

# Once Upon Accounting(\*)

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## **Abstract**

Commercial Court of Paris, Sixth Chamber

Hearing of February 21, 1870

Vrain-lucas affair- fraud and breach of trust committed against M. Michel Chasles, member of the institute- sale of 27,000 false autographs

“...the accused sold to M. Chasles in part, what he presented as being autographs of various illustrious persons, and in part, copies of very old writings coming from these persons, an important series of hand-written pieces, all of which had been fabricated by himself, and which were paid to him by M. Chasles for more than 140,000 francs.”

Member of the Academy of Sciences, professor at Polytechnic, Officer of the Legion of Honour.... M. CHASLES (1793-1880), recognized as one of the most enlightened of minds was swindled by forger M. Vrain-Lucas who managed to sell to him as “authentic” Cleopatra’s letters to Caesar, Jules César’s letters to the Gallic chief, and more...all of it written in Old French, on paper (unknown at the time), where the watermark of a fleur de lys could be seen.

Yet perhaps even more serious, in his main field of expertise, he considered as authentic a letter from Blaise Pascal using mathematical formulas yet unknown at his time.

M. Chasles, amorous of history, got carried away by his passion to the point of losing all critical reasoning.

Do we not find a common thread in the thesis of Professor Mattesich as to the existence of a form of double-entry accounting in Mesopotamia during the 4th Millennium BC?

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**Key words:** Clay accounting, Accounting artifacts.

**Jel Classification:** M41, M49, M21

## 1. Introduction

*« If it is confirmations that we seek, it is not difficult to find for the vast majority of theories, confirmations or verifications. »*

*K. Popper.*

### 1.1 The Cart Before the Horse

Egypt, 2500 BC: The pyramid of Kheops seems endowed with architecturally extraordinary virtues.

The division of its height by the length of one side of its base, multiplied by 2, yields a number very close to the number Pi.

Why not divide the base of the monument by the width of one of its surface stones to obtain the number of days in a year (being 365)?

Even more impressive, let us multiply the height of the pyramid by  $10^9$  and the distance between Earth and the sun appears.

The magic works nowadays as well, on lottery counters, the mysterious proportions of which are largely unknown. Indeed, the relation between the height and width of the rear window of the counter yields 3.14, nearly Pi. The length of the plateau is a hundred-millionth of the distance between Earth and the sun. If we add the heights of the front and rear apexes we obtain 732, the date of the victory at Poitiers.

In other words, the conclusion may have a tendency to precede the demonstration.

### 1.2 Clay Accounting

During excavations between 1960 and 1970, small clay objects of geometric shape hold the attention of archaeologist Denise Schmandt-Besserat.

The place: Mesopotamia.

The dating: 8 000 BC.

The conclusion: These artifacts attest to one of the oldest known methods of counting and bookkeeping.

As for Professor Mattesich, he sees in them the testimony of a form of double-entry accounting, characterized by debits, credits, owner's equity, monetary assets, physical assets, debts and claims.

In other words, even a brilliant academic may ring reality's neck in order to accommodate a preconceived notion.

“A way of counting is nothing other than a way of thinking.” J.G. Courcelle-Séneuil (1813-1892)

## **2. Mesos Potamos**

Ambiant temperature of 50° C, a penury of wood, of stones, and of minerals. The devastating floods cyclically transform the countryside into swampland.

That was 10,000 years ago, in Mesopotamia.

The strong point was that the Tigris and Euphrates nourished a fertile land.

The exploitation of wild cereals, the seeds of which could be conserved, led man to adopt a sedentary lifestyle. Towards 8000 BC, he changes from hunter to farmer.

Managing agricultural surplus demands new intellectual tools: counting and bookkeeping.

Clay is abundant and of good quality. It would thus be used as the medium for the administrative tasks of the Sumerians.

## **3. Accounting Artifacts**

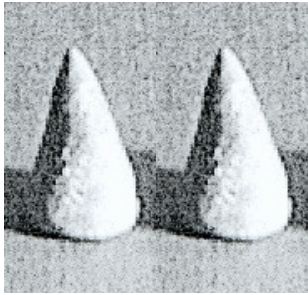
3.1 – 8 000 to 3500 BC

At first accounting is muddled. Witnesses of commercial transactions are clay tokens, the calculi.

