea of the normal extent of public commercial activities, which is only one aspect of the need for informal social regulation in this field. If we map our market information from what was called the “intelligence papers”, regional governmental publications to overview and to inspire social law and local economy, we get a “thick description” of at least one part of rural commercial networks covering — and connecting — the country as a whole. The annual calendar of Osnabrueck in 1790, e.g., mentions more than 800 markets of local and regional significance. Many rural villages at crossroads which hardly still appear on today’s regional maps, have two, three or even four annual markets on a considerable scale. And even the territory of Oldenburg with its 200.000 inhabitants had 129 markets in 1834.

Haggling, price fixing, setting the rules of payment and even withdrawal from the perfect deal were at least four different strategies to ascertain reliable interaction among sometimes unfamiliar partners — from today’s perspective “invisible” rules that kept the market going, not the laws and orders of the absolutist state which prevail in our archives of that time. A certain historical view of a “fair balance” of interests was an integral part of contemporary understanding, regulating the final rules of the transaction for the dealer as well as for the customer.<sup>9</sup>

#### **(5) Literacy and the calculating mind — the “Mint of Bremen”**

From this point of view, what could seem to us being a relentless and really boring collection of examples for a simple algebraic formula is a sophisticated training in rational or “mental” rituals of pre-modern money handling. A huge collection of the so-called “Mint of Bremen” at the Open Air

<sup>9</sup> Cf. Michaela FENSKE, *Marktkultur in der Frühen Neuzeit. Wirtschaft, Macht und Unterhaltung auf einem städtischen Jahr- und Viehmarkt* (Köln, Weimar, Wien 2006).

Museum Cloppenburg illustrates these educational exercises preparing basic mental requirements of everyday economic culture.<sup>10</sup>

The “Mint of Bremen” was written in 1664 as a teaching book in calculation techniques, based on the currency system, the measures and weights of the city of Bremen. Its author was the writing-master and arithmetician Peter Koster who worked as a teacher at an orphanage in Bremen. Until 1801, when it finally was considered to be outdated, the “Mint of Bremen” was reedited and reprinted around ten times and used everywhere between Bremen and the border of the Netherlands. Very few examples of this book survived — not only because of its rather frequent use but mainly because calculation training meant to copy the book or a copy of the book by hand.<sup>11</sup>

We can use an interleaved copy of the sixth edition of Koster’s “Mint” to exemplify the usual way of teaching or self-education in calculating techniques during the eighteenth century on peasant farms like the Aschenbeck’s one.<sup>12</sup> To start with, “calculating on lines”, the usual kind of dealing with non-positional roman figures, had been slowly disappearing as a leading educational technique since the famous Adam Riese’s intervention “Account on lines and quills” in 1532. But even in 1722, the editor of Koster’s book, another writing-master and arithmetician at the St. Stephen’s orphanage, Lüder Wehrmann, made a short reference to the basic techniques of “calculating on lines”, easily reproduced with chalk on tables or — more sophisticated — executed with an abacus, which is still in use in very many regions of the world up to the present day because of its enormous speed in calculating procedures. And it was of immediate use for educational purposes because of its obvious identity between practically — vertically — calculating with stones on the table or at the abacus and — horizontally — writing down the sums in roman figures.

But as Adam Riese argued in 1532 and many of his intellectual successors did, the enormous advantage of working “on quills” was its ability to calculate instead of combining subsequent procedures of summing up items. This summing up a vertical line of positional figures seemed to be the enormous progress in establishing business accounts following the late medieval Italian standard. The first exercises Aschenbeck writes down on the interleaved pages deal with this kind of addition of equal units of measurement. Looking at the addition of different portions of sold rye, we see Aschenbeck applying the contemporary rules of his book.

But even if the vertical summing operations seem to be quite familiar and follow the decimal operations explained to the pupils on the first pages of the book, they tell a lot about economic education of that time. Real life accounting procedures had to deal with all those different units that covered not only the currency sector but also every system of measures and weights. A typical example is that of selling rye in Aschenbeck’s “Mint of Bremen”. Calculating vertically “on lines”, Aschenbeck has to keep in mind different units for every row in his calculation: four “viertel” being one “scheffel” and fourty “scheffels” one “last”. So he carries forward 2 “scheffels” from the “viertel” row and keeps 36 “scheffels” remaining from 76 in that row. A second operation written below completes the exercise in subtracting this sum from the original amount of rye.

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<sup>10</sup> Cf. Gerhard BECKER, *Das Rechnen mit Münze, Maß und Gewicht seit Adam Ries. Schuleinschreibebücher aus Niedersachsen*. Vol. 1: *Text. (Materialien und Studien zur Volkskultur nordwestliches Niedersachsen 21; Cloppenburg 1994)*; Gerhard BECKER, *Das Rechnen mit Münze, Maß und Gewicht seit Adam Ries. Schuleinschreibebücher aus Niedersachsen*. Vol. 2: *Materialien. (Materialien und Studien zur Volkskultur nordwestliches Niedersachsen 22; Cloppenburg 2007)*.

<sup>11</sup> Cf. Wolfgang HASE, “Damit mußten sie rechnen... auch auf dem Lande. Ein Beitrag zur regionalen Kulturgeschichte des Rechnens”, in: Wolfgang Hase, Gerd Dethlefs, *Damit mußten sie rechnen... auch auf dem Lande. Zur Alltagsgeschichte des Rechnens mit Münze, Maß und Gewicht* (Cloppenburg 1994), p. 10–96.

<sup>12</sup> [Lüder WEHRMANN] (ed.), “Die (so genandte) Bremer-Müntze. Das ist: Eine kurtze; doch grün[sic!]liche Anweisung zu der vortrefflichen Rechen-Kunst auff Linien und Zieffern: so wol nach der Practic als gemeinen Art / zu gebrauchen. In welcher alle Kauffmanns-Handelung und Wechsel dieser und anderer benachbahrten Städte und Länder / Müntz- und Gewichts-[??] / sampt andern nützlichen Sachen / gründlich vorgestellt mit dazu dienenden Fürgaben erkläret / daß ein Anfahender nebenst mündlicher Unterrichtung / daraus bald fertig rechnen lernen kan. Fünffmahl vor diesem ausgefertigt von Weyl. Peter Koster / Schreib- und Rechen-Meister zu St. Ansgarii, Nunmehr aber zum sechsten mahl mit Fleiß übersehen und mit einigen Exempeln / zum Nutz der lieben Jugend / vermehret Durch einen Liebhaber derselben Kunst” (Bremen 1722; Museumsdorf Cloppenburg Inv. Nr. 21587).

But this was only the mathematical part of the game. Following the instructions of the “Mint of Bremen” we have to recognize that the spatial behaviour of calculating remained horizontally oriented. Another example that Aschenbeck copied in his “Mint” introduces the rule of three, maybe the most important part of the whole book. The *regula de tri* being at the core of every practical numerical transaction, the basic rule of formulating this intellectual transaction required its representation on a “line”: “To set up this rule we follow this order to place (1) the purchase first, in the center the value or the price of the goods and at the end the purpose of the question or what we want to know.”<sup>13</sup> Thus the endless examples for the *regula de tri* given on the pages of the “Mint of Bremen” reveal a very complex practical pattern to execute this rule even at the most basic operations.

But living in a duodecimal universe, nearly every sum can be divided by 6, by 4, by 3, and by 2. Switching to the decimal system, all this comfort is reduced to merely two factors: the 5, and the 2. What we perceive as an enormously complex system of e.g. numbers like 288 pennies making one reichstaler or the parallel calculation in 48 marygrotes and 36 goodgrotes, is a very simple (and useful!) one for contemporaries. And a world full of decimal fractions we are used to live in would have been extremely complicated for our ancestors to understand.