Each token represents a unit of merchandise.

The first forms are simple. We find cones, disks, cylinders...

Thus two small measures of grain would be represented by two cones, three small measures of grain by three cones, etc....



2 clay cones = 2 small measures of grain

*Plain tokens, Mesopotamia, present-day Iraq, ca. 4000 B.C. The cone, represented various grain measures; Courtesy Denise Schmandt-Besserat, The University of Texas at Austin.*

If the unit of measure of the grain was to be more significant, it would be symbolised by a sphere according to the same counting principle.

These tokens are not linked to a particular economic operation. They are free agents.

This reminds us of the usage of rough accounting drafts on which operations were recorded haphazardly “in the fury of business” as Luca Pacioli said.

3.2 – 3 500 to 3 100 BC

5 000 passed in this way.

This administrative use left the door open to embezzlement.

Delivering his production of grains, the supplier was not at all protected against the misappropriation of his merchandise by the carrier, nor was he protected against the cheating of his client on the actual quantities received.

With transactions steadily growing, it was becoming necessary to find a parry.

Toward the 4th Millenium BC, tokens were placed in hollow clay capsules.



*Envelope bearing impressed markings corresponding to the tokens held inside. Susa (Sb 1940). Iran. Courtesy Musée du Louvre. Département des Antiquités Orientales.*

From that point forward, every economic transaction had its ‘envelope.’ Accounting was becoming organized, not unlike newspapers and their articles would be much later on.

Sealed and then dried, the capsule formed a sort of strong-box, making it impossible to steal a token without breaking it open.

Nevertheless, this system remained imperfect, for one needed only to replace one sphere with another containing fewer tokens.

For this reason seals were placed on the surface of the capsule. The seller could therefore personalize the transaction with his own mark. Substituting the capsule became impossible.

Yet breaking open the capsule was always indispensable in carrying out the transaction.

The tokens developed into more complex shapes.

The calculi were thus imprinted onto the capsule, their silhouettes pressed into the wet clay before being enclosed within it.

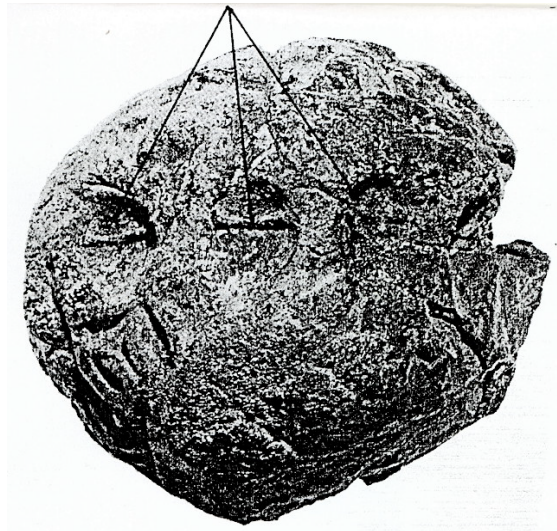
For example, three jars of oil would be symbolised by three ovoid tokens...



*Complex tokens representing three jars of oil from Susa, Iran Ca. 3300 BC  
Courtesy Musée du Louvre, Département des antiquités orientales. Paris*

...and by impression on the surface of the capsule we obtain

#### IMPRESSION OF OVOID TOKENS



*Envelope showing the imprint of three ovoid tokens with an incised line  
representing jars of oil, from Habuba Kabira, Syria, ca. 3300 B.C. Courtesy Museum  
für vor- und Frühgeschichte, Schloss Charlottenburg, Berlin.*

This method made it unnecessary to break open the envelope in order to know its contents.

The inserted tokens, however, which were doubles of their imprinted representations, became redundant.

3.3 – 3 100 BC

Over the course of time, the calculi disappeared as well, and only their surface silhouettes remained.

The capsules were flattened into tablets, small in size, adapted to the morphology of the hand, and oval, square, or rectangular in shape.

These tablets were, in all likelihood, the medium to welcome the emergence of writing.

#### **4. Controversies**

*«...the criterion of the scientificity of a theory resides in the possibility of invalidating it, of refuting it, or of testing it »*

*K. Popper*

Let us confront the arguments of Professor Mattessich with the analyses of Schmandt-Besserat.

##### **4.1.0 Arguments of Professor Mattessich**

“Thus every type of token is basically a specific type of account -what we discriminate by words or names, the ancient Sumerians discriminated by token shapes”

Thus for the author, one clay token would be one account. From this standpoint, one calculus would translate into one stock of oil for example.

##### **4.1.1 Analyses of Denise Schmandt-Besserat**

“The foremost function of tokens was to count goods.”

The archaeologist assigns a simple task of counting merchandise to the tokens. Counting by tokens is the step which precedes the discovery of abstract numbers. A few centuries would pass before the appearance of abstract numbers, at last, detached from the product to be quantified: (1, 2, 3...) from that which we want.

### **4.1.2 Refutation**

The token is a form of figurative numbering.

The notions of merchandise and number are confused.

An ovoid calculus is the sign of one jar of oil; two calculi represent two jars of oil, etc....

Yet if we should count another type of merchandise, for example, a certain quantity of grain, another type of tokens would be used; the calculation would be carried out with spheres and with as many spheres as measures of grain to be numbered.

In 1970 in the north of Ghana, the anthropologist Jack Goody Ghana asked a member of the LoDagaa to count in front of him. The answer was, "Count what?"

For, to this people, counting depends on the nature of the objects to be counted. The count of livestock differs from the count of seashells.

Out of context, figures were void of meaning.

Finally, as for the account, a veritable toolbox, can be defined as, "an enumerative table, grouping under one column the whole of the results of a series of enumerations, arranged so as to be added up, and enabling a differentiation between them by explanatory notes." L. Quesnot

To calculate is not to account for; the most beautiful token in the world cannot give anything but what it is.

### **4.2.0 Arguments of Professor Mattessich**

"There is sufficient evidence indicating that the plain tokens referred to such assets as grain and cattle while the complex tokens referred to services and manufactured goods. This separation resembles the distinction between cash items (including receivables, payables, etc.) and non cash items (inventories, equipment, land, etc...) in double entry accounting of the Italian Renaissance."

The author seems to discern an inherited distinction between monetary assets and physical assets by opposing the simple tokens and the complex tokens.



#### **4.2.1 Analyses of Denise Schmandt-Besserat**

“Plain tokens occurred concurrently with farming and served to count such agricultural products as animals and quantities of cereal. Complex tokens coincided with industry, keeping track of products...textiles and garments; luxury goods...”

Simple tokens issued from an agricultural period. Commerce was concerned with livestock and grains. Theoretically, tokens were the symbols (cylinder, cone, sphere).

In the 4th millennium BC, with the development of urbanisation economic activities broadened to include manufactured products and provisions of service. The tokens evolved. Considered complex, they were the accounting representatives of economic development.

#### **4.2.2 Refutation**

Contrary to what the Professor Mattessich seems to suggest, the distinction between the simple and complex tokens, far from being a theorised accounting classification, was only the material expression of the transfer from a primary activity to a secondary and tertiary activity.

#### **4.3.0 Arguments of Professor Mattessich**

“...It was deduced that the ancient Sumerians practised a kind of double entry record keeping some five thousand years ago.”

“Impressing token shapes on the outside of envelope: equivalent to a Credit in an equity account, recording the existence of a debt or ownership relation on the asset (indicated by the token inserted - see next line).

Inserting tokens in envelope: equivalent to a Debit in an asset account (corresponding to token shape), connecting the physical reality of an asset with the social reality of a debt or ownership claim - just as in modern double entry bookkeeping.