Fortunately, signing even private exercises was common during the 18th century. Following the dated signatures, we can conclude that Gerhard Aschenbeck, the son of the owner of the Aschenbeck farm and the writer of our annotation book, studied the 1722 edition of the “Mint of Bremen” in two subsequent years, in 1753 and 1754, when he was at an age of fifteen or sixteen years respectively. Having accomplished the first — printed — volume in executing exercises on many pages, he then starts to write down a complete copy of the second volume. What we assume to be a stupid repetition of extant knowledge rather is a proof of perfection of a peasant’s management technique and a leading position in his community in the 18th century.

In this respect, literacy itself is not an independent, purely educational phenomenon, as it is widely perceived by historians of schooling and teaching, but a general cultural pattern, ready to determine the access and use of social significance. Recent research in north-west German territories to examine the quality and state of literacy at the end of the 18<sup>th</sup> century showed an average of 85% reading ability. This underlines the enormous efficiency of the dense network of new village schools built during the whole century, especially against the background of a practically non-existent compulsory school attendance. Peasant villages not only paid regularly for elementary schooling; they even built these schools on their own cost, proving a vigorous interest in literacy as a prerequisite for economic success. Even calligraphy in this period is much more than a playful kind of scriptural self-expression. The ritualised artistic repetition of one’s own signature exhibits the adherence to the rational — and divine — system of knowledge as a constituent of social status and performance.

As the example of Peter Koster in Bremen has already shown, the writing-master is a crucial element in this respect. Albrecht Dürer, the famous artist, is an outstanding example of these artist engineers. In his sketches and writings, he shows us a variety of examples for the “golden” geometric relations determining the human body as well as typography or calculating procedures.<sup>14</sup> Writing-masters as artistic or at least technical successors of Dürer covered the absolutist monarchies as a professional hierarchy during the growth of the territorial administration since the early 17<sup>th</sup> century, giving written documents a new cultural significance as a key element of social identity.<sup>15</sup>

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<sup>13</sup> “In formirung der Regul aber wird diese Ordnung gehalten daß man (1) vorne setze den Einkauf / (2) ins Mittel die Geldung / oder den Preiß solches Einkaufs / und (3) hinten die Frage / wornach die Aufgabe gerichtet / oder das man zu wissen begehret.” [WEHRMANN] (1722), *cit. op.*, p. 18.

<sup>14</sup> Albrecht DÜRER, “Underweysung der messung mit dem zirckel un richtscheyt in Linien ebenen und gantzen corporen, durch Albrecht Dürer zusammen gezogen und zu nutz allen kunstliebhabenden mit zugehörigen figuren.” (Nürnberg 1525). Cf. Wolfgang SCHMID, *Dürer als Unternehmer: Kunst, Humanismus und Ökonomie in Nürnberg um 1500. (Beiträge zur Landes- und Kulturgeschichte 1; Trier 2003)*; Anja GREBE, *Albrecht Dürer. Künstler, Werk und Zeit* (Darmstadt 2006).

<sup>15</sup> Cf. Werner DOEDE, *Bibliographie deutscher Schreibmeisterbücher von Neudörffer bis 1800* (Hamburg 1958); Karl-Heinz ZIESSOW, “Schreibmeister – Vom Renaissancekünstler zum Schreibtechniker”, in: Kultur- und Stadthistorisches Museum Duisburg (ed.), *Die Macht der Schrift. 5000 Jahre Medien und ihre Wirkung. (Begleitband zur gleichnamigen Ausstellung im Kultur- und Stadthistorischen Museum Duisburg; Duisburg 2001)*, p. 70–73.

Learning to calculate in this new universe means performing the ritual of relating things and their quantities. What this article tries to demonstrate is, that under the duodecimal system real-life calculating and its formal documentation were successfully integrated. The early decimal system of the nineteenth century couldn't offer any comparable degree of unity between the intellectual system, the cultural outfit, and ritual capacities. This is why we shouldn't be astonished about the fact, that duodecimal systems more or less openly survived in everyday life in all those countries where its modern successor was introduced around the mid of the nineteenth century. The decimal system required not only one but multiple ways of standardisation: the introduction of new currencies, weights, and measures as well as a complex mental transformation of the calculating mind.