For the professor, the impression of tokens on the clay surface of the capsules constitutes a sort of representation of the merchant's down payment in the transaction, the shareholder's equity in fact. Theoretically, the inserted tokens would reveal the physical decomposition of that capital (grain, oil...)

Should Professor Mattessich's argument be retained, the capsule would be in accounting language, the double entry translated by:

Debit. X Inserted clay tokens representing merchandise

Credit. X Impressions of the inserted tokens on the capsule

Or if we consider the capsule to be a balance sheet by:

ASSETS	LIABILITIES
X Inserted clay tokens representing merchandise (current assets)	X Impressions on the capsule of inserted tokens (shareholder's equity)

#### 4.3.1 Analyses of Denise Schmandt-Besserat

As Denise Schmandt-Besserat underlines, "In this technique, the markings were shown in one-to-one correspondence, that is, each token enclosed was indicated by one marking on the surface of the case."

The relation established between the enclosed tokens and their impressions on the surface of the capsule is a simple pairing (mathematicians would speak of bijection). To each inserted token its surface representation.

#### 4.3.2 Refutation

Double-entry accounting is vectorial by nature and is not limited to a simple redundancy.

Let us take the example of an associate's contribution of 10, deposited into the company's bank account.

According to the double-entry accounting technique, this transaction would produce the following entry:

	Debit	Credit
Bank	10	
Associate		10

The starting point of the contribution entry is the debt of 10 towards the Associate, represented by the credit in the Associate's account. The ending point is formalised by the debit of the Bank account for a value of 10.

In this way we establish the characteristics of a vector: magnitude, direction, and orientation.

The magnitude is expressed by the impact of the monetary engagement, here for a value of 10.

The direction is represented by the inherited right of the balance sheet, marked out by the accounts ‘Associate’ and ‘Bank.’

The orientation is given by its point of origin, the Associate account in Credit, and by its end, the Bank account in Debit.

The entry can be illustrated as follows.



The double entry is not repetition, but rather action; the acquired information is put into movement.

Bijection or vector, one must choose.

## 5. Rhetoric

In spite of all this, Professor Mattessich’s discourse remains credible. The reader willingly adheres to it. Why?

The reason is, accounting is a language and thus a vehicle of ideas, of arguments, and of logical effects.

To prove our point, let us interpret one of Baudelaire’s poems: The Enemy, in which the author expresses his fear of the passing time. The poem is composed of two quatrains and two triplets.

## THE ENEMY

My youth was a dark storm,  
Crossed here and there by brilliant suns;  
Thunder and rain have caused such quick ravage [1]  
That there remain in my garden very few red fruits.

Now I have touched the autumn of my mind,  
And I must use the spade and rakes  
To assemble again the drenched lands, [2]  
Where the water digs holes as large as graves.

And who knows whether the new flowers I dream of  
Will find in this soil washed like a shore [3]  
The mystic food which would create their strength?

- O grief! O grief! Time eats away life,  
And the dark enemy who gnaws the heart [4]  
Grows and thrives on the blood we lose!

Quatrain [1] is a return to the author's past. A depreciated past "...dark storm, thunder, rain, ravage...." the double entry could declaim:

Allowance of provisions for depreciation of Baudelaire's youth

Provisions for depreciation of Baudelaire's youth

The author's resignation is revealed in quatrain [2]: "Now I have touched the autumn of my mind...." Baudelaire pays this 'spleen' of time daily:

Costs of time

Daily cash payment

Triplet [3] depicts hope as the breath newly-born of a dream, "...the new flowers I dream of..."

Uncertain debts should not be accounted for. Recording the hypothesis of a new inspiration must therefore be ruled out. Yet what may be retained is an entry in the form of conditional engagement that accountants qualify as ‘off-balance sheet’:

Potential debt of hypothetical new inspiration

Compensation due at immateriality of dream

Yet should this dream become reality, the entry of the engagement would be reversed for waiver and replaced by a certain debt, the new ideas resulting from the dream come true:

Certain debt of occurred inspiration

Product of dream come true

Finally, triplet [4] expresses the risk involved in Time, considered The Enemy. It is tempting to translate it into accounting terms by an allowance of provisions for risks:

Allowance of provisions of time

Provisions for risks of time

We could have manipulated any other poem, expression, or proverb, etc. without difficulty because proper to each language, accounting language included, is its power of communication.

## **6. Analogy**

If clay was the Sumerians’ “paper” medium,

if ensuring the security of commercial transactions necessitated the use of accounting capsules, and if accounting gave birth to writing, we are tempted to be drawn to the story narrated by bishop Wilkins in 1641:

“How much this Art and Writing must have seemed strange during its invention, which we can understand at the surprise of these recently discovered Americans, surprised to see that Men converse with Books, having difficulty believing that Paper could speak...

“There is a lovely tale on this subject about an Indian slave who, having been given the mission by his Master to deliver a letter and a basket of figs, ate a large part of his Load along the way and gave the Rest to the person it was addressed to. The latter, having read the letter and not finding

the indicated quantity of figs, accused the Slave of eating them, bringing the letter to bear against him. But the Indian (despite this Proof) denied the Act naively, insulting the Paper, calling it a false and dishonest Witness.

“Thereafter, having once again been summoned with the same load accompanied by a letter indicating the exact number of figs to be delivered, he resumed his precedent behavior, devouring a large part of the fruit en route. But before having touched them (in order to prevent any accusation) he took the Letter and hid it under a large stone, thus reassuring himself, thinking that if it didn’t seem him eating the Fruit, it could never recount the act. Yet finding himself accused all the more strongly this time, he confessed his fault, admiring the Divinity of the Paper, and promised for the Future the greatest Faithfulness in all missions.”

All lies therein!

Let us replace the paper with clay, the writing with the marking of tokens on capsules, and let us concede the commercial security entailed in this system.

This story from the 17<sup>th</sup> century opportunely illustrates the hypothesis of accounting capsules and the nature of pre-scriptural accounting markings.

Should we consider for as much the number of figs indicated on paper as the expression of the Master’s equity (assumed to be credit) in contrast to the physical asset of the figs (suggesting a debit)?

A map is not the territory.” (A. Korzybski)

## 7. Conclusion

*A language of experts tends to reduce the disorder of natural languages to honest bijections: one word per concept, one concept per word.  
(J. Lavau- “Vectors,” 151 Years of Disloyal Service)*

“...Philologists, philosophers, economists, and special authors have not managed to define accounting in a rational manner ; moreover, they have not even managed to agree on whether accounting is a science or an art.” (Léautey and Guilbaut 1889).

What if double-entry accounting was missing a scientific definition?  
Professor Mattessich could have referred to it.

We can distinguish three tendencies:

Systemic authors consider that there is no double-entry except in an organic structure: *“For an accounting method to be ‘double-entry,’ each chronological entry must first be entered in debit and credit in two different accounts. The amount of the debited account must be equal to the amount of the credited account. The sums must be defined in a single reference currency. The chronological transactions must then be subject to analysis in a ledger which contains complete and coherent record of accounts; accounts of capital, values, stocks, third parties, and outturn. These accounts, even if not the same in nature, function according to the same rules, obey a predefined hierarchy and allow the recording of whatever type of transaction. The balance allows verifications and periodic controls of arithmetic equalities.”* (J.G. Degos)

Fragmentary authors show the division of accounts into two parts, the debit to the left and the credit to the right; the existence of two registers, one journal for the chronological entries and one recapitulative ledger; the existence of accounts of people and accounts of values; the balance sheet outturn account dichotomy.

Finally, minimalist authors as in the French General Accounting Plan note that: “Writings have passed to what is called the ‘double-entry’ system. In this system all movement or variation in the accounting record is represented by a notation establishing an equivalence between what is calculated as debit and what is calculated as credit in the different accounts affected by this writing.”

Should we not consider the double entry as a branch of mathematics, and acknowledge its quality as a vector?

In such a way, any record composed of the three vectorial criteria (magnitude, direction, and orientation) could be demonstrated by double entry.

“The best way to ‘know’ a thing is in the context of another discipline.”

L. Bernstein

